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CONCEPT | CURRENT AFFAIR | TEST | SNIPPETS

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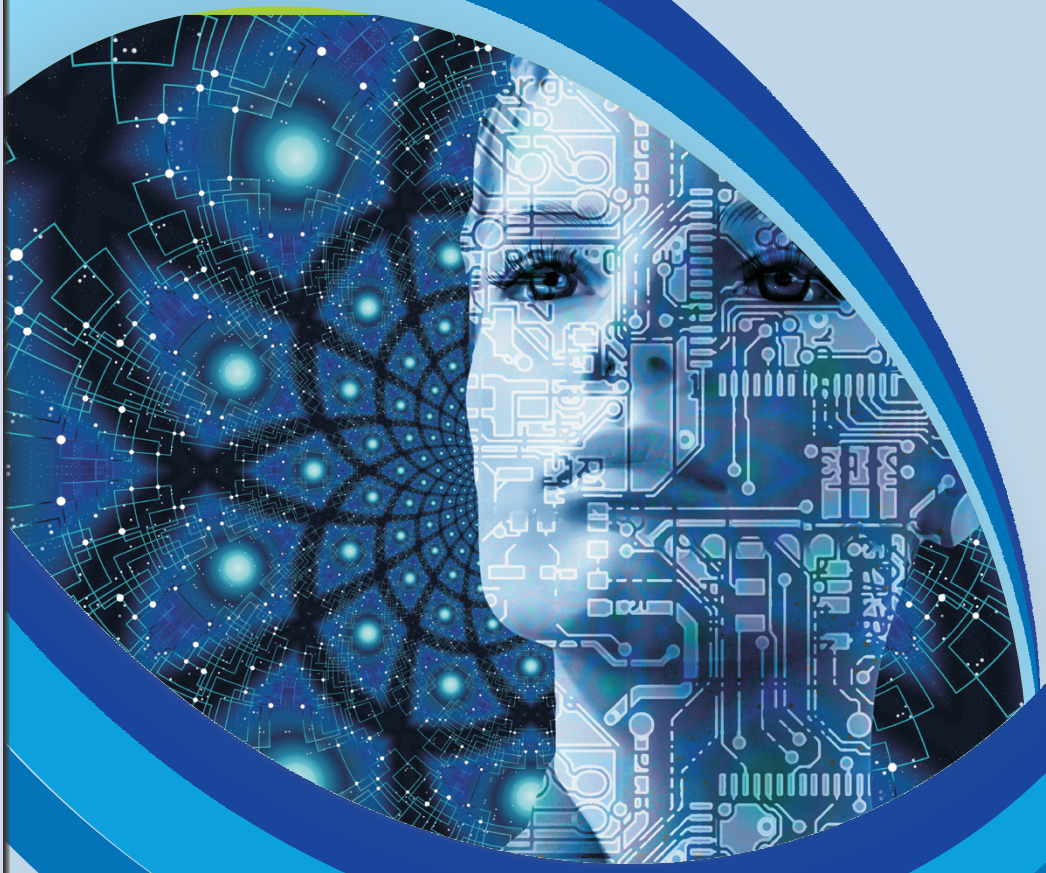

SCIENCE & TECHNOLOGY

QUIZ (STATIC & CURRENT)

DAY 60-68

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CONTENT

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TEST
DAY - 61

Time Allowed: 30 mins **Maximum Marks: 50**

1. Which of the following are the human coronaviruses?

1. COVID-19
2. MERS-CoV
3. H1N1

Select the correct option using the codes given below:

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

2. Consider the follow statements:

1. Human coronaviruses can cause both upper and lower respiratory tract illnesses.
2. There are no specific treatments for illnesses caused by human coronaviruses.

Which of the above statements is/are correct?

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

3. Which of the following diseases is/are *not* caused by Bacteria?

1. Cholera
2. Tetanus
3. Gonorrhea

Select the correct option using the codes given below:

(a) 1 only
(b) 2 only
(c) 3 only
(d) None of the above

4. Which of the following statements regarding the Gene Therapy is/are correct?

1. Gene Therapy can be in the germline cells of the human body.
2. Viruses can be used as the vectors during gene therapy.

Select the correct option using the codes given below:

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

5. Consider the follow statements:

1. A biosimilar is regarded as a generic of a biological medicine.
2. Biologics are the semi synthesized products from living sources only.

Which of the above statements is/are ***incorrect***?

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

6. Consider the follow statements:

1. Oxytocin is secreted from the anterior pituitary gland whereas Prolactin, by the posterior pituitary gland.
2. Prolactin stimulates milk biosynthesis whereas, oxytocin stimulates causes the milk to be ejected.

Which of the above statements is/are correct?

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

7. Consider the following situation:

"A woman in the family carries a faulty gene for hemophilia while her husband does not. They have a son and a daughter."

In this context, which of the following statements is most probably correct?

(a) Both son and daughter suffer from hemophilia.
(b) Son suffers from hemophilia while the daughter does not.
(c) Both son and daughter do not suffer from hemophilia.
(d) The daughter suffers from hemophilia while the son does not.

8. Which of the following is/are *not* the methods of the physical methods the gene transfer?

1. Lipofection
2. Microprojectile transfection
3. Electroporation
4. Calcium phosphate Transfection

Select the correct option using the codes given below:

(a) 1 and 2 only
(b) 2 and 3 only
(c) 1 and 4 only
(d) 4 only

9. Which of the following are the applications of the Polymerase chain reaction?

1. DNA fingerprinting
2. Phylogenic analysis
3. DNA isolation

Select the correct option using the codes given below:

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

10. Food fortification refers to the deliberate addition of one or more micronutrients to reduce the burden of micronutrient malnutrition in India. In this context, consider the following statements:

1. Milk, salt and edible oil are the only items that are fortified in India at present.
2. Fortification of staple food is not mandatory as per the Fortification of Food Regulations 2018.
3. Double fortified salt delivers a crucial amount of iodine and vitamin B12.

Which of the above statements is/are correct?

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

11. Which of the following toxins is/ are used by the *Bacillus thuringiensis* bacteria to kill the insects?

1. Cyt gene
2. Exfoliatin
3. Cry gene

Select the correct option using the codes given below:

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

12. Which of the following statements is/ are correct?

1. Plasmids are the extra-chromosomal DNA present only in the Bacteria.
2. They act as vectors to transfer genes.

Select the correct option using the codes given below:

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

13. Recently the Delhi High Court put a stay on Delhi government's Measles-Rubella vaccine campaign. In this context, consider the following statements regarding measles and rubella:

1. Measles and Rubella are both viral diseases spreading through respiratory droplets of sick people.
2. Rubella also is known as German Measles is more contagious and severe than Measles.

Which of the above statements is/are correct?

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

14. Consider the following situation:

"A woman in the family carries a faulty gene for hemophilia while her husband does not. They have a son and a daughter."

In this context, which of the following statements is most probably correct?

(a) Both son and daughter suffer from hemophilia.
(b) Son suffers from hemophilia while the daughter does not.
(c) Both son and daughter do not suffer from hemophilia.
(d) The daughter suffers from hemophilia while the son does not.

15. Consider the following statements regarding Industrial genetics:

1. In this, the desired proteins are overexpressed in the organism by cells transformation and produced in mass scale.
2. This technique can be used in medicines production and bioremediation.

Which of the above statements is/are correct?

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

16. Consider the following statements:

1. Antimicrobial resistance is the ability of a microbe to resist the effects of medication previously used to treat them.
2. India launched the Red Line campaign for Anti-Microbial Resistance awareness.
3. Interagency Coordination Group on Antimicrobial Resistance (IACG) was convened by the World Health Organization (WHO).

Which of the above statements is/are correct?

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

17. Consider the following statements regarding the National Biotechnology Development Strategy 2015-2020:

1. It aims to create a Technology Development and Translation network across the country with global partnerships and focusing on biotechnology tools for inclusive development.
2. It will be implemented by the Biotechnology Industry Research Assistance Council (BIRAC).

Which of the above statements is/are correct?

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

18. With reference to the common genetic blood disorders, consider the following statements:

1. Sickle cell anemia occurs only when both the parents are carriers of the defective sickle cell gene.
2. Thalassemia is a condition in which the body is not able to produce enough Red Blood Cells (RBCs), which causes severe anemia.

Which of the above statements is/are correct?

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

19. Consider the following statements related to Embryo Transfer Technology (ETT):

1. It is a technique of assisted reproduction in which foetus is collected from a donor female with higher genetic merit and transferred to the surrogate.
2. RashtriyaGokul Mission and National Mission on Bovine Productivity utilize this technology.

Which of the above statements is/are correct?

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

20. Recently, a team of Greek and Spanish doctors has produced a baby from three people. In the context of triple parent baby, consider the following statements:

1. It is done to replace the father's faulty Mitochondrial DNA with healthy Mitochondria from a donor
2. Spain became the first country in 2015, to have officially approved procedures to create "three-parent" babies.

Which of the above statements is/are correct?

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

21. Which of the following statement(s) is/are correct about Exercise Indradhanush?

1. It is a joint air force exercise conducted by the Royal Air Force (RAF) of United Kingdom and the Indian Air Force (IAF) being held since 2006.
2. The theme of this edition of the exercise is 'Base Defence and Force Protection'.

Choose the correct option:

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) None

22. Which of the following statement(s) is/are correct about Regulation of Artificial Intelligence?

1. SundarPichai advocated for the regulation of Artificial Intelligencekeeping in mind both the harm and societal benefits that the technology could bring in.
2. NITI Aayog noted the stringent regulation around AI as a major weakness for India.

Choose the correct option:

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) None

23. Consider the following statements about the nature of advice by the ministers:

1. The advice tendered by council of ministers to the President is binding on him/her.
2. Such advice cannot be inquired in the court of law.

Which of the statement(s) given above is/ are **incorrect**?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) None

24. Which of the following statement(s) is/are correct about theDuckworth-Lewis-Stern (DLS)?

1. The International Cricket Council (ICC) announced the new version of the Duckworth-Lewis-Stern (DLS) System that comes into effect from September 30, 2018.
2. Duckworth-Lewis-Stern (DLS) is a intelligence measurement standard.

Choose the correct option:

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) None

25. What is 'hand of trust' that economy survey 2020 talks about?

(a) Invisible hand of market

(b) Powerful hand of the state

(c) Weak hands of poor people

(d) Moral support of state and transparency in market

❖❖❖❖❖❖

ANSWER HINTS

DAY - 61

1. Correct Option: (b)

Explanation:

Human Coronaviruses

- Coronaviruses are named for the crown-like spikes on their surface. There are four main sub-groupings of coronaviruses, known as alpha, beta, gamma, and delta.
- Human coronaviruses were first identified in the mid-1960s. The seven coronaviruses that can infect people are:
  - 229E (alpha coro**navirus)**
  - **NL63 (alpha coronavirus)**
  - **OC43 (beta coronavirus)**
  - **HKU1 (beta coronavirus)**
  - **MERS-CoV (the beta coronavirus that causes Middle East Respiratory Syndrome, or MERS)**
  - **SARS-CoV (the beta coronavirus that causes severe acute respiratory syndrome, or SARS)**
  - **SARS-CoV-2(the novel coronavirus that causes coronavirus disease 2019, or COVID-19)**

2. Correct Option: (c)

Explanation:

Human coronaviruses

- Common human coronaviruses, including types 229E, NL63, OC43, and HKU1, usually cause mild to moderate **upper-respiratory tract illnesses**, like the common cold.
- **Human coronaviruses can sometimes cause lower-respiratory tract illnesses, such as pneumonia or bronchitis.** This is more common in people with cardiopulmonary disease, people with weakened immune systems, infants, and older adults.
- **There is no vaccine to protect against human coronaviruses and there are no specific treatments for illnesses caused by human coronaviruses.** Most people with common human coronavirus illness will recover on their own. However, to relieve the symptoms one can:
  - take pain and fever medications
  - use a room humidifier or take a hot shower to help ease
  - a sore throat and cough
  - drink plenty of liquids
  - stay home and rest

3. Correct Option: (d)

Explanation:

Bacterial disease

- Bacteria cause disease by secreting or excreting toxins (as in botulism), by producing toxins internally, which are released when the bacteria disintegrate (as in typhoid), or by inducing sensitivity to their antigenic properties (as in tuberculosis).
- Other serious bacterial diseases include **cholera**, diphtheria, bacterial meningitis, **tetanus**, Lyme disease, **gonorrhea**, and syphilis.
- **Cholera is caused by *Vibrio cholera*, gonorrhea by *Neisseria gonorrhoeae*, and tetanus by *Clostridium tetani*.**

4. Correct Option: (b)

Explanation:

Gene Therapy

- Gene therapy is a technique that involves the replacement of defective genes with healthy ones to treat genetic disorders.
- It is an artificial method that introduces DNA into the cells of the human body.

- In gene therapy, scientists can do one of several things depending on the problem that is present. They can replace a gene that causes a medical problem with one that doesn't, add genes to help the body to fight or treat disease, or turn off genes that are causing problems.
- To insert new genes directly into cells, scientists use a vehicle called a "vector" which is genetically engineered to deliver the gene.
- **Viruses, for example, have a natural ability to deliver genetic material into cells, and therefore,** can be used as vectors. Before a virus can be used to carry therapeutic genes into human cells, however, it is modified to remove its ability to cause an infectious disease.

There are two types of gene therapy

- **Somatic Gene Therapy**
  - This type usually occurs in the **somatic cells** of the human body. This is related to a single person and the only person who has the damaged cells will be replaced with healthy cells.
- **Germline Gene Therapy**
  - It occurs in the **germline cells** of the human body. Generally, this method is adopted to treat the genetic, disease causing-variations of genes that are passed from the parents to their children.

5. Correct Option: (a)

Explanation:

Biopharmaceuticals

- Unlike with generic drugs of the more common small-molecule type, biologics generally exhibit high molecular complexity and may be quite sensitive to changes in manufacturing processes. Despite that heterogeneity, all biopharmaceuticals, including biosimilars, must maintain consistent quality and clinical performance throughout their lifecycle.
- **Biosimilar drugs and generic drugs are very different,** mainly because while generic drugs are identical to the original in chemical composition, biosimilar drugs are "highly similar," but close enough in duplication to accomplish the same therapeutic and clinical result. Another key difference is that generics are copies of synthetic drugs, while biosimilars are modeled after drugs that use living organisms as important ingredients.
- A biopharmaceutical, also known as a biologic(al) medical product, or biologic, is any pharmaceutical drug product manufactured in, extracted from, or semi synthesized from biological sources. Different from totally synthesized pharmaceuticals, they include vaccines, blood, blood components, allergens, somatic cells, gene therapies, tissues, recombinant therapeutic protein, and living cells used in cell therapy. Biologics can be composed of sugars, proteins, or nucleic acids or complex combinations of these substances, or maybe living cells or tissues.
- **They (or their precursors or components) are isolated from living sources—human, animal, plant, fungal, or microbial.**

6. Correct Option: (b)

Explanation:

Physiology of Lactation

- The two primary hormones that are needed for lactation are prolactin and oxytocin.
- **Prolactin stimulates milk biosynthesis within the alveolar cells of the breast and oxytocin stimulates contraction of the myoepithelial cells that surround the alveoli, causing the milk to be ejected.**

Prolactin

- Prolactin (PRL), also known as luteotropic hormone or luteotropin, is a protein that in humans is best known for its role in enabling mammals, usually females, to produce milk. **Prolactin is secreted from the anterior pituitary gland** in response to eating, mating, estrogen treatment, ovulation, and nursing. It plays an essential role in metabolism, regulation of the immune system and pancreatic development.

Oxytocin

- Oxytocin is a medication and hormone. As a medication, it is used to cause contraction of the uterus, which is used to start labor, increase the speed of labor, and to stop bleeding following delivery. **It is normally produced by the paraventricular nucleus of the hypothalamus and released by the posterior pituitary.**

7. Correct Option: (b)

Explanation:

Hemophilia

- Hemophilia is usually an inherited bleeding disorder in which the blood does not clot properly. This can lead to spontaneous bleeding as well as bleeding following injuries or surgery.
- Blood contains many proteins called clotting factors that can help to stop bleeding. People with hemophilia have low levels of either factor VIII (8) or factor IX (9).
- Hemophilia has been called a "royal disease".
- This is because the hemophilia gene was passed from Queen Victoria, who became Queen of England in 1837, to the ruling families of Russia, Spain, and Germany.
- **In the most common types of hemophilia, the faulty gene is located on the X chromosome. Everyone has two sex chromosomes, one from each parent. A female inherits an X chromosome from her mother and an X chromosome from her father.**
- **A male inherits an X chromosome from his mother and a Y chromosome from his father. This means that hemophilia almost always occurs in boys and is passed from mother to son through one of the mother's genes.** Most women with the defective gene are simply carriers and experience no signs or symptoms of hemophilia. But some carriers can experience bleeding symptoms if their clotting factors are moderately decreased.
- However, about 30% of people with hemophilia have no family history of the disorder. In these people, an unexpected change occurs in one of the genes associated with hemophilia.

8. Correct Option: (c)

Explanation:

Physical Transfection

- Gene transfer technique is used very widely both in basic research and applied biology. The delivery of DNA into animal cells is a fundamental and established procedure. It has become an indispensable tool for gene cloning, the study of gene function and regulation and the production of small amounts of recombinant proteins for analysis and verification.
- It can be done physically, chemically, and biologically.
- In physical methods, the DNA is delivered directly into either the cytoplasm or the nucleus using some kind of physical force. There is no requirement for interaction with the plasma membrane. This avoids involvement with the endosomal pathway and thus limits the amount of damage sustained by the exogenous DNA. These are:
  - **Electroporation**: Electroporation is the transfection of cells following their exposure to a pulsed electric field. This causes several nanometer-sized pores to open in the plasma membrane for up to 30 minutes, allowing the uptake of free DNA from the surrounding medium.
  - **Microinjection**: The direct microinjection of DNA into the cytoplasm or nuclei of cultured cells is sometimes used as a transfection method. It is highly efficient at the level of individual cells.
  - **Transfection by particle bombardment**: Particle bombardment (also known as biolistics or microprojectile transfection) procedure involves coating micrometer-sized gold or tungsten particles with DNA and then accelerating the particles into cells or tissues. A major advantage of this method is that DNA can be delivered to deep cells in tissue slices, and the depth of penetration can be adjusted by changing the applied force.
  - Transfection by ultrasound: It involves the exposure of cells to a rapidly oscillating probe, such as the tip of a sonicator. The application of ultrasound waves to a dish of cells or a particular tissue results in the formation and collapse of bubbles in the liquid, including the cell membrane, a process known as cavitation. The transient appearance of such cavities allows DNA to cross the membrane into the cytoplasm.
- **Lipofection and Calcium phosphate Transfection are the chemical methods.**

9. Correct Option: (d)

Explanation:

Polymerase chain reaction

- Polymerase chain reaction (PCR) is a method widely used in molecular biology to rapidly make millions to billions of copies of a specific DNA sample allowing scientists to take a very small sample of DNA and amplify it to a large enough amount to study in detail. PCR was invented in 1983 by Kary Mullis. It is fundamental to much of genetic testing including analysis of ancient samples of DNA and identification of infectious agents. Using PCR, copies of very small amounts of DNA sequences are exponentially amplified in a series of cycles of temperature changes.
- PCR is now a common and often indispensable technique used in medical laboratory and clinical laboratory research for a broad variety of applications including biomedical research and criminal forensics.
- Its applications are in DNA isolation, Amplification and quantification of DNA, Medical and diagnostic applications, Infectious disease applications, Forensic applications(eg., in DNA fingerprinting), Research applications (eg. phylogenic analysis, gene mapping), etc.

10. Correct Option: (b)

Explanation:

Food Fortification

- Food fortification is usually regarded as the deliberate addition of one or more micronutrients to particular foods, to increase the intake of these micronutrients to correct or prevent a demonstrated deficiency and provide a health benefit.
- **In October 2016, FSSAI operationalized the Food Safety and Standards (Fortification of Foods) Regulations, 2016 for fortifying staples namely Wheat Flour and Rice (with Iron, Vitamin B12 and Folic Acid), Milk and Edible Oil (with Vitamins A and D) and Double Fortified Salt (with Iodine and Iron) to reduce the high burden of micronutrient malnutrition in India.**
- The '+F" logo has been notified to identify fortified foods.
- **Food Safety and Standards (Fortification of Foods) Regulations, 2018**
- As per these rules:
- **The fortification of staples is not compulsory.**
- The fortification of the products and use of the +F logo is allowed to FBO only if the enrichment of the food is done according to the standards laid under it.
- Adding iodine to commercial salt is mandatory in India.
- Whenever the food articles standards stated under 'Food Safety and Standards Regulations' instructs for adding specific minerals or vitamins as an obligatory demand of that particular standard, the same shall comply, but the +F logo shall not be used.
- New standards now provide a minimum and a maxima range for the fortification of staples like wheat flour, maida, rice, salt, vegetable oil, and milk.
- The dosage of the micronutrients has been adjusted so that they provide 30 to 50 percent of the daily requirements.

11. Correct Option: (c)

Explanation:

Toxins of *Bacillus thuringiensis*

- *Bacillus thuringiensis* (Bt) are gram-positive spore-forming bacteria with entomopathogenic properties.
- Bt produces insecticidal proteins during the sporulation phase as parasporal crystals.
- These crystals are predominantly comprised of one or more proteins (Cry and Cyt toxins), also called □-endotoxins.
- Cry proteins are parasporal inclusion (Crystal) proteins from *Bacillus thuringiensis* that exhibit experimentally verifiable toxic effect to a target organism or have significant sequence similarity to a known Cry protein.
- Similarly, Cyt proteins are parasporal inclusion proteins from Bacillus thuringiensis that exhibit hemolytic (Cytolytic) activity or have obvious sequence similarity to a known Cyt protein. These toxins are highly specific to their target insect, are innocuous to humans, vertebrates, and plants, and are completely biodegradable.
- Cry proteins are specifically toxic to the insect orders Lepidoptera, Coleoptera, Hymenoptera and Diptera, and also to

nematodes. In contrast, Cyt toxins are mostly found in Bt strains active against Diptera.

12. Correct Option: (b)

Explanation:

Plasmids

- Plasmids are the autonomously replicating circular extra-chromosomal DNA present mainly in Bacteria.
- **However, plasmids are sometimes present in archaea and eukaryotic organisms, for instance, in the Yeasts.**
- **These plasmid DNA act as vectors to transfer the piece of DNA attached to it.**

13. Correct Option: (a)

Explanation:

Measles-Rubella (MR) Vaccine

- Measles-Rubella (MR) Vaccine was introduced in the Universal Immunization Programme in 2017, as the Measles-Rubella combination vaccine to provide protection against congenital birth defects caused by Rubella infection for children aged between 9 months and 15 years.
- Recently, the New Delhi High Court stopped the implementation of the 'Measles and Rubella Vaccine Immunization Campaign' by the Delhi government. Court's order said that 'measles vaccination cannot be administered "forcibly" and without the consent of parents,' it introduced a dimension to vaccination — the question of consent — that had not been adequately dealt with earlier.
- **Measles and Rubella are two different viral diseases**. Generally, Rubella causes milder infections than measles but it is of concern when a pregnant woman is infected by the virus because it results in severe birth defects.
- **Both Measles and Rubella are caused by an RNA virus and are generally spread through respiratory droplets of sick people.**
- It is important to note that Rubella is not the same as measles. Though both diseases share the same characteristics including the red rash and have similar symptoms, they are distinct.
- **Measles is far more contagious and severe an illness than rubella (also called German Measles).**
- Swollen lymph nodes always occur with rubella but not often with measles.

14. Correct Option: (b)

Explanation:

Hemophilia

- Hemophilia is usually an inherited bleeding disorder in which the blood does not clot properly. This can lead to spontaneous bleeding as well as bleeding following injuries or surgery.
- Blood contains many proteins called clotting factors that can help to stop bleeding. People with hemophilia have low levels of either factor VIII (8) or factor IX (9).
- Hemophilia has been called a "royal disease".
- This is because the hemophilia gene was passed from Queen Victoria, who became Queen of England in 1837, to the ruling families of Russia, Spain, and Germany.
- **In the most common types of hemophilia, the faulty gene is located on the X chromosome. Everyone has two sex chromosomes, one from each parent. A female inherits an X chromosome from her mother and an X chromosome from her father.**
- **A male inherits an X chromosome from his mother and a Y chromosome from his father. This means that hemophilia almost always occurs in boys and is passed from mother to son through one of the mother's genes.** Most women with the defective gene are simply carriers and experience no signs or symptoms of hemophilia. But some carriers can experience bleeding symptoms if their clotting factors are moderately decreased.
- However, about 30% of people with hemophilia have no family history of the disorder. In these people, an unexpected change occurs in one of the genes associated with hemophilia.

15. Correct Option: (c)

Explanation:

Industrial genetics

- Industrial genetics means **mass-scale production of desired species** of plants and animals. This field includes activities such as animal breeding, cattle breeding.

Dairying is an example of industrial genetics.

- For this industrial genetics, cells of the organisms are transformed with a gene coding for a useful protein, such as an enzyme. This **desired protein is then overexpressed in the organism**.
- Mass quantities of the protein can then be manufactured by growing the transformed organism in bioreactor equipment using industrial fermentation and then purifying the protein.
- This transformation of organisms can be done in bacteria, yeast, insect cells and mammalians.
- This transformation technique is **used to produce medicines such as insulin, human growth hormone, vaccines, supplements (such as tryptophan), aid in the production of food (chymosin in cheese making) and fuels.**
- Other applications are making biofuels, cleaning up oil spills, carbon and other toxic waste and **detecting arsenic in drinking water, biomining and bioremediation** (due to their ability to extract heavy metals from their environment and incorporate them into compounds that are more easily recoverable).

16. Correct Option: (c)

Explanation:

Antimicrobial resistance

- The Anti-Microbial Resistance (AMR) is the ability of a microbe to resist the effects of medication previously used to treat them. It is also known as **antibiotic resistance**.
- The WHO defines antimicrobial resistance as a microorganism's resistance to an antimicrobial drug that was once able to treat an infection by that microorganism.
- The resistance to antimicrobials is a natural biological phenomenon.
- It should be noted that it is the microbe that will become resistant to antibiotics and not the person (patient). A person cannot become resistant to antibiotics because the resistance is a property of the microbe, and not by a person or other organism infected by a microbe.

Reasons for Anti-Microbial Resistance

- The natural resistance in certain types of bacteria.
- The genetic mutation.
- By one species acquiring resistance from another.

Interagency Coordination Group on Antimicrobial Resistance (IACG)

- It was convened by the Secretary-General of the United Nations after the UN High-Level Meeting on Antimicrobial Resistance in 2016.
- The IACG brought together partners across the UN, international organizations and individuals with expertise across human, animal and plant health, as well as the food, animal feed, trade, development and environment sectors, to formulate a blueprint for the fight against antimicrobial resistance.
- The World Health Organization (WHO) provided the Secretariat for the IACG, with contributions from the Food and Agriculture Organization of the United Nations (FAO) and the World Organisation for Animal Health (OIE).

Red Line campaign

- The Ministry of Health and Family Welfare has launched a program called Red Line campaign.
- It is an Anti-Microbial Resistance awareness campaign. This awareness campaign impulses people not to use medicines marked with a red vertical line, comprising of antibiotics, without the prescription of a doctor. These medicines are called as the 'Medicines with the Red Line'.
- This campaign is intended at discouraging needless prescription and over-the-counter sale of antibiotics causing drug resistance for numerous dangerous diseases comprising of Tuberculosis, Malaria, and even HIV, etc.

17. Correct Option: (c)

Explanation:

National Biotechnology Development Strategy 2015-2020 (NBDS)

- NBDS was launched in 2015 with an aim to establish India as a world-class bio-manufacturing hub.
- **It aims to achieve:**
  - Making India ready to meet the challenge of achieving US$100bn by 2025.

- Launching Four Major Missions – Healthcare, Food and Nutrition, Clean Energy and Education backed with significant investments for the creation of new biotech products.
- Create a strong infrastructure for R&D and commercialization and empower India's human by creating a Life Sciences and Biotechnology Education Council.
- **Creating a Technology Development and Translation network across the country with a global partnership.**
- To revitalize the knowledge environment at par with the growing bio-economy, **focus of biotechnology tools for inclusive development, etc.**
- The Mission will be implemented by the Biotechnology Industry Research Assistance Council (BIRAC).
- The mission entails an investment of over 1500 crore by the Government of India for five years with a 50% cost for the program coming to the World Bank loan.

18. Correct Option: (a)

Explanation:

Genetic Blood Disorders

Sickle Cell Anemia

- Sickle cell anemia is an inherited form of anemia — a condition in which there aren't enough healthy red blood cells to carry adequate oxygen throughout your body.
- Our red blood cells are normally round and flexible which makes their movement through the blood vessels easier. But in the case of sickle cell anemia, the red blood cells become rigid and sticky and are shaped like sickles or crescent moons. The irregular shaping can cause the cells to get stuck in small blood vessels, which can slow or block blood flow and oxygen to parts of the body.
- **The sickle cell gene is passed from generation to generation in a pattern of inheritance called autosomal recessive inheritance. This means that both the mother and the father must pass on the defective form of the gene for a child to be affected.**
- If only one parent passes the sickle cell gene to the child, that child will have the sickle cell trait. With one normal hemoglobin gene and one defective form of the gene, people with the sickle cell trait make both normal hemoglobin and sickle cell hemoglobin. Their blood might contain some sickle cells, but they generally don't have symptoms. But they are carriers of the disease, which means they can pass the gene to their children.

Thalassemia

- **Thalassemia is a blood related genetic disorder that involves the absence of or errors in genes responsible for the production of hemoglobin, a protein present in the red blood cells.**
- Each red blood cell can contain between 240 and 300 million molecules of hemoglobin. The severity of the disease depends on the mutations involved in the genes and their interplay.
- A hemoglobin molecule has sub-units commonly referred to as alpha and beta. Both subunits are necessary to bind oxygen in the lungs properly and deliver it to tissues in other parts of the body. Genes on chromosome 16 are responsible for alpha subunits, while genes on chromosome 11 control the production of beta subunits.
- A lack of a particular subunit determines the type of thalassemia (e.g. a lack of alpha subunits results in alpha-thalassemia). The lack of subunits thus corresponds to errors in the genes on the appropriate chromosomes.
- **People who have thalassemia can have mild or severe anemia.**

19. Correct Option: (b)

Explanation:

Embryo Transfer Technology

- It is a technique of assisted reproduction in which the **embryo or zygote** is collected from a donor female with higher genetic merit and transferred to a recipient who serves as surrogate for the rest of the pregnancy.
- The technique is being utilized for **development and conservation** of indigenous breeds through the following programmes:
  - **RashtriyaGokul Mission**

- **National Mission on Bovine Productivity**
- National Dairy Plan-I
- Breed Improvement Institutes.

- Indigenous Cow Breeds such as Sahiwal, Gir, Red Sindhi, Ongole, Deoni and Vechurwill be the recipient surrogates under the program.

Embryo Transfer Technology Benefits

- This technology will be made available to farmers easily.
- This will result in the rapid breeding of indigenous cattle of high genetic merit.
- A farmer can get five to six times an increased number of offspring with high genetic merit.
- Such calves so obtained will also be free of diseases.

20. Correct Option: (d)

Explanation:

About "three-parent" babies

- Mitochondrial Replacement Therapy (MRT) is a form of In Vitro Fertilization (Assisted Reproductive Technology).
- **It is used to replace the mother's faulty Mitochondrial DNA with healthy Mitochondria from a donor woman during the IVF process, thus the name- "three-parent" baby**.
- The resulting child is still conceived from two parents and will have nuclear DNA from the woman and her partner, and mitochondrial DNA from the donor.
- The donor's mitochondria contribute just 37 genes to the child, compared with more than 20,000 from the parents. That is a negligible amount and far less than one would gain from a blood transfusion or organ transplant
- No other characteristics in terms of intelligence, eye color, hair color, height, etc. are changed.
- It could prevent severe genetic diseases being passed from mother to offspring and can be used to treat infertility.
- **The United Kingdom became the first country in 2015, to have officially approved procedures to create "three-parent" babies.**
- Recently, a team of Greek and Spanish doctors has produced a baby from three people using the maternal spindle transfer technique(similar to Pronuclear Transfer in its effort to prevent the transmission of mitochondrial disease). (a method of Mitochondrial Replacement Therapy).

21. Correct Answer: (c)

Explanation: Both the statements are correct.

- **Supplementary Notes**
- The Indian Air Force (IAF) and Royal Air Force (RAF) jointly commenced the fifth edition of Exercise Indradhanush at Air Force Station Hindan.
- It is a joint air force exercise conducted by the Royal Air Force (RAF) of United Kingdom and the Indian Air Force (IAF) being held since 2006.
- The exercise is tasked to enhance mutual operational understanding between the two air forces via close interaction.
- The theme of this edition of the exercise is 'Base Defence and Force Protection'.
- This theme is of significance considering the recent threats to military establishments from terror elements.
- The RAF team include 36 specialised combatants of the RAF Regiment, whereas the IAF team comprises of 42 combatants of the GARUD Force.
- Other joint exercises between India and UK are
  - **Exercise Konkan:**It is an annual maritime bilateral exercise between Indian Navy and the Royal Navy of Britain.
  - **Exercise Ajeya warrior:**It is a joint military exercise between India and the UK.It was held for the first time in 2013.

Significance

- Indradhanush will allow the IAF and RAF to strategise and share information, as well as learn from each other's operational experience.
- Through this exercise, the two airforces can plan scenarios and train on tactics to counter terror threats and protect their installations.

- The forces will share their training philosophies and best practices along with contemporary technologies.

22. Correct Answer: (a)

Explanation: 2nd statement is incorrect. NITI Aayog noted the lack of regulation around AI as a major weakness for India.

Supplementary Notes

- SundarPichai, in an editorial, advocated for AI to be regulated keeping in mind both the harm and societal benefits that the technology could bring in. He also said that governments must be willing to align on regulations around AI for "making global standards work".
- While India has been vocal about the use of AI in various sectors, it is far from regulating it.
- A 2018 NITI Aayog paper proposed five areas where AI can be useful. This paper noted the lack of regulation around AI as a major weakness for India.

What is AI?

- Artificial Intelligence or AI is an autonomous decision-making system. It is a constellation of technologies that enable machines to act with higher levels of intelligence and emulate the human capabilities of sense, comprehend and act.
- AI can be described as, "a system's ability to correctly interpret external data, to learn from such data, and to use those learnings to achieve specific goals and tasks through flexible adaptation."
- AI has become an integral part of Information Technology (IT) and this branch mainly focuses on the production of intelligent machines that derive valuable output from the available data and react in accordance with it.
- Quality of data is one of the crucial elements for the success of AI.
- The science of AI is based on various disciplines, which makes it a multidisciplinary field. This is essentially one reason why AI has a plethora of applications.

23. Correct Answer (d)

Explanation: Both the statements are correct.

Supplementary Notes

Nature of Advice by Ministers

- There shall be a Council of Ministers with the Prime Minister at the head to aid and advise the President who shall, in the exercise of his functions, act in accordance with such advice: Provided that the President may require the council of Ministers to reconsider such advice, either generally or otherwise, and the President shall act in accordance with the advice tendered after such reconsideration.
- The question whether any, and if so what, advice was tendered by Ministers to the President shall not be inquired into in any court.

24. Correct Answer: (c)

Explanation: Both the statements are correct.

Supplementary Notes

- The International Cricket Council (ICC) announced the new version of the Duckworth-Lewis-Stern (DLS) System that comes into effect from September 30, 2018.

About:

- The Duckworth–Lewis (D/L) method is a mathematical formula used to calculate the target score for the team batting second in a limited overs cricket match interrupted by weather (e.g. Rain) or other circumstances.
- Nomenclature: The D/L method was devised by two English statisticians, Frank Duckworth and Tony Lewis. After their retirements, Professor Steven Stern became the custodian of the method. In 2014, it was renamed the Duckworth–Lewis–Stern method (or DLS method).
- History: It was first used in international cricket in 1997 and was formally adopted by the ICC in 1999.

Working:

- Each team in a limited-overs match has two resources available with which to score runs (overs to play and wickets remaining).
- The target is revised proportionally in the combination of these two resources to set a statistically fair target for the second team's innings, which is the same difficulty as the original target.

- This is the third version but second update of the DLS System since its introduction into international cricket in 2014
- It is based on information from 700 ODIs and 428 T20 Internationals, which comprise over 240,000 outcomes of individual deliveries.
- This has been carried out following a detailed ball-by-ball analysis of scoring patterns, including in the Powerplays, in all limited overs internationals played during the previous four years.

25. Correct Answer (d)

Explanation: option (d) is the correct answer.

Supplementary Notes:

- Introducing the idea of "trust as a public good that gets enhanced with greater use", the Survey suggests that policies must empower transparency and effective enforcement using data and technology to enhance this public good.
- The Economic Survey has said "a feeling of suspicion and disrespect towards wealth creators is ill-advised," batting strongly — in one whole chapter — for India Inc which has been facing heat from enforcement agencies. It called for more pro-business measures to encourage wealth creation, but cautioned against pro-crony policies that favour specific private interests.
- The Survey says that a market failure of trust happened around 2011-13 due to a few large **unscrupulous promoters.** This created large Non-Performing Assets (NPAs) in the banking system, especially for Public Sector Banks (PSBs).
- It said that while there is a case for government intervention when markets do not function properly, excessive intervention stifles economic freedom and creates 'deadweight loss'.

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TEST
DAY - 62

Time Allowed: 30 mins **Maximum Marks: 50**

1. Which of the following is/are correct about the Event Horizon Telescope (EHT)?

1. A long-standing goal in astrophysics is to directly observe the immediate environment of a black hole. The 'event horizon' is the boundary defining the region of space around a black hole from which nothing can escape.
2. The EHT is an international collaboration to continue the progress in achieving this goal, using the technique of Very Long Baseline interferometry (VLBI) at short wavelengths.
3. In this technique, a network of 8 ground-based radio telescopes have been linked and exploit the rotation of our planet to form one virtual Earth-size telescope observing at a wavelength of 1.3 mm.

Select the correct option from the codes given below:

(a) 1only
(b) 1 and 2 only
(c) 1, 2 and 3
(d) None of the above

2. Consider the following statements:

1. Black holes were predicted by Einstein's theory of general relativity.
2. Black holes can be directly observed because they do not emit or radiate light, or any other electromagnetic waves that can be detected by instruments built by human beings.

Which of the following is/are **incorrect**?

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

3. Which of the following is/are correct about Chandrayaan-2?

1. It is ISRO's first interplanetary mission to land a rover on any celestial body.
2. It was launched by Geosynchronous Satellite Launch Vehicle Mk III (GSLV-F10).
3. Only four countries have ever soft-landed on the moon— France, the United States, the U.S.S.R., and China.

Select the correct option from the codes given below:

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

4. Which is the first molecule to be formed in our universe for the first time?

(a) Sodium hydride
(b) Calcium hydride
(c) Potassium hydride
(d) Helium hydride

5. Mosquirix is a vaccine developed to treat which of the following?

(a) SARS
(b) MERS
(c) COVID-19
(d) Malaria

6. Which of the following statements is/ are correct regarding "three-parent" babies?

1. Mitochondrial Replacement Therapy (MRT) is a form of In Vitro Fertilization (Assisted Reproductive Technology) which is used for 3 parent babies.
2. It is used to replace the mother's faulty Mitochondrial DNA with healthy Mitochondria from a donor woman during the IVF process, thus the name- "three-parent" baby.

Select the correct option from the codes given below:

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

7. The term FL-2027 is related to which of the following?

(a) Meteorites
(b) Galaxy
(c) Asteroids
(d) Potato

8. Consider the following statements:

1. The InternationalUnion for the Protection of New Varieties of Plants (UPOV) is an intergovernmental organization, to provide and promote an effective system of plant variety protection.
2. To avail the breeders' rights under the Convention, the new plants must not have been previously marketed in the country where rights are applied for

Which of the following is/are correct?

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

9. Which of the following is/are correct about GSAT-29?

1. It is a type of communication satellite.
2. It is India's heaviest satellite.

Select the correct option from the codes given below:

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

10. Which of the following is true about the Copernicus project?

(a) Aimed to track environmental damage and aid disaster relief operations.
(b) Aimed at promotion of agriculture
(c) For the Sustainable Development program.
(d) Space program to moon.

11. Which is correct about Gaofen 11?

(a) Nuclear weapon
(b) Weather Forecasting satellite
(c) Surface to air missile
(d) Optical remote sensing satellite

12. Consider the following pairs:

1. Cartosat: PSLV
2. Oceansat: GSLV
3. Resourcesat: PSLV

Which of the above pairs is/are correctly matched?

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

13. Consider the following statements:

1. Aditya – 1 is India's first solar launch to study solar coroner.
2. GAGAN has been launched by the Ministry of Civil Aviation.

Which of the above is/are correct?

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

14. Consider the following statements:

1. RISAT is the only microwave remote using satellite casting & synthetic Arpetive Radar.
2. Megha – Tropiques is a satellite develop program between India and Japan.

Which of the above is/are correct?

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

15. Consider the following:

1. Department of Space (DoS) and the Space Commission were set up in 1972.
2. ISRO was brought under DoS on June 1, 1972.
3. DoS comes under the Ministry of Science and Technology.

Which of the above are correct?

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

16. Concerning Outer Space Missions, consider the following pairs:

1. Gaia Mission – NASA
2. Hongyun Project – Chinese Space Agency
3. MAVEN Spacecraft – European Space Agency
4. Hayabusa 2 – JAXA

Which of the above pairs are correctly matched?

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

17. Regarding the Spitzer Space Telescope recently seen in the news, consider the following statements:

1. It is a part of 'Great Observatories' designed by NASA for space research.
2. It captures X-rays emitted by a warm object like stars in space.
3. It will be decommissioned by its agency by 2020.

Which of the above statements is/are correct?

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

18. Regarding the Antrix Corporation in India, consider the following statements:

1. It is a Maharatna company.
2. It is involved in building and marketing of satellite systems but it cannot establish ground infrastructure for space applications.

Which of the above statements is/are correct?

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

19. Which of the following space agency has announced funding support for Made In Space's project, known as RAMA (Reconstituting Asteroids into Mechanical Automata)?

(a) NASA
(b) ISRO
(c) JAXA
(d) Roscosmos

20. Regarding the Global Navigation Satellite System (GNSS) around the world, consider the following pairs:

1. GPS – USA
2. Quasi-Zenith Satellite System – Israel
3. BeiDou – China
4. Galileo – Russia

Which of the above pairs is/are ***incorrectly*** matched?

(a) 4 only
(b) 2 and 4 only
(c) 1 and 3 only
(d) 2 and 3 only

21. Consider the following statements regarding Companies (Second Amendment) Bill, 2019:

1. The Bill amends the Companies Act, 2013 to enable listing of Indian firms on foreign stock exchanges.
2. It decriminalizes several existing compoundable offenses under the Companies Act 2013.
3. Companies that spend over the obligated 2% on CSR in a particular year can carry it forward as credit for the fulfillment of CSR obligations for the next few years as well.

Which of the statement given above are correct?

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

22. Consider the following statements regarding "Land Ports Authority of India (LPAI)":

1. Land Ports Authority of India is an autonomous body.
2. It functions under the administrative control of the Ministry of Home Affairs.
3. It includes facilities for the movement of cargo as well as passengers too.

Which of the statement given above are correct?

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

23. In a significant victory for India's defense sector, the country has bagged a deal to supply 'Swathi radars' to Armenia. Concerning this deal, consider the following statements:

1. Swathi is a weapon locating radar that provides fast, automatic and accurate locations of enemy weapons.
2. It is developed by the Defence Research and Development Organisation (DRDO).
3. It would be operational in LoC in Jammu & Kashmir from 2022.

Which of the statements given above are correct?

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

24. Which of the following statement(s) is/ are correct about the state funding of election?

1. The state funding of elections was recommended by the Dinesh GoswamiCommittee in 1998.
2. Recently, the Election Commission of India has not favored state funding in elections.

Select the correct answer using the codes given below:

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) None

25. Which of the following is/are the cause/s of coastal erosion in India?

1. Wave energy
2. Cyclones, thermal expansion of seawater and storm surges.
3. Strong littoral drift
4. Sand mining and coral mining

Select the correct answer using the codes given below:

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

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ANSWER HINTS

DAY - 62

1. Correct Option: (c)

Explanation:

- A long-standing goal in astrophysics is to directly observe the immediate environment of a black hole.
- The 'event horizon' is the boundary defining the region of space around a black hole from which nothing can escape.
- The EHT is an international collaboration to continue the progress in achieving this goal, using the technique of Very Long Baseline interferometry (VLBI) at short wavelengths.
- In this technique, a network of 8 ground-based radio telescopes have been linked and exploit the rotation of our planet to form one virtual Earth-size telescope observing at a wavelength of 1.3 mm.

2. Correct Option: (b)

Explanation:

Black holes

- Black holes can be directly observed because they do not emit or radiate light, or any other electromagnetic waves that can be detected by instruments built by human beings.

3. Correct Option: (a)

Explanation:

Chandrayaan-2

- It is ISRO's first interplanetary mission to land a rover on any celestial body.
- It was launched by Geosynchronous Satellite Launch Vehicle Mk III (GSLV-F10).
- Only 3 countries have ever soft-landed on the moon— the United States, the U.S.S.R., and China.

4. Correct Option: (d)

Explanation:

first molecule of the universe

- Helium hydride is the first molecule to be formed in our universe for the first time.

5. Correct Option: (d)

Explanation:

Mosquirix

- Mosquirix is a vaccine developed to treat Malaria.

6. Correct Option: (c)

Explanation:

"Three-parent" babies

- Mitochondrial Replacement Therapy (MRT) is a form of In Vitro Fertilization (Assisted Reproductive Technology) which is used for 3 parent babies.
- It is used to replace the mother's faulty Mitochondrial DNA with healthy Mitochondria from a donor woman during the IVF process, thus the name- "three-parent" baby.

7. Correct Option: (d)

Explanation:

FL-2027

- The term FL-2027 is related to **Potato**.
- The potatoes produced from this breedare used for the manufacturing of chips.

8. Correct Option: (c)

Explanation:

Union for the Protection of New Varieties of Plants

- **Union for the Protection of New Varieties of Plants (UPOV) is an intergovernmental organization, to**

provide and promote an effective system of plant variety protection, with headquarters in Geneva (Switzerland).

- The Convention was adopted in Paris in 1961 and it was revised in 1972, 1978 and 1991.
- The objective of the Convention is the protection of new varieties of plants by an intellectual property right. By codifying intellectual property for plant breeders, UPOV aims to encourage the development of new varieties of plants for the benefit of society.
- For plant breeders' rights to be granted, the new variety must meet four criteria under the rules established by UPOV:
  - **The new plant must be novel, which means that it must not have been previously marketed in the country where rights are applied for.**
  - The new plant must be distinct from other available varieties.
  - The plants must display homogeneity.
  - The trait or traits unique to the new variety must be stable so that the plant remains true to type after repeated cycles of propagation.

9. Correct Option: (a)

Explanation:

GSAT-29

- GSAT-29 satellite with a lift-off mass of 3423 kg, is a multi-beam, multiband **communication satellite** of India, configured around the ISRO's enhanced I-3K bus.
- **This is the heaviest satellite launched from India. But India's heaviest satellite is GSAT-11, launched by the French rocket from the Kourou spaceport in French Guiana.**
- GSAT-29 carries Ka/Ku-band high throughput communication transponders which will bridge the digital divide of users including those in Jammu & Kashmir and North-Eastern regions of India. It also carries Q/V-band payload, configured for technology demonstration at higher frequency bands and Geo-stationary High-Resolution Camera. carriedonboard GSAT-29 spacecraft. An optical communication payload, for the first time, will be utilized for data transmission.
- A multiband and multi-beam satellite. The mission life will be 10 years.

10. Correct Option: (a)

Explanation:

Copernicus project

- Copernicus project is a joint initiative of the European Union (EU) and the European Space Agency (ESA) to track environmental damage and aid disaster relief operations.

11. Correct Option: (d)

Explanation:

Gaofen 11

- Launched by China, it is an **optical remote sensing satellite**, as part of the country's high-resolution Earth observation project.
- It was launched onboard of Long March 4B rocket from Taiyuan Satellite Launch Center in northern Shanxi Province.
- It was the overall 282nd flight mission by Long March carrier rocket.

12. Correct Option: (d)

Explanation:

India's remote sensing program

- India's remote sensing program was developed with the idea of applying space technologies for the benefit of humankind and the development of the country. The program involved the development of three principal capabilities. The first was to design, build and launch satellites to a sun-synchronous orbit. The second was to establish and operate ground stations for spacecraft control, data transfer along with data processing and archival. The third was to use the data obtained for various applications on the ground.
- **All the IRS's are launched by the PSLV.**
- The initial versions are composed of 1 (A,B,C,D). The later versions are named based on their area of application including **OceanSat, CartoSat, ResourceSat**.

13. Correct Option: (c)

Explanation:

Space missions

- Aditya – 1 is India's first solar launch to study solar coroner.

- GAGAN launched by the Ministry of Civil Aviation is for GPS aided GEO Augmented Navigation.

14. Correct Option: (a)

Explanation:

Space missions

- RISAT is the only microwave remote using satellite casting & synthetic Arpetive Radar.
- Megha – Tropiques is a satellite develop program between ISRO & CNES. (**French government space agency**)
- It is to study the water cycle in the tropical atmosphere in the context of climate change

15. Correct Option: (c)

Explanation:

Department of Space (DoS)

- Department of Space (DOS) and the Space Commission were set up in 1972.
- ISRO was brought under DOS on June 1, 1972.
- DOS comes under PMO.

16. Correct Option: (b)

Explanation:

Outer Space Missions

Hayabusa 2

- It is an asteroid sample-return mission operated by the Japanese space agency, **JAXA**. It follows on from Hayabusa mission which returned asteroid samples in 2010. Hayabusa2 was launched on 3 December 2014 and rendezvoused with near-Earth asteroid 162173 Ryugu on 27 June 2018.

Gaia Mission

- It is a **European Space Agency (ESA)** mission to chart a three-dimensional map of our Galaxy, the Milky Way, in the process revealing the composition, formation, and evolution of the Galaxy.

MAVEN spacecraft

- It is **NASA's** mission that was launched in November 2013 and went into orbit around Mars in September 2014. Spacecraft has beamed back a selfie to mark its four years orbiting Mars and studying the upper atmosphere of the red planet. The image was obtained with the Imaging Ultraviolet Spectrograph (IUVS) instrument that normally looks at ultraviolet emissions from the Martian upper atmosphere.

Hongyun project

- **China** started the Hongyun project in September 2016. Under this project, China plans to give broadband internet connectivity to users all over the world by building a space-based communications network. The project also seeks to take the Internet connectivity to the underserved regions of the world.

17. Correct Option: (c)

Explanation:

Spitzer Space Telescope

- The "**Great Observatories**" are four big-ticket space telescopes designed to view the universe indifferent and complementary wavelengths of light. These include:
  - **Spitzer**
  - Hubble Space Telescope
  - The Compton Gamma Ray Observatory (CGRO)
  - The Chandra X-ray Observatory
- Launched into solar orbit on August 25, 2003, Spitzer was initially scheduled for a minimum 2.5-year primary mission however it has lasted longer than its predicted period and completed 15 years of life.
- It is managed and operated by the Jet Propulsion Laboratory (JPL) of NASA.
- **It captures infrared light, which is often emitted by "warm" objects that are not quite hot enough to radiate visible light.**
- NASA's Spitzer Space Telescope – which was initially scheduled for 2.5-year primary mission – has completed 15 years of space exploration.
- Spitzer has illuminated some of the oldest galaxies in the universe, revealed a new ring around Saturn, and peered through shrouds of dust to study newborn stars and black holes. It assisted in the discovery of planets beyond our solar system, including the detection of seven Earth-size planets orbiting the star TRAPPIST-1, among other accomplishments.
- **NASA's Spitzer Space Telescope will be switched off permanently on**

January 30, 2020, after nearly 16 years of exploring the cosmos in infrared light.

18. Correct Option: (d)

Explanation:

Antrix and ISRO

- Antrix Corporation Limited (Antrix), incorporated on 28 September 1992 (under the Companies Act, 1956), is a wholly-owned Government of India Company under the administrative control of the Department of Space (DOS).
- Antrix is the commercial arm of the Indian Space Research Organisation (ISRO).
- Antrix promotes and commercially markets the products and services emanating from the Indian Space Programme.
- **In the year 2008, the Company was awarded 'MINI RATNA' status.**
- The current business activities of Antrix include:
  - Provisioning of communication satellite transponders to various users,
  - Providing launch services for customer satellites,
  - Marketing of data from Indian and foreign remote sensing satellites,
  - **Building and marketing of satellites as well as satellite sub-systems,**
  - **Establishing the ground infrastructure for space applications, and**
  - Mission support services for satellites.
- By January 2018, Antrix had facilitated the launch of 237 foreign customer satellites in PSLV.

19. Correct Option: (a)

Explanation:

Project RAMA

- **NASA** in 2018 announced to give funds to a California-based 3D printing company for finding ways to turn asteroids into giant, autonomous spacecraft, which could fly to outposts in space, the media reported.
- Made In Space's project, known as **RAMA (Reconstituting Asteroids into Mechanical Automata),** aims for finding ways to turn asteroids into giant, autonomous spacecraft, which could fly to outposts in space.
- It has been designed to leverage the advancing trends of additive manufacturing (AM) and in-situ resource utilization (ISRU).
- The project aims to enable asteroid rendezvous missions in which a set of technically simple robotic processes convert asteroid elements into very basic versions of spacecraft subsystems (GNC, Propulsion, Avionics).
- Upon completion, the asteroid will be programmed mechanical automata carrying out a given mission objective such as relocation to an Earth-Moon liberation point for human rendezvous.

20. Correct Option: (b)

Explanation:

Global Navigation Satellite System (GNSS)

- Global navigation satellite system (GNSS) is a general term describing any satellite constellation that provides positioning, navigation, and timing (PNT) services on a global or regional basis.
- **GPS**: The **United States** is the first country to introduce satellite technology with the global positioning system (GPS). This satellite navigation system, operated by the United States government offers navigation and tracking technology, including location, time and other data throughout the planet.
- **QuaSi-Zenith Satellite System (QZSS)**: It is **Japan's satellite** system which is similar to a GPS satellite with some slight variations. The QZSS is a system using three satellites. The satellites in this constellation are expected to orbit Japan and other areas of Asia, which will further increase the accuracy of GPS signals in the US.
- **GLONASS**: **Russia** also has its satellite system called the Russian Global Navigation Satellite System (GLONASS). GLONASS is similar to GPS and includes 24 satellites located in 3 orbit planes.
- **BeiDou**: BeiDou Navigation Satellite System (formerly referred to as Compass) is the navigational system of **China**. It

will consist of more than 30 satellites. This satellite system intends to have two levels of signals to be used for military and civilians. The Chinese government has reported that the satellite constellation is expected for global availability by 2020.

- **Galileo**: Galileo system of **Europe** is a Global Navigation Satellite System (GSNN). The development for Galileo began in 2003 and is expected to be fully completed by 2019. Galileo will have 30 satellites (27 active with 3 spares) with signals reaching throughout the globe. Galileo is funded by public and private sectors, as opposed to the public only funding of the US-GPS.
- **The Indian Regional Navigation Satellite System (IRNSS),** which was later given the operational name of NavIC or NAVigation with Indian Constellation, is the regional satellite navigation system of India. It was launched and operated by the Indian Space Research Organisation (ISRO).IRNSS covers India and nearby regions extending up to 1,500 km.

21. Correct option: (d)

Explanation

Govt approves amendments to Companies Act

- The Union Cabinet has approved the Companies (Second Amendment) Bill, 2019.
- It amends the Companies Act to enable listing of Indian firms on foreign stock exchanges.
- It decriminalizes several existing compoundable offenses under the Companies Act 2013 to promote ease of doing business.
- It ensures that companies thatmust spend Rs. 50 lakh per annum or less on corporate social responsibility(CSR) is no longer required to have a CSR committee.
- Companies that spend over the obligated 2% on CSR in a particular year can carry it forward as credit for the fulfillment of CSR obligations for the next few years as well.

22. Correct option: (b)

Explanation

Land Ports Authority of India

- The Land Ports Authority of India (LPAI) has been envisaged as a statutory body that will function as a body corporate under the administrative control of the Department of Border Management, Ministry of Home Affairs.
- It functions under the administrative control of the Department of Border Management, Ministry of Home Affairs.
- It was established to provide safe, secure and systematic facilities for the movement of cargo as well as passengers at its Integrated Check Posts (ICPs) along the international borders of India.
- Integrated Check Post (ICP) is a trade center for the facilitation of bilateral trade between countries as well as for the movement of passengers across the border.

23. Correct option: (a)

Explanation

Swathi Radar

- Swathi is a weapon locating radar developed by DRDO's Electronics & Radar Development Establishment (LRDE) and manufactured by Bharat Electronics Limited (BEL).
- It is designed to detect and track incoming artillery and rocket fire to determine the point of origin for counter-battery fire.
- It is developed by the Defence Research and Development Organisation (DRDO) and manufactured by the Bharat Electronics Limited (BEL).
- This would be a big boost for Make in India as the Prime Minister has declared a target of increasing exports to Rs 35,000 crore in the next five years.
- The contract is for four Swathi weapon locating radars which provide fast, automatic and accurate location of enemy weapons like mortars, shells and rockets in a 50 km range.
- It can simultaneously detect multiple projectiles like shells, mortars fired from various locations within a 50-km radius.
- The Indian Army is also using the same radars for its operations along the Line of Control in Jammu and Kashmir where this system is used to trace the source of attack by Pakistani positions.
- The system was handed to the Indian Army on a trial basis in 2018.

24. Correct Answer: (b)

Explanation:

state funding of election

Recently, the Minister of State for Finance has informed LokSabha that the Election Commission of India (ECI) is not in favor of state funding of elections.

- The ECI has stated that it would not be able to prohibit or check candidates' expenditure or expenditure by others over and above that which is provided for by the state.
- It has also mentioned that for addressing the real issues with political fundings, there need to be changed in the following elements of the election funding process :
- Receipts of funds by political parties.
- How received funds are spent by the political parties.
- Complete transparency in the political funding process.
- The scrutiny over the above aspects will help to bring better transparency in political funding.

Background

- The state funding of elections was recommended by the **Indrajit Gupta Committee in 1998.**
- **ECI allows airtime** to recognized national and State parties for campaigning on state media.
- It had recommended that funding should be given in the form of free facilities provided to these parties and their candidates.

Law Commission Report (1999)

- It had stated that a state funding of elections is 'desirable' provided that political parties are prohibited from taking funds from other sources.

National Commission to Review the Working of the Constitution (2000)

- It did not support state funding of elections but mentioned that the appropriate framework for the regulation of political parties would need to be implemented before state funding is considered.

Current Scenario of Political Funding

- Political Funding implies the methods that political parties use to raise funds to finance their campaign and routine activities.
- Methods of Political Funding in India:
- **Individual Persons:** Section 29B of RPA allows political parties to receive donations from individual persons.
- **Indirect State Funding:** It includes methods except direct funding, like free access to media, free access to public places for rallies, free or subsidized transport facilities. It is allowed in India in a regulated manner.
- **Corporate Funding:** In India, donations by corporate bodies are governed by the Companies Act, 2013.
- **Electoral Trusts:** A non-profit company created in India for orderly receipt of voluntary contributions from any person like an individual or a domestic company.

Issues with Political Funding

- One of the biggest disadvantages of corporate funding is the use of fake companies to route black money.
- Influence of people and companies over political parties to which they provide funds.
- There are various gaps in Indian rules, the benefit of which political parties take to avoid any kind of reporting.
- Hidden sources of funding lead to more spending of funds in election campaigns, thus impacting the economy of the country.

25. Correct Answer: (d)

Explanation:

- Coastal erosion is the wearing away of land and removal of beach sediments by high winds, drainage, wave action, wave currents, and tidal currents. Coastal morphodynamics studies the erosion and sediment redistribution in coastal areas. It is caused by corrosion, hydraulic action or abrasion.
- Coastal erosion can be either a:
  - ➤ rapid-onset hazard (occurs very quickly, a period of days to weeks)
  - ➤ slow-onset hazard (occurring over many years, or decades to centuries).

- The beaches and shorelines in India serve multidimensional needs such as seaport for maritime commerce, space for residential & commercial structures, recreational purposes, etc.
- Developmental activities along the coastline have increased and the trend is expected to continue in the decades to come. Similar to any other maritime country, India's long peninsular region constantly battles erosion.
- The developmental activities are often carried out without a clear understanding of the coastal dynamics. This leads to a long term, in the worst cases, permanent damage particularly to the local communities.
- According to the Ministry of Environment, Forest and Climate Change (MOEFCC) 40% of India's coastline is subjected to high, medium or low coastal erosion.

Causes of Coastal Erosion

- **Wave energy** is considered to be the primary reason for coastal erosion.
- **Natural hazards** like cyclones, thermal expansion of seawater, storm surges, tsunami etc due to the melting of continental glaciers and ice sheets as a result of climate change hamper the natural rhythm and precipitate erosion.
- **Strong littoral drift** resulting in sand movement can also be considered as one of the major reasons for coastal erosion.
- **Dredging, sand mining and coral mining** have contributed to coastal erosion causing sediment deficit, modification of water depth leading to longshore drift and altered wave refraction.
- Coastal erosion has been sparked by fishing harbors and dams constructed in the catchment area of rivers and ports reducing the flow of sediments from river estuaries.
- **Heavy rainfall** can enhance the saturation of soils, with high saturation leading to a reduction in the soil's shear strength, and a corresponding increase in the chance of slope failure (landslides).

Status of Coastal Erosion in India

- The Ministry of Earth Sciences that monitors shoreline changes along the Indian coast states that:
- About 89% of the shoreline of Andaman and Nicobar Island is eroded by the Bay of Bengal.
- Goa has the highest percentage of stable shoreline.

World Coastal Erosion

- A study report published in the scientific **journal Nature Climate Change** says that Climate change poses an existential threat to the world's sandy beaches and that as many as half of them could disappear by the end of the century. It states that even by 2050 some coastlines could be unrecognizable from what we see today, with 14% to 15% facing severe erosion.

- With 62% of its coast gaining land, Tamil Nadu has gained the newest shoreline.
- **Example:**
- The length of the coastline of India including the coastlines of the Andaman and Nicobar Islands in the Bay of Bengal and Lakshadweep Islands in the Arabian Sea is 7517 km.
- Length of the Coastline of the Indian mainland is 6100 km which is surrounded by the Arabian Sea in the west, Bay of Bengal in the east, and the Indian Ocean in the south.
- The long coastline of India is dotted with several major ports such as Kandla, Mumbai, Navasheva, Mangalore, Cochin, Chennai, Tuticorin, Vishakapatnam, and Paradip.

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TEST
DAY -63

Time Allowed: 30 mins **Maximum Marks: 50**

1. An online campaign named „#www : Web- Wonder Women" has been launched to discover and celebrate the exceptional achievements of women who are driving social change via social media. The campaign has been launched by:

(a) NITI Aayog

(b) Ministry of Women and Child Development, Government of India

(c) Facebook

(d) Microsoft

2. Which of the following countries have the Nuclear Triad (nuclear strike from land, air, and water) capability?

1. India
2. United States of America
3. France
4. United Kingdom
5. Israel

Select the correct answer using the codes given below:

(a) 1, 2, 3 and 4 only

(b) 2, 3 and 5 only

(c) 1, 2 and 3 only

(d) 1, 2, 3, 4 and 5

3. Consider the following statements about Indian Railways' AskDishachatbot facility:

1. It is an Artificial Intelligence-based chatbot.
2. It is developed and managed by the National Informatics Centre.

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

4. Which of the following pairs is/are correctly matched?

(Military Exercises)	**(Countries)**
1. INDRA	Russia
2. KONKAN	United Kingdom
3. MALABAR	United States

Select the correct answer using the codes given below:

(a) 1 and 3 only

(b) 2 only

(c) 1 and 2 only

(d) 1, 2 and 3

5. Consider the following statements about Agni-V Missile:

1. It is an supersonic missile jointly developed by DRDO and Department of Science and Technology.
2. Its maximum speed is upto 12 Mach.

Which of the above statements is/are correct?

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2

6. Which of the following statement(s) is correct about Defence Communication Network?

(a) It is launched by Defence Research and Development Organization

(b) It is developed by HCL Technologies

(c) This platform will avail its services to army, air force and navy only

(d) All of the above

7. The Digital Sky Platform has been launched for the registration of

(a) Remotely Piloted Aerial Systems (RPAS)

(b) Sea-Planes

(c) Commercial Pilots

(d) 5G Network Operators

8. ISRO has launched the Samwad with Students (SwS) initiative for the purpose of

(a) to promote innovation and scientific temper among students.

(b) to engage youngsters in activities related to scientific innovation.

(c) to engage youngsters in activities concerning Space Science.

(d) to organize debates and seminars for the promotion of scientific knowledge.

9. Consider the following pairs:

Exercise	Country
1. AviaIndra	France
2. Hand-In-Hand	China
3. YudhAbhyas	United Kingdom

Which of the pairs given above is/are correctly matched?

(a) 1 and 3 only

(b) 2 only

(c) 2 and 3 only

(d) 1, 2 and 3

10. Which of the following statements regarding Free Space Optical Communication (FSOC) is/are correct?

1. It is an optical communication technology that uses light to wirelessly transmit data to telecommunication and internet applications.
2. It creates a high-speed internet network that requires special cabling.
3. The X centre in Hyderabad will be the first Developmental Centre using FSOC technology outside the US.

Select the correct answer using the code given below:

(a) 1 and 2 only

(b) 1 only

(c) 1 and 3 only

(d) 1, 2 and 3

11. Recently the term 'ParamShivay' seen in news, is refers to:

(a) first Hindu temple built in United Arab Emirates.

(b) highest peak of Shiwalik range of Himalaya

(c) India's first indigenously built anti-submarine warfare corvette.

(d) first supercomputer developed under National Supercomputing Mission.

12. "INS Magar" is refers to

(a) Mine countermeasure vessel

(b) Torpedo launch and recovery vessel

(c) Nuclear - powered submarine

(d) Amphibious warfare vessel

13. Recently, the Indian Navy has launched the Operation NISTAR in

(a) Yemen

(b) Oman

(c) Somalia

(d) Syria

14. "Dharma Guardian" is a military exercise between India and

(a) USA

(b) Sri Lanka

(c) Japan

(d) Australia

15. Which of the following has become the first country in the world to launch the nationwide 5G mobile network?

(a) United States of America

(b) South Korea

(c) China

(d) India

16. With reference to the BrahMos missile, consider the following statements:

1. The missile is named after Indian River Brahmaputra and Russian city Moscow.
2. It is a supersonic ballistic missile that can be launched from submarine, ships, aircraft, and even land-based systems.

Which of the above statements is/are correct?

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

17. Consider the following statements with reference to Indian AWACS:

1. The Phalcon AWACS operational in Indian Air Force is procured from Israel.
2. NETRA Airborne Early Warning and Control System have been built indigenously by India's DRDO.

Which of the above statements is/are correct?

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

18. Consider the following statements with reference to the indigenously developed Doppler Weather Radar (DWR) in India:

1. It is the first indigenously developed Polarimetric Doppler Weather Radar (DWR) in India.
2. It can provide even detailed information on storm's internal wind flow and structure.
3. It is installed at Cherrapunjee, Meghalaya.

Which of the above statements is/are correct?

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

19. With reference to the Defence Research and Development Organisation, consider the following statements:

1. It was formed from the amalgamation of the Technical Development Establishment (TDEs) of the Indian Army and the Directorate of Technical Development & Production (DTDP) with the Defence Science Organisation (DSO).
2. Its vision is to empower the nation with state-of-the-art indigenous defence technologies and systems.

Which of the above statements is/are correct?

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

20. Which of the following missile systems were developed under the Integrated Guided Missile Development Programme (IGMDP)?

1. Prithvi
2. Agni
3. Trishul
4. Akash
5. Nag

Select the correct answer using the code given below:

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

21. Consider the following statements regarding Hard ground swamp deer (Barasingha):

1. It is the state animal of Uttar Pradesh.
2. It has been listed vulnerable in the International Union for Conservation of Nature (IUCN) Red List of Threatened Species.

Which of the statement(s) given above is/ are correct?

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

22. Which of the following statement(s) is/ are correct regarding 'UrjaDakshata Information Tool (UDIT)'?

1. It is a user-friendly platform that explains the energy efficiency landscape of India across industry, appliances, building, transport, municipal and agriculture sectors.
2. The initiative has been launched by the Bureau of Energy Efficiency (BEE) along with World Bank.
3. The BEE is a statutory body under the Ministry of New and Renewable Energy.

Select the correct answer using the codes given below:

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

23. With reference to 'SetuBharatam Scheme', consider the following statements:

1. The scheme is launched by the Ministry of Urban Development.
2. It aims to make all National Highways free of railway level crossings.

Which of the statement(s) given above is/ are correct?

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

24. A large number of white-throated laughingthrush birds recently died mysteriously in the forests of Uttarakhand. Regarding the bird species, consider the following statements:

1. The species is found mainly in the northern regions of the Indian subcontinent.
2. Its natural habitat is subtropical or tropical moist montane forests.
3. It is listed as Vulnerable in IUCN Red List.
4. Which of the statement(s) given above is/are correct?

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

25. With reference to 'Integrated Disease Surveillance Programme (IDSP)' consider the following statements:

1. The programme was launched by the Ministry of Social Justice and Empowerment.
2. Surveillance units would be established at Centre, State and District level too.
3. It also undertakes inter-sectoral coordination for zoonotic diseases.

Which of the statements given above are correct?

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

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ANSWER HINTS

DAY - 63

1. Correct Option: (b)

Explanation:

IT and Communication

- The Web-Wonder Women Campaign has been launched by Ministry of Women and Child Development, Government of India in collaboration with Breakthrough NGO and Twitter India, to celebrate the exceptional achievements of women who have influenced and impacted society through social media.
- The Campaign aims to recognize the fortitude of Indian women stalwarts from across the globe who have used the power of social media to run positive campaigns to steer a change in society.

2. Correct Option: (a)

Explanation:

Nuclear Triad

- **Option (a) is correct:** Nuclear triad, a three-sided military-force structure consisting of land-launched nuclear missiles, nuclear-missile-armed submarines, and strategic aircraft with nuclear bombs and missiles.
- **The countries having operational nuclear triad capability are-** India, the US, United Kingdom, Russia, China, and France.

3. Correct Option: (a)

Explanation:

Ask Disha

- **Statement 1 is correct: The AskDisha is an Artificial Intelligence-based chatbot facility of Indian Railways. 'Ask Disha' chatbot is a special computer program which has been designed to simulate conversations with passengers, through the internet**. It is aimed at facilitating accessibility by answering the users' queries concerned with the various services offered to Indian Railway passengers.
- **Statement 2 is incorrect:** It is **developed and managed by e-ticketing arm of Indian Railways, Indian Railways Catering and Tourism Corporation (IRCTC)**, had earlier introduced the chatbot services of the artificial intelligence-based 'Ask Disha' in the English language. **Now, IRCTC has powered the 'Ask Disha' chatbot to converse in the Hindi language as well**.With the introduction of the chatbot service powered in Hindi, passengers can now ask queries to Ask Disha in the Hindi language through the voice medium and text.

4. Correct Option: (d)

Explanation:

Military Exercises

- Ex. INDRA- India and Russia
- Ex. KONKAN- India and United Kingdom
- Ex. MALABAR- India and United States

5. Correct Option: (d)

Explanation:

Agni-V Missile

- Agni-V is an intercontinental ballistic missile developed by the Defence Research and Development Organisation (DRDO) of India. Agni V is part of the Agni series of missiles, under the original Integrated Guided Missile Development Program (IGMDP), its range is 5000-8000 km.
- Its maximum speed it 24 Mach.

6. Correct Option: (b)

Explanation:

Defence Communication Network

- **India's first integrated Defense Communication Network (DCN) has**

been launched by the Ministry of Defence.

- It is **built by HCL Technologiesunder a nearly Rs. 600 crore project**.
- The Defence Communication Network (DCN), a strategic, highly secure and scalable system, has a pan-India reach - from Ladakh to the North East to island territories, enabling the army, air force, navy and the Special Forces Command to share situational awareness for a faster decision-making process.

7. Correct Option: (a)

Explanation:

Digital Sky Platform

- The Digital Sky Platform is launched by Ministry of Civil Aviation for the registration of Remotely Piloted Aerial Systems (RPAS), popularly referred to as drones.
- To get permissions to fly, RPAS operators or remote pilots will have to file a flight plan. Flying in the 'green zones' will require only intimation of the time and location of the flights via the portal or the app. Permissions will be required for flying in 'yellow zones' and flights will not be allowed in the 'red zones'. The location of these zones will be announced soon. Permission, if granted, will be available digitally on the portal.

8. Correct Option: (c)

Explanation:

Samwad with Students (SwS) initiative

- As part of the enhanced outreach programme of Indian Space Research Organisation, a new platform named Samwad with Students (SwS) was launched in Bengaluru recently.
- Through the SwS initiative, ISRO aims to constantly engage youngsters across India in activities concerning Space Science and capture their scientific temperament. The new conversation mission will inspire students cutting across schools and colleges.
- The first SwS event saw 40 wards and 10 teachers from select schools interact with ISRO. During the three-hour stay at ISRO HQ, the students were first briefed about Indian space programme and their benefits to the common man.

9. Correct Option: (b)

Explanation:

Military Exercises

- AviaIndra- Indian Air Force and Russian Federation Aerospace Force (RFSAF).
- Hand-In-Hand is a joint Indo-Sino military exercise.
- YudhAbhyasis a joint Indo-US Military exercise.

10. Correct Option: (b)

Explanation:

Free Space Optical Communication (FSOC)

- **Statement 1 is correct:** FSOC is an optical communication technology that uses light to wirelessly transmit data to telecommunication and internet applications. The technology remained outside the commercial applications for long owing to distance, speed, and efficiency related problems.
- **Statement 2 is incorrect:** This technology uses a beam of light through FSOC boxes placed kilometers apart on roofs or towers with the signal beamed directly between the boxes. It doesn't require special cabling. Therefore, the government of Andhra Pradesh proposes to use FSOC technology to connect the areas that are cut-off by difficult terrain, forest areas, river crossings, railway crossings etc.
- **Statement 3 is incorrect:** Google X is ready to set up its Development Centre in Visakhapatnam, Andhra Pradesh, which will be its first development centre outside the United State of America.

11. Correct Option: (d)

Explanation:

Super computer

- Prime Minister inaugurated ParamShivay Supercomputer of 833 teraflop capacity built under National Supercomputing Mission at IIT BHU.
- The National Supercomputing mission is an important initiative of Government of India. It supports the vision of the government's Digital India and Make in India and it will also play an important role in keeping India in the forefront of the world's supercomputing map.Under

this project, the Center for Development of Advanced

- Computing (C-DAC) has developed the first supercomputer ParamShivay of 833 teraflop capacities under the chain of NSM.
- Uses of ParamShivay would be in the areas like Climate assessment, weather forecasting, space engineering, seismic analysis, finance, disaster simulation and management, search astrophysics, macro-data analytics, information collection. India's first supercomputer called PARAM 8000 was launched in 1991.

12. Correct Option: (d)

Explanation:

INS Magar:

- INS Magar is the lead ship of Magar-class amphibious warfare vessels of the Indian Navy. It was built by Garden Reach Shipbuilders and Engineers, Kolkata. It was commissioned into army in 1987.

13. Correct Option: (a)

Explanation:

Operation NISTAR

- The Indian Navy has launched the Operation NISTAR in Yemen to evacuate the stranded Indians from the gulf nation.

14. Correct Option: (c)

Explanation:

Military Exercise

- Dharma Guardian is a joint military exercise between India and Japan.
- Aim- to share experience gained during various Counter-Terrorism Operations in respective countries.

15. Correct Option: (b)

Explanation:

5G Communication

- South Korea launched the world's first nationwide 5G mobile network. The superfast communications heralded by fifth-generation wireless technology will ultimately underpin everything from toasters to telephones; from electric cars to power grids.

16. Correct Option: (d)

Explanation:

BrahMos Missile

- **It is the fastest, medium-range, supersonic cruise missile that can be launched from submarine, ships, aircraft, or land cruise missile of its class in the world.**
- It flies almost three times the speed of sound at Mach 2.8 and has a range of 290 km. Hence it is also described as the world's fastest supersonic cruise missile.
- **The missile has been jointly developed with Russia and is named after the rivers Brahmaputra and Moskva in Russia.**
- The BrahMos has been inducted into the Navy and Army from 2006 onwards and the latest versions are inducted into all the three arms of the Indian military.
- Unlike warships, a BrahMos armed Sukhoi-30 can fly 1,500 kilometers in the direction of a hostile target out at sea.
- The air-to-ground BrahMos missiles can conceivably be used for pinpoint strikes on terror camps located deep inside enemy territory, or to take out underground nuclear bunkers, command-and-control centers and other high-value military targets like aircraft carriers on the high seas, from long stand-off distances
- The BrahMos is extremely difficult to be intercepted by surface to air missiles deployed on leading warships around the world.
- By July 2019, India has successfully test-fired a vertical steep dive version of BRAHMOS and even the upgraded version of the missile with an enhanced range of up to 500 km is also ready.

17. Correct Option: (c)

Explanation:

Indian AWACS

- Airborne Warning and Control System (AWACS) is a mobile, long-range radar surveillance and control centre for air defence.
- Armed with deep penetration and long-range radars, AWACS control the battle theatre in times of hostilities by providing advance information about the movement

of air assets of the adversary as well as directing air defence to prevent any breach of home air space.

- **IAF has three Israeli built PHALCON AWACS** and two more DRDO built early warning systems mounted on an Embraer jet platform.
- **The DRDO Airborne Early Warning and Control System (AEW&CS) is a project of India's Defence Research and Development Organisation to develop an airborne early warning and control system for the Indian Air Force.**
- **It is also referred to as 'NETRA' Airborne Early Warning and Control System (AEW&CS).**
- It was this NETRA aircraft that was flying well inside Indian airspace while it was providing surveillance and radar coverage for the "non-military pre-emptive action" carried out by the Mirage jets in the IAF Balakot strike on February 26th, 2019.
- India will add 2 more aircraft to strengthen AWACS capabilities and bring them at par with Pakistan amid rising security concerns in the region.

18. Correct Option: (d)

Explanation:

Doppler Weather Radar

- Doppler Weather Radar (DWR) is used for forecasting storms, cyclones, and other severe weather conditions.
- The Doppler Weather Radar provides advance information, enhancing the lead-time so essential for saving lives and property, in the event of natural disasters associated with severe weather.
- The DWR has been designed and developed by Radar Development Area, ISRO Telemetry Tracking and Command Network (ISTRAC), ISRO and manufactured by Bharat Electronics Limited (BEL), Bengaluru.
- **It is the first indigenously developed Polarimetric Doppler Weather Radar (DWR) and is installed at Cherrapunjee, Meghalaya.**
- Though the conventional radars are able to track and predict cyclones, **the DWR provides detailed information on storm's internal wind flow and structure**. The severity of the weather systems can thus be quantitatively estimated more accurately than ever before and more precise advance warnings can be generated for saving human lives and property.
- The DWR, being the first S-band dual polarimetric Doppler Weather Radar can detect the Weather phenomenon up to 500 km.
- India is set to bring its entire coast under the cover of the Doppler Weather Radar (DWR) network for cyclone monitoring by 2019-20.

19. Correct Option: (c)

Explanation:

Defence Research and Development Organisation

- **D**RDO is the R&D wing of Ministry of Defence, Govt of India, with a vision to empower India with cutting-edge defence technologies and a mission to achieve self-reliance in critical defence technologies and systems, while equipping our armed forces with state-of-the-art weapon systems and equipment in accordance with requirements laid down by the three Services.
- **DRDO was formed in 1958 from the amalgamation of the then already functioning Technical Development Establishment (TDEs) of the Indian Army and the Directorate of Technical Development & Production (DTDP) with the Defence Science Organisation (DSO**).

Vision

- **Empowering the nation with state-of-the-art indigenous Defence technologies and systems.**

Mission

- Design, develop and lead to the production of state-of-the-art sensors, weapon systems, platforms and allied equipment for our Defence Services.
- Provide technological solutions to the Services to optimise combat effectiveness and to promote the well-being of the troops.
- Develop infrastructure and committed quality manpower and build a strong indigenous technology base.

20. Correct Option: (d)

Explanation:

Integrated Guided Missile Development Programme

- The Integrated Guided Missile Development Programme (IGMDP) was conceived by Dr. A P J Abdul Kalam to enable India to attain self-sufficiency in the field of missile technology.
- Keeping in mind the requirements of various types of missiles by the defence forces, the team recommended the development of five missile systems.
- The missiles developed under the programme were:
  - **Short-range surface to surface ballistic missile Prithvi**
  - **Intermediate-range surface to surface ballistic missile Agni**
  - **Short-range low-level surface to air missile Trishul**
  - **Medium range surface to air missile Akash**
  - **3rd generation anti-tank missile Nag**

21. Correct option: (b)

Explanation

Statement 1 is incorrect: **Hard ground swamp deer is the state animal of Madhya Pradesh (NOT Uttar Pradesh).**

Supplementary notes

Near-extinct hard ground swamp deer see revival in Kanha

- Barasingha is one of the rarest species of deer family spread across central and northern India only in small congregations. The deer is native to India and Nepal.
- Barasingha is also known as swamp deer. It is the state animal of Madhya Pradesh.
- It has been listed vulnerable in the IUCN (International Union for Conservation of Nature) Red List of Threatened Species.
- The Indian Barasingha or Swamp Deer is an endangered species of deer and can be seen in protected sanctuaries in India.
- The Barasingha is a medium-sized deer. It can grow to a height of 130 cm and weigh up to 180 Kg.
- It has been listed vulnerable in the IUCN (International Union for Conservation of Nature) Red List of Threatened Species.
- A number of deer species like the hangul of Kashmir, the barasingha of Madhya Pradesh, the brow-antlered deer of Manipur, and antelope-like the Himalayan tahr - all adorn the list of endangered species.
- The Kanha tiger reserve, spread over Mandla and Balaghat districts, is the only place in the world where the species exists.
- It is located on the Maikal range of the Satpura hills and is spread over Mandla and Balaghat districts of Madhya Pradesh.
- It is a first tiger reserve in India to officially introduce a mascot, Bhoorsingh the Barasingha.
- According to a recent survey, the population of Hard ground swamp deer (Barasingha) has increased to 800 in the Kanha National park and Tiger Reserve.

22. Correct option: (a)

Explanation

Statement 2 is incorrect: **Bureau of Energy Efficiency (BEE) along with the World Resources Institute (WRI) has launched UrjaDakshata Information Tool (UDIT).**

Statement 3 is incorrect: **The BEE is a statutory body under the Ministry of Power (NOT Ministry of New and Renewable Energy).**

Supplementary notes

UrjaDakshata Information Tool (UDIT)

- Bureau of Energy Efficiency (BEE) along with the World Resources Institute (WRI) has launched UrjaDakshata Information Tool (UDIT) to facilitate a database on energy efficiency.
- UrjaDakshata Information Tool (UDIT) is a user-friendly platform that explains the energy efficiency landscape of India across industry, appliances, building, transport, municipal and agriculture sectors.
- It will also showcase the capacity building and new initiatives taken up by the Government across the sectors in the increasing energy efficiency domain.
- The BEE is a statutory body under the Ministry of Power. It was set up under the

provisions of Energy Conservation Act, 2001.

- Its mission is to assist in developing policies with the primary objective of reducing the energy intensity of the Indian Economy.

23. Correct option: (b)

Explanation

Only statement 1 is incorrect: **The Scheme is launched by the Ministry of Road Transport and Highways (Ministry of Urban Development).**

Supplementary notes

- **SetuBharatam Scheme**
  - **SetuBharatam programme** was launched in 2016 by the Ministry of Road Transport and Highways for building bridges for safe and seamless travel on National Highways.
  - The programme aims at making all national highways Railway Level Crossing free to ensure safe and smooth flow of traffic and reduce road fatalities by 50%.
  - 208 new "road over bridges/road under bridges" are envisaged for construction, while 1500 bridges will be widened, rehabilitated or replaced.

24. Correct option: (a)

Explanation

Statement 3 is incorrect: IUCN Red List: Least Concern.

Supplementary notes

White-throated laughingthrush

- Recently, around 50 white-throated laughingthrush birds died mysteriously in the forests of Berinag sub-division of Pithoragarh district in Uttarakhand.
- The white-throated laughingthrush (Proterorhinusalbogularis) is a species of passerine bird in the family Leiothrichidae.
- Its natural habitat is subtropical or tropical moist montane forests.
- It is found mainly in the northern regions of the Indian subcontinent, primarily the Himalayas and some adjoining and disjunct areas.
- IUCN Red List: Least Concern.

25. Correct option: (b)

Explanation

Only statement 1 is incorrect: **Integrated Disease Surveillance Programme was launched in 2004 by the Ministry of Health and Family Affairs with the assistance of the World Bank.**

Supplementary notes

- **Integrated Disease Surveillance Programme (IDSP)**
  - To strengthen/maintain decentralized laboratory based IT enabled disease surveillance systems for epidemic prone diseases to monitor disease trends and to detect and respond to outbreaks in early rising phase through trained Rapid Response Team(RRTs).
  - Integrates and decentralises surveillance activities through the establishment of surveillance units at Centre, State and District level.
  - Trains state surveillance officers, district surveillance officers, RRTs and other medical and paramedical staff on principles of disease surveillance as part of human resource development.
  - Uses Information Communication Technology for collection, collation, compilation, analysis and dissemination of data.
  - Strengthens public health laboratories.
  - Undertakesinter-sectoralcoordination for zoonotic diseases.

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TEST

DAY - 64

Time Allowed: 30 mins **Maximum Marks: 50**

1. 1. The term VyomMitra, recently seen in the news, refers to

(a) (a) humanoid robot being developed by the ISRO

(b) (b) anartificial intelligence-based device by Amazon

(c) (c) the renowned scientist of NASA

(d) (d) endangered species of snake found in the Western Ghats

2. Which of the following statements about LASER is/are correct?

1. The entire spectrum is of a single wavelength
2. They are produced by hot molecules of a gas vibrating randomly
3. Mercury lamp and CFL are examples of LASER light-emitting devices

Select the correct answer using the code given below:

(a) 1 only

(b) 2 only

(c) 1 and 3 only

(d) 1, 2 and 3

3. **Which of the following are the applications of Robotic Process Automation?**

1. Customer Service
2. Accounting
3. Financial Service
4. Supply Chain Management

Select the correct answer using the code given below:

(a) 2 only

(b) 1, 2 and 3 only

(c) 1, 3 and only

(d) 1, 2, 3 and 4

4. With reference to the Nuclear Suppliers Group (NSG), consider the following statements:

1. It was founded in 1974.
2. It comprises of those members whom contribute to the non-proliferation of nuclear weapons.

Which of the above statements is/are correct?

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2

5. The government of India recently put four nuclear reactors under IAEA Safeguards. In light of this, consider the following statements:

1. Safeguarded nuclear facilities can use imported uranium for civilian purposes only while unsafeguarded facilities can use imported uranium for any purpose.
2. New reactor plants established with foreign collaboration are automatically placed under IAEA safeguards.

Which of the above statements is/are correct?

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2

6. India and Russia have signed a Memorandum of Understanding (MoU) to constructRooppur Atomic Energy Plant, which is located in

(a) Sri Lanka
(b) Bangladesh
(c) Nepal
(d) Afghanistan

7. The chain reaction is controlled in a nuclear reactor to generate electricity. In this context, consider the following statements:

1. Moderators are provided along with fissionable material to increase the speed of slow neutrons for sustaining the chain reaction.
2. Control rods are used for controlling the reaction rate in a nuclear reactor.
3. The nuclear reactor coolant used to absorb the heat can also act as a moderator.

Which of the above statements are correct?

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

8. Consider the following statements regarding humanoid robots:

1. Sophia is the first humanoid robot to get citizenship in UAE.
2. Rashmi is an Indian version of Sophia that can speak Hindi, Bhojpuri, and Marathi along with English.

Which of the above statements is/are correct?

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

9. With reference to India's Robocop 'KP-Bot', consider the following statements:

1. It has been inducted at Goa police headquarters.
2. It is equipped with facilities to fix the appointment of visitors with officers and also open new files based on their grievances.

Which of the above statements is/are correct?

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

10. Consider the following statements regarding 'Kirobo Robot':

1. It is a micro-robot developed for deep-ocean research.
2. It has been developed by a collaborative effort between the University of Tokyo, Toyota, and JAXA.

Which of the above statements is/are ***incorrect***?

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

11. Which of the following is/are the method of synthesis of carbon nanotubes?

(a) Laser Method
(b) Chemical Vapour Deposition Method
(c) Arc Method
(d) All of the above

12. A nanoparticle that is made from fat molecules surrounding a core of water is known as:

(a) Liposome
(b) Vesicles
(c) Proteomics
(d) None of the above

13. Consider the following statements about All India Council for Robotics and Automation:

1. It is a not-for-profit organization established in 2014.
2. It aims to promote and build an ecosystem for robotics and automation in India.

Which of the above statements is/are correct?

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

14. Consider the following statements regardingNanogenerator made in India:

1. A Nanogenerator is a type of technology that converts mechanical or thermal energy produced from small-scale physical change into electricity.
2. The piezoelectric polymer used in it is coated with inorganic ferroelectric material (BaTiO3).

Which of the above statements is/are correct?

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

15. With reference to India's nuclear program, consider the following statements:

1. Thethree-stage nuclear power programme was formulated by HomiBhabha in the 1950s.
2. Nuclear power in India delivers a total capacity of 6.7 GWe (Giga Watt Electricity), contributing about 2% of the country's electricity supply.

Which of the above statements is/are correct?

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

16. With reference to Nuclear Power Corporation of India Ltd. (NPCIL), which of the following statements is/ are correct?

1. It was founded in 1987.
2. It aims to configure the indigenous nuclear power program.

Which of the above statements is/are correct?

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

17. Consider the following statements with reference to Nanotechnology:

1. It involves science and engineering of objects in the range of only 1 to 10 nanometer.
2. An atomic force microscope is used to generate images of nanoscale details on a physical surface.

Which of the above statements is/are correct?

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

18. With reference to Quantum dots, consider the following statements:

1. They are semiconductor nanoparticles that glow a particular colour after being illuminated by light.
2. Quantum dots are both photoluminescent and electro-active.

Which of the above statements is/are correct?

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

19. With reference to the Chatbots, consider the following statements:

1. These are computer programs designed to simulate conversations with human users over the internet.
2. Rule-based chatbots provide predefined responses from a database, based on the keywords used for the search.
3. Siri and Alexa are a type of Data-driven and predictive chatbots.

Which of the above statements are correct?

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

20. Consider the following statements with reference to Buckyball:

1. They are composed of carbon atoms linked to three other carbon atoms by covalent bonds.

2. They are very good electron acceptors that can be used in increasing the efficiency of solar cells.

Which of the above statements is/are correct?

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2

21. With reference to UdyamSakhi Portal consider the following statements:

1. The portal is an initiative of the Ministry of Women and Child Development.
2. It aims to encourage women entrepreneurs by creating business models.

Which of the above statement(s) is/are correct?

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2

22. In the last 30 years, some 40% of the giraffe population has disappeared and poaching for meat and skin continues. Recently, two extremely rare white giraffes have been killed by poachers in north-eastern Kenya.

In light of the above fact, consider the following statements regarding Giraffe:

1. Giraffes are most often found in Savanna and woodland habitats.
2. In white giraffes, their white appearance is due to leucism.
3. IUCN Status of a Giraffe is 'endangered'.

Which of the statements given above are correct?

(a) 1 and 2 only

(b) 2 and 3 only

(c) 1 and 3 only

(d) 1, 2 and 3

23. Recently, the term "Oculuden taviskhaungraae" was in news, with regards to that choose the correct option:

(a) It is a fossilised skull of a flying dinosaur which may be the smallest Dinosaur yet discovered.

(b) It is an exotic plant species found in the state of Tamil Nadu.

(c) It is a type of grass recently discovered that is been considered to kill coronavirus.

(d) It is a kind of herb having medicinal values recently found in Kenya.

24. Consider the following statements regarding 'BhoomiRashi Portal':

1. The Portal is launched by the Ministry of Housing and Urban Affairs.
2. It is a single point platform for online processing of land acquisition projects to accelerate Railway infrastructure development.
3. It has been integrated with the Public Financial Management System (PFMS).

Which of the above statement(s) is/are correct?

(a) 1 and 2 only

(b) 2 only

(c) 3 only

(d) 1, 2 and 3

25. With reference to National Biopharma Mission consider the following statements:

1. It is an industry-academia collaborative mission.
2. It is launched by the Department of Biotechnology (DBT).
3. 50% of funding would be done by a loan from the Asian Infrastructure Investment Bank.

Which of the statement(s) given above is/ are correct?

(a) 1 and 2 only

(b) 2 and 3 only

(c) 3 only

(d) 1, 2 and 3

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ANSWER HINTS

DAY - 64

1. Correct Option: (a)

Explanation:

VyomMitra

- Vyommitra is a female spacefaring humanoid robot being developed by the Indian Space Research Organisation to function on-board the Gaganyaan, a crewed orbital spacecraft.

2. Correct option: (a)

Explanation

LASER:

- "**LASER**" is an acronym for **L**ight **A**mplification by **S**timulated **E**mission of **R**adiation. It is quite different from a light bulb or a flashlight. Lasers produce a very narrow beam of light. Each color of light has a different wavelength.
- **They do not occur in nature**. The laser's light waves travel together with their peaks all lined up, or in phase. This is why laser beams are very narrow, very bright, and can be focused on a very tiny spot.
- **Statement 2 is incorrect: Mechanism of laser production:** A laser is created when the electrons in atoms in special glasses, crystals, or gases absorb energy from an electrical current or another laser and become "excited." The excited electrons move from a lower-energy orbit to a higher-energy orbit around the atom's nucleus. When they return to their normal or "ground" state, the electrons emit photons (particles of light). They are **not** produced by hot gaseous molecules
- These photons are all at the same wavelength and are "coherent" meaning the crests and troughs of the light waves are all in lockstep. In contrast, ordinary visible light comprises multiple wavelengths and is not coherent.
- Laser light is directional. A laser generates a very tight beam, a flashlight produces diffuse light. Because laser light is coherent, it stays focused for vast distances, even to the moon and back.

3. Correct Option: (d)

Explanation:

Applications of Robotic Process Automation

- **Customer service:** RPA can help companies offer better customer service by automating contact center tasks, including verifying e-signatures, uploading scanned documents and verifying information for automatic approvals or rejections.
- **Accounting:** Organizations can use RPA for general accounting, operational accounting, transactional reporting and budgeting.
- **Financial services:** Companies in the financial services industry can use RPA for foreign exchange payments, automating account openings and closings, managing audit requests and processing insurance claims.
- **Healthcare:** Medical organizations can use RPA for handling patient records, claims, customer support, account management, billing, reporting and analytics.
- **Human resources:** RPA can automate HR tasks, including onboarding and offboarding, updating employee information and timesheet submission processes.
- **Supply chain management:** RPA can be used for procurement, automating order processing and payments, monitoring inventory levels and tracking shipments.

4. Correct Option: (c)

Explanation:

Nuclear Suppliers Group (NSG)

- **The Nuclear Suppliers Group (NSG) is a group of nuclear supplier countries**

that seeks to contribute to the non-proliferation of nuclear weapons through the implementation of two sets of Guidelines for nuclear exports and nuclear-related exports.

- The NSG was founded in response to the Indian nuclear test in May 1974 and first met in November 1975.

5. Correct Option: (b)

Explanation:

Indian Nuclear Facilities under IAEA Safeguards

- The government of India has decided to place four more nuclear reactors under the IAEA safeguards.
- The four reactors will include two Russian-designed Pressurized Light Water Reactors and two Pressurized Heavy Water Reactors built with Indian technology.
- With the addition of four new nuclear reactors, a total of 26 Indian nuclear facilities will be under IAEA, the nuclear energy watchdog.
- These reactors are eligible to import uranium to generate nuclear energy for civilian purposes.
- **As India is not a party to the Non-Proliferation Treaty (NPT), it has classified its nuclear facilities into two types under Separation Plan:**
  - **Unsafeguarded- where domestic uranium can be used anywhere India wants.**
  - **Safeguarded- where imported uranium would be used for civilian nuclear energy**.
- Since India's use of domestic uranium could not anyway be restricted, this was seen as a balance between the benefits of nuclear energy in emission reduction and the risks of increasing India's military capability.
- A special set of India-specific safeguards, negotiated with the International Atomic Energy Agency (IAEA), a UN body, ensures that imported uranium was not diverted for military use.
- **New reactor plants established with foreign collaboration are automatically placed under the IAEA safeguards.**

6. Correct Option: (a)

Explanation:

Rooppur Atomic Energy Plant

- According to Rosatom, India, Bangladesh, and Russia signed an agreement to allow Indian firms in construction and installation works in the "non-critical" category for the Rooppur nuclear power plant project in northwest Bangladesh.

7. Correct Option: (c)

Explanation:

Working of a Nuclear Reactor

- The fact that more neutrons are produced in fission than are consumed raises the possibility of a chain reaction with each neutron that is produced triggering another fission. This chain reaction can be controlled in a nuclear reactor to generate electric power.
- But soon it was discovered that neutrons liberated in the fission of a uranium nucleus were so energetic that they would escape instead of triggering another fission reaction.
- **Therefore, in reactors, light nuclei called moderators are provided along with the fissionable nuclei for slowing down fast neutrons.** The moderators commonly used are water, heavy water and graphite. The Apsara reactor at the Bhabha Atomic Research Centre (BARC), Mumbai, uses water as a moderator. The other Indian reactors, which are used for power production, use heavy water as a moderator.
- Because of the use of moderator, the ratio, K, of the number of fission produced by a given generation of neutrons to the number of fission of the preceding generation may be greater than one.
- This ratio is called the multiplication factor; it is the measure of the growth rate of the neutrons in the reactor. For $K = 1$, the operation of the reactor is said to be critical, which is what we wish it to be for a steady power operation. If K becomes greater than one, the reaction rate and the reactor power increases exponentially. Unless the factor K is brought down very close to unity, the reactor will become supercritical and can even explode.
- **The reaction rate is controlled through control-rods made out of neutron-absorbing material such as cadmium.** To raise or lower the power,

the number of reactions must be changed (using the control rods) so that the number of neutrons present (and hence the rate of power generation) is either reduced or increased. Withdrawal of the rods increases the parameter one or more (multiplication factor), thus increasing the power. Insertion of the rods decreases the parameter one or more (multiplication factor), thus decrease the power.

- **A nuclear reactor coolant — usually water but sometimes a gas or a liquid metal (like liquid sodium) or molten salt — is circulated past the reactor core to absorb the heat that it generates.** The heat is carried away from the reactor and is then used to generate steam.
- **In some reactors, the coolant also acts as a neutron moderator.** If the coolant is a moderator, then temperature changes can affect the density of the coolant/moderator and therefore change power output. A higher temperature coolant would be less dense, and therefore a less.

8. Correct Option: (b)

Explanation:

Humanoid Robot

- A humanoid robot is a robot with its body shape built to resemble the human body.
- **Sophia is a social humanoid robot developed by Hong Kong-based company Hanson Robotics.**
- In October 2017, at the Future Investment Summit in Riyadh, the robot was granted Saudi Arabian citizenship, becoming the first robot ever to have a nationality.
- In November 2017, Sophia was named the United Nations Development Programme's first-ever Innovation Champion and is the first non-human to be given any United Nations title.
- **Rashmi is an Indian version of Sophia robot which can speak Hindi, Bhojpuri, and Marathi along with English.**
- Rashmi is India's first lip-synching robot which functions under a specially designed software and linguistic interpretation system.
- It uses linguistic interpretation (LI), artificial intelligence (AI), visual data and facial recognition systems. The LI program analyses the feeling of the conversation while the AI program analyses the conversation to extract the response from the device.

9. Correct Option: (b)

Explanation:

KP-Bot

- **Kerala Police Headquarters has become the first in the country to use a robot for police work**.
- The KP-Bot will be deployed to perform duties of the front office of the police headquarters and it has been given the rank of sub-inspector (SI).
- It will receive visitors and direct them to different places as and when required.
- **The robot is equipped with facilities to fix an appointment with officers, provide them with identity cards and also open new files based on their grievances**.
- This RoboCop is capable of identifying higher officials and greet them with a salute.
- Its duties would include identifying and guiding a visitor to the concerned department. It would also enquire about the details of the visitors and record their complaints.
- Powered by Al along with a range of sensors gathering information of the surroundings, KP-bot can work alongside human beings seamlessly.

10. Correct Option: (a)

Explanation:

Kirobo Robot

- Kirobo is Japan's first robot astronaut which accompanied 'Koichi Wakata', the **first Japanese commander of the International Space Station**.
- **Kirobo was developed by a collaborative effort between Dentsu, the University of Tokyo's Research Center for Advanced Science and Technology, Toyota, and JAXA (Japan Aerospace Exploration Agency)**.
- The robot's capabilities include voice and speech recognition, natural language processing, speech synthesis, and telecommunications, as well as facial recognition and video recording.

11. Correct Option: (d)

Explanation:

Synthesis of Carbon Nanotubes

- **Laser Method:** Dual-pulsed laser vaporization technique is used to produce single-wall nanotubes by laser vaporization of graphite rods with a 50:50 catalyst mixture of Co and Ni at high temperature in flowing argon, followed by heat treatment in a vacuum at 1000oC to remove the C60 and other fullerenes.
- **Chemical Vapour Deposition:** It is one of the synthesis methods for carbon nanotubes. Large amounts of CNTs can be formed by catalytic CVD of acetylene over Co and Fe catalysts supported on silica or zeolite. Fullerenes and bundles of Single Wall Nano Tubes were also found among the Multi-Wall Nano Tubes produced on the carbon/zeolite catalyst.
- **Arc Method:** This method creates CNTs through arc-vaporization of two carbon rods placed end to end in an enclosure that is usually filled with inert gas (helium, argon) at low pressure. A direct current of 50 to 100 A, driven by a potential difference of approximately 20 V, creates a high-temperature discharge between the two electrodes. The discharge vaporizes the surface of one of the carbon electrodes and forms a small rod-shaped deposit on the other electrode.

12. Correct Option: (a)

Explanation:

Liposome

- **A liposome is a type of nanoparticle made from fat molecules surrounding a core of water**.
- **They were the first nanoparticles used to create unique therapeutic agents**.
- It is used for the encapsulation and delivery of bioactive agents.
- Liposomes possess particular properties such as biocompatibility, biodegradability.
- Their nanosize has potential applications in nanomedicine, cosmetics, and the food industry.
- Nanoliposome technology offers food technologists a way to include encapsulation and controlled release of food ingredients along with improved bioavailability and stability of sensitive materials.

13. Correct Option: (d)

Explanation:

All India Council for Robotics and Automation

- It is a not-for-profit organization established in 2014.
- It sets up standards in robotics & automation and education industry, helping organizations and professionals to solve difficult technical problems while enhancing their leadership and personal career capabilities.
- It is engaged in various activities and has launched several programs to promote and build an ecosystem for robotics and automation in India.

14. Correct Option: (c)

Explanation:

Nanogenerator

- Researchers at IISER, Pune have fabricated a flexible portable nano-generator for wearable electronics.
- **Statement 1 is correct:** A Nanogenerator is a type of technology that converts mechanical or thermal energy produced from small-scale physical change into electricity.
  - ➤ It generates electric power when pressure or twist is applied got a shot in the arm. The Nanogenerator produces 14 volts when thumb pressure is applied.
  - ➤ To achieve this, a piezoelectric polymer [P (VDF-TrFE)] was electrospun directly onto a flexible, conducting carbon cloth. The carbon cloth was produced by the researchers by heating a piece of cotton cloth at 800°C for several hours in an inert atmosphere.
- Statement 2 is correct: Piezoelectric polymers are those which accumulate electric charge in response to applied mechanical stress.
  - ➤ To improve the piezo voltage of the polymer fibers, the researchers coated the fibers with a stronger, inorganic ferroelectric material (BaTiO3) paste. The nanoparticles from the coating help fill the gaps between the polymer nanofibres and increase the piezoelectric property.

- Currently, there is considerable research emphasis to develop flexible or wearable devices. Such Piezoelectric materials, which can generate electrical power locally through stress or flexing, are a great proposition in the creation of such devices that are portable, lightweight, shock-resistant, and inexpensive.

15. Correct Option: (c)

Explanation:

India's nuclear program

- **Statement 1 is correct:** India has consciously proceeded to explore the possibility of tapping nuclear energy for the purpose of power generation. In this direction three-stage nuclear power programme was formulated by HomiBhabha in the 1950s..
- **Statement 2 is correct:**Nuclear power in India delivers a total capacity of 6.7 GWe (Giga Watt Electricity), contributing about 2% of the country's electricity supply.
- India has ambitious plans to increase nuclear power generation capacity to 275 GWe by 2052. At the start of 2018, six reactors were under construction in India, with a combined capacity of 4.4 GWe.

16. Correct Option: (c)

Explanation:

Nuclear Power Corporation of India Ltd. (NPCIL)

- The Nuclear Power Corporation of India Limited (NPCIL) is an Indian public sector undertaking based in Mumbai, Maharashtra. It is wholly owned by the Government of India and is responsible for the generation of nuclear power for electricity. NPCIL is administered by the Department of Atomic Energy (DAE).
- NPCIL was created in September 1987 under the Companies Act 1956, "with the objective of undertaking the design, construction, operation and maintenance of the atomic power stations for generation of electricity in pursuance of the schemes and programmes of the Government of India under the provision of the Atomic Energy Act 1962." All nuclear power plants operated by the company are certified for ISO-14001 (Environment Management System).

17. Correct Option: (b)

Explanation:

Nanotechnology

- The idea of nanotechnology was born in 1959 when physicist Richard Feynman gave a lecture exploring the idea of building things at the atomic and molecular scale.
- The term 'Nanotechnology' was coined in 1974 by Norio Taniguchi of Tokyo Science University to describe semiconductor processes such as thin-film deposition that deal with control on the order of nanometers.
- **Nanotechnology is science, engineering, and technology conducted at the nanoscale, which is about 1 to 100 nanometers.**
- Nanoscience and nanotechnology are the study and application of extremely small things and can be used across all the other science fields, such as chemistry, biology, physics, materials science, and engineering.
- **An Atomic force microscope is a scientific instrument that can generate images of nanoscale details on a physical surface by scanning small nanoscale probes.**

18. Correct Option: (c)

Explanation:

Quantum Dots

- Quantum dots are semiconductor nanoparticles that glow a particular colour after being illuminated by light. The colour they glow depends on the size of the nanoparticle. When the quantum dots are illuminated by UV light, some of the electrons receive enough energy to break free from the atoms.
- This capability allows them to move around the nanoparticle, creating a conductance band in which electrons are free to move through a material and conduct electricity.
- When UV light hits these semiconducting nanoparticles, they can emit light of various colours.
- Nanoparticles of semiconductors – quantum dots – were theorized in the 1970s and initially created in the early 1980s.
- Due to their particular electronic properties, they can be used as active materials in single-electron transistors.

- The properties of a quantum dot are not only determined by its size but also by its shape, composition, and structure.
- Quantum dots have found applications in composites, solar cells and fluorescent biological labels (for example to trace a biological molecule) which uses both the small particle size and tunable energy levels.
- Advances in chemistry have resulted in the preparation of monolayer-protected, high-quality, monodispersed, crystalline quantum dots as small as 2 nm in diameter, which can be conveniently treated and processed as a typical chemical reagent.
- **Quantum dots are both photoluminescent and electro-active** and hence find their most common use nowadays in display screens.
- Quantum Dots can be deposited on any substrate and can be used to make even rollable display screens.

19. Correct Option: (d)

Explanation:

ChatBots

- **A Chatbot or Chatter Robot is a computer program designed to simulate conversation with human users, especially over the Internet.**
- It is an assistant that communicates with us through text messages, a virtual companion that integrates into websites, applications or instant messengers and helps entrepreneurs to get closer to customers.
- Such a bot is an automated system of communication with users.
- Chatbots works in two ways- Rule-based and Smart machine-based.
- Rule-based chatbots provide predefined responses from a database, based on the keywords used for the search.
- Smart machine-based chatbots inherit its capabilities from Artificial Intelligence and Cognitive Computing and adapt their behaviour based on customer interactions.
- There are two main types of chatbots:
  - **Task-oriented (declarative) chatbots** are single-purpose programs that focus on performing one function. Interactions with these chatbots are highly specific and structured and are most applicable to support and service functions. These are currently the most commonly used chatbots.
  - **Data-driven and predictive (conversational) chatbots** are often referred to as virtual assistants or digital assistants, and they are much more sophisticated, interactive, and personalized than task-oriented chatbots. Digital assistants can learn a user's preferences over time, provide recommendations, and even anticipate needs. In addition to monitoring data and intent, they can initiate conversations. Apple's **Siri** and Amazon's **Alexa** are examples of consumer-oriented, data-driven, predictive chatbots.

20. Correct Option: (c)

Explanation:

Buckyball

- Buckyball or Buckminsterfullerene is a type of fullerene with the formula C60.
- It has a cage-like fused-ring structure that resembles a soccer ball, made of twenty hexagons and twelve pentagons.
- It was one of the first nanoparticles discovered in 1985 by a trio of researchers working out of Rice University named Richard Smalley, Harry Kroto, and Robert Curl.
- Buckyballs are composed of carbon atoms linked to three other carbon atoms by covalent bonds.
- The covalent bonds between carbon atoms make buckyballs very strong, and the carbon atoms readily form covalent bonds with a variety of other atoms.
- Buckyballs are used in composites to strengthen the material.
- Buckyballs have the electrical property of being very good electron acceptors. This feature is useful, for example, in increasing the efficiency of solar cells in transforming sunlight into electricity.

21. Correct option: (b)

Explanation

- Only statement 1 is incorrect: UdyamSakhi Portal is an initiative of the Ministry of Micro, Small & Medium Enterprises

(NOT Ministry of Women and Child Development)

Supplementary notes

- Recently, it has been observed that India is witnessing a phenomenal rise in women entrepreneurship.
- The successful presence of women in almost every field has a great impact on women entrepreneurship.
- UdyamSakhi is the project which is designed to give such women to feel comfortable by getting the right information to go for self-employment on one single portal.
- The Ministry of Micro, Small and Medium Enterprises (MSME) launched UdyamSakhi Portal for women entrepreneurs of India in 2018.
- The portal is a network for nurturing entrepreneurship and creating business models for low-cost products and services to empower women and make them self-reliant and self-sufficient.
- The portal assists with its platform for entrepreneurship learning tools, incubation facility, training programs for fundraising, providing mentors, one-on-one investor meet, provide market survey facility and technical assistance.

22. Correct option: (a)

Explanation

- Only statement 3 is incorrect: The International Union for Conservation of Nature (IUCN), the gold standard for assessing endangerment, has found that giraffes are "vulnerable".

Supplementary notes

- Recently, Poachers have killed two extremely rare white giraffes in northeast Kenya leaving just one such animal in the world.
- Giraffes are most often found in savanna/ woodland habitats and range widely throughout Africa.
- IUCN Status: Vulnerable
- CITES: Appendix II
- Threats: Habitat loss, civil unrest, poaching and ecological issues.
- In white giraffes, their white appearance is due to a rare condition called leucism, which causes skin cells to have no pigmentation.
  - ➤ Leucism inhibits pigmentation in some skin cells
  - ➤ It is different from albinism where no melanin is produced at all
  - ➤ Animals with leucism may have darker pigment in their soft tissue
  - ➤ Giraffes with leucism retain their dark eyes, whereas animals with albinism have pink eyes
  - ➤ Birds, lions, fish, peacocks, penguins, eagles, hippos, moose and snakes have all displayed traits of leucism

23. Correct option: (a)

Explanation

- Recently scientists identified a fossilised skull of a flying dinosaur named 'Oculudentaviskhaungrae' which may be the smallest Dinosaur yet discovered.

Supplementary notes

Oculudentaviskhaungraae

- Recently, scientists have identified a fossilised skull of a flying dinosaur named Oculudentaviskhaungrae which may be the smallest Dinosaur yet discovered.
- It was discovered in 99-million-year-old amber in northern Myanmar.
- The Skull is only 7.1 mm in length which indicates the dinosaur was similar in size than the bee hummingbird, the smallest living bird.
- The fossil is said to be from the Mesozoic era which is about 250 million to 65 million years ago.

24. Correct option: (c)

Explanation

- Statement 1 is incorrect: BhoomiRashi Portal was launched in 2018 by the Ministry of Road Transport & Highways with the help of National informatics Centre (NIC).
- Statement 2 is incorrect: It acts as a single point platform for online processing of land acquisition projects to accelerate highway infrastructure development (NOT railway) in the country.

Supplementary notes

- Launched in 2018 by the Ministry of Road Transport & Highways with the help of National informatics Centre (NIC).

- It acts as a single point platform for online processing of land acquisition projects to accelerate highway infrastructure development in India.
- The portal has been integrated with the Public Financial Management System (PFMS) for depositing the compensation in the account of affected/ interested persons on a real-time basis.
- PFMS is a web-based online software application developed and implemented by the Office of Controller General of Accounts (CGA).
- Aims to facilitate a sound Public Financial Management System for the Government of India (GoI) by establishing an efficient fund flow system as well as a payment cum accounting network.
- Its coverage includes a) Central Sector and Centrally Sponsored Schemes b) Direct Benefit transfer among others.

25. Correct option: (a)

Explanation

- Statement 3 is incorrect: It was launched by the Department of Biotechnology (DBT) with 50% co-funding by World Bank loan (NOT AIIB).

Supplementary notes

National Biopharma Mission

- The National Biopharma Mission (NBM) is an industry-academia collaborative mission for accelerating biopharmaceutical development in the country.
- It was launched in 2017 by the Department of Biotechnology (DBT) with 50% co-funding by World Bank loan.
- Implementation: Biotechnology Research Assistance Council (BIRAC)-a Public Sector Undertaking of DBT.
- Under this Mission, Government has launched Innovate in India (i3) programme to create an enabling ecosystem to promote entrepreneurship and indigenous manufacturing in the biopharma sector.

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TEST
DAY - 65

Time Allowed: 30 mins **Maximum Marks: 50**

1. Which of the following statements regarding the Pugwash Conferences on Science and World Affairs is/are correct?

1. Its mission is to reduce armed conflict.
2. It was founded at Nova Scotia, Canada.

Select the correct option using the codes given below:

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

2. Which of the following statements regarding the Chemical Weapons Convention is/are correct?

1. It is administered by the Organisation for the Prohibition of Chemical Weapons, based in The Hague.
2. All the UN members are signatory to the Convention.
3. India is a signatory to the Convention but has not ratified it so far.

Select the correct option using the codes given below:

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

3. Which of the following organizations has started the "RemoveDEBRIS mission"?

(a) NASA
(b) University of Surrey
(c) The Space Foundation
(d) Bill & Melinda Gates Foundation

4. Which of the following organizations has recently published the Global Talent Competitiveness Index?

(a) World Economic Forum
(b) World Bank
(c) Organisation for Economic Co-operation and Development
(d) INSEAD

5. Which of the following are included amongst the top 5 global risks as per the Global Risks Report, published by the World Economic Forum?

1. Human-made environmental damage anddisasters.
2. Major natural disasters
3. Trade War

Select the correct option using the codes given below:

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

6. Q6. Which of the following statements regarding the Biological Weapons Convention (BWC)are correct?

1. The BWC bans both the Biological agents and toxins except for prophylactic, and peaceful purposes.
2. It does not ban the use of biological and toxin weaponsbut reaffirms the 1925 Geneva Protocol, which prohibits such use.
3. It is a legally binding treaty on all the United Nation members.

Select the correct option using the codes given below:

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

7. Which of the following organization has recently launched the Starlink Network project?

(a) National Aeronautics and Space Administration
(b) European Space Agency
(c) SpaceX
(d) Japan Aerospace Exploration Agency

8. Which of the following organizations organized the 5th Asia Pacific Drosophila Research Conferences?

(a) Indian Institute of Science Education and Research (IISER), Pune
(b) Indian Institute of Science Education and Research (IISER), Mohali
(c) Indian Institute of Science Education and Research (IISER), Bhopal
(d) Indian Institute of Science Education and Research (IISER), Kolkata

9. India is keen to be a part of the East Asian Observatories Consortium (EACAO). Regarding this, which of the following statements is/are correct?

1. It consists of only East Asian countries.
2. The organization is based at Tokyo.

Select the correct option using the codes given below:

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

10. Which of the CSIR labs have implemented the IndiGen genome project?

1. Cellular and Molecular Biology, Hyderabad
2. Institute of Genomics and Integrative Biology, New Delhi
3. Indian Institute of Chemical Biology (IICB), Kolkata
4. National Chemical Laboratory (NCL), Pune

Select the correct option using the codes given below:

(a) 1 and 2 only
(b) 2 and 3 only
(c) 3 and 4 only
(d) 1 and 4 only

11. Which of the following statements regarding WHO is/are correct?

1. It is a member of the United Nations Development Group.
2. Its foundation day is celebrated every year as World Health Day.
3. It is successor to the Health Organisation, an agency of the League of Nations.

Select the correct option using the codes given below:

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

12. Recently, the Drone Innovators Network Summit-2019 was held in New Delhi. It was organized by which of the following organizations?

(a) United Nations Industrial Development Organization
(b) International Civil Aviation Organization
(c) World Economic Forum
(d) United Nations Department of Economic and Social Affairs

13. On the 150th birth Anniversary of Mahatma Gandhi, the 'Gandhian Challenge'was launched by__

1. UNICEF
2. UNESCO
3. NITI Aayog

Select the correct option using the codes given below:

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

14. Recently International Intellectual Property Index 2020 was released by which organization?

(a) World Intellectual Property Organization

(b) Global Innovation Policy Centre

(c) INSEAD

(d) World Economic Forum

15. Which of the following pairs regarding organizations and their headquarters are correctly matched?

1. International Fund for Agricultural Development: Rome
2. International Maritime Organization: London
3. International Civil Aviation Organization: Quebec
4. International Telecommunication Union: New York

Select the correct option using the codes given below:

(a) 1 and 4 only

(b) 2, 3, and 4 only

(c) 1, 2, and 3 only

(d) 1, 2, 3, and 4

16. Consider the following statements regarding DART space probe:

1. It is an asteroid deflecting mission to prevent a collision with earth.
2. It would be the first mission of Roscosmos to demonstrate such capability.

Which of the above statements is/are correct?

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2

17. With respect to Outer Space Missions, consider the following pairs:

1. Gaia Mission – NASA
2. Hongyun Project – Chinese Space Agency
3. MAVEN Spacecraft – European Space Agency
4. Hayabusa 2 – JAXA

Which of the above pairs are correctly matched?

(a) 1 and 4 only

(b) 2 and 4 only

(c) 1 and 2 only

(d) 1, 3 and 4 only

18. With reference to the NISAR mission, consider the following statements:

1. It is joint earth observing mission of NASA and JAXA.
2. NISAR will be the first satellite mission to use two different radar frequencies for measuring and surface changes less than a metre across.

Which of the above statements is/are incorrect?

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2

19. With reference to the YUVIKA program, consider the following statements:

1. The program focuses on arousing the interest of university-level students in the emerging areas of Space activities.
2. The program has been organized by the Ministry of Home Affairs along with the Department of Science and technology.

Which of the above statements is/are incorrect?

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2

20. With reference to the Spitzer Space Telescope recently seen in the news, consider the following statements:

1. It is a part of 'Great Observatories' designed by NASA for space research.
2. It captures X-rays emitted by a warm object like stars in space.
3. It will be decommissioned by its agency by 2020.

Which of the above statements is/are correct?

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

21. With reference to the 'Silk Samagra Scheme', consider the following statements:

1. It is a Central Sector Scheme.
2. It is being implemented by the Central Silk Board (CSB).
3. Sericulture is an agro-based industry.

Which of the statements given above are correct?

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

22. With reference to Exercise (SAREX-2020), consider the following statements:

1. The exercise has been conducted annually since 2003.
2. The exercise is been conducted by the Indian Navy.
3. Theme this year was "Harmonization of Maritime and Aeronautical Search and Rescue named 'HAMSAR'.

Which of the statement(s) given above is/ are correct?

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

23. Consider the following statements regarding the 'Kisan Rail Scheme':

1. The scheme was proposed by the Ministry of Agriculture.
2. It aims to set up a national cold supply chain to transport highly perishable goods including milk, fish and meat.
3. It will be set up through a public-private-partnership (PPP) arrangement.

Which of the above statements are correct?

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

24. With reference to "Senna Spectabilis", consider the following statements:

1. It is a plant species native to Africa.
2. It is categorised as 'Least Concern' under IUCN Red List.
3. Nilgiri Biosphere Reserve is a part of the Western Ghats which is a World Heritage Site.

Which of the statements given above are correct?

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

25. Which of the following statement(s) is/ are correct about the Article 35A of the Indian Constitution?

1. It gave the Jammu and Kashmir Legislature a carte blanche to decide who all are 'permanent residents' of the State and confer on them special rights and privileges in the public sector.
2. It has been scrapped recently through a Presidential Order.

Choose the correct option:

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

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ANSWER HINTS

DAY - 65

1. Correct Option: (c)

Explanation:

Pugwash Conferences on Science and World Affairs

- The Pugwash Conferences on Science and World Affairs is an international organization that brings together scholars and public figures to work toward **reducing the danger of armed conflict and to seek solutions to global security threats.**
- **The mission of the Pugwash Conferences on Science and World Affairs is to bring scientific insight and reason to bear on namely, the catastrophic threat posed to humanity by nuclear and other weapons of mass destruction.**
- **It was founded in 1957 by Joseph Rotblat and Bertrand Russell in Pugwash, Nova Scotia, Canada, following the release of the Russell–Einstein** Manifesto in 1955.
- Rotblat and the Pugwash Conference jointly won the Nobel Peace Prize in 1995 for their efforts on **nuclear disarmament.**

2. Correct Option: (a)

Explanation:

Chemical Weapons Convention

- The Chemical Weapons Convention (CWC) is an arms control treaty that outlaws the production, stockpiling, and use of chemical weapons and their precursors. The full name of the treaty is the Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction and **it is administered by the Organisation for the Prohibition of Chemical Weapons (OPCW), an intergovernmental organization based in The Hague, The Netherlands.**
- The Chemical Weapons Convention prohibits the large-scale use, development, production, stockpiling and transfer of chemical weapons. Very limited production for research, medical, pharmaceutical or protective purposes is still permitted. The main obligation of member states under the convention is to affect this prohibition, as well as the destruction of all current chemical weapons. All destruction activities must take place under OPCW verification.
- As of May 2018, 193 states have become parties to the CWC and accept its obligations**. Israel has signed but not ratified the agreement, while three other UN member states (Egypt, North Korea and South Sudan) have neither signed nor acceded to the treaty.** Most recently, the State of Palestine deposited its instrument of accession to the CWC on 17 May 2018. In September 2013 Syria acceded to the convention as part of an agreement for the destruction of Syria's chemical weapons.
- **India ratified the Convention on 3 September 1996.**

3. Correct Option: (b)

Explanation:

RemoveDEBRIS

- It is aimed at performing key Active Debris Removal (ADR) technology demonstrations to find the best way to capture the estimated 40,000 pieces of space debris that is orbiting Earth.
- The mission is led by the Surrey Space Centre from the **University of Surrey** with the satellite's platform manufactured by Surrey Satellite Technology Ltd (SSTL). Partners on the project include Airbus, ArianeGroup, Swiss Center for Electronics and Microtechnology, Inria, Innovative Solutions in Space, Surrey Space Centre, and Stellenbosch University.

4. Correct Option: (d)

Explanation:

Global Talent Competitiveness Index

- The Global Talent Competitiveness Index (GTCI) is an innovative, annual benchmarking study, encompassing 132 countries.
- Recently, Global Talent Competitive Index (GTCI) for2020 compiled by **INSEAD** in collaboration withAddeco and Google has been released.
- Switzerland topped the index followed by United States and Singapore.
- India has climbed eight places to 72nd rank in the2020. In the BRICS grouping, China was ranked 42nd,Russia (48th), South Africa (70th) and Brazil at 80thposition.

5. Correct Option: (b)

Explanation:

The Global Risks Report

- It is an annual study published by the World Economic Forum ahead of the Forum's Annual Meeting in Davos, Switzerland.
- It is part of the Global Risks Initiative which bringsstakeholders together to develop sustainable,integrated solutions to the world's most pressingchallenges.
- A "global risk" is defined as an uncertain event orcondition that, if it occurs, can cause significantnegative impact for several countries or industrieswithin the next 10 years.
- **Top five global risks in terms of likelihood are allenvironmental and includes:**
  - Extreme weather events with major damageto property, infrastructure and loss of humanlife
  - Failure of climate-change mitigation andadaptation by governments and businesses.
  - Human-made environmental damage anddisasters, including environmental crime, suchas oil spills, and radioactive contamination.
  - Major biodiversity loss and ecosystemcollapse (terrestrial or marine) withirreversible consequences for theenvironment, resulting in severely depletedresources for humankind as well as industries.
  - Major natural disasters such as earthquakes,tsunamis, volcanic eruptions, andgeomagnetic storms.

6. Correct Option: (a)

Explanation:

- The Biological Weapons Convention (BWC) is a legally binding treaty that outlaws'biological arms. After being discussed and negotiated in the United Nations' disarmament forum starting in 1969, the BWC opened for signature on April 10, 1972, and entered into force on March 26, 1975.
- **It currently has 182 states-parties, including Palestine, and five signatories (Egypt, Haiti, Somalia, Syria, and Tanzania). Ten states have neither signed nor ratified the BWC (Chad, Comoros, Djibouti, Eritrea, Israel, Kiribati, Micronesia, Namibia, South Sudan and Tuvalu).**
- The BWC bans:
  - The development, stockpiling, acquisition, retention, and production of:
  - Biological agents and toxins "of types and in quantities that have no justificationforprophylactic,protective or other peaceful purposes;"
  - Weapons, equipment, and delivery vehicles "designed to use such agents or toxins for hostile purposes or in armed conflict."
  - The transfer of or assistance with acquiring the agents, toxins, weapons, equipment, and delivery vehicles described above.
- The convention further requires states-parties to destroy or divert to peaceful purposes the "agents, toxins, weapons, equipment, and means of delivery" described above within nine months of the convention's entry into force.
- **The BWC does not ban the use of biological and toxin weapons but reaffirms the 1925 Geneva Protocol, which prohibits such use.**
- It also does not ban biodefense programs.

7. Correct Option: (c)

Explanation:

Starlink Project

- Starlink is the name of a satellite network that the private spaceflight company **SpaceX**is developing to provide low-cost internet to remote locations.
- The first 60 Starlink satellites were launched on May 23, 2019, aboard a SpaceX Falcon 9 rocket. The satellites successfully reached their operational altitude of 340 miles (550 kilometers) — low enough to get pulled down to Earth by atmospheric drag in a few years so that they don't become space junk once they die.
- The Starlink satellites carry Hall thrusters, which use electricity and krypton gas to generate an impulse, to manoeuvre in orbit, maintain altitude and guide the spacecraft back into the atmosphere at the end of their mission.

8. Correct Option: (a)

Explanation:

APDRC

- The Asia Pacific Drosophila Research Conferences (APDRC) are biennial events that aim to promote the interaction of Drosophila Researchers in the Asia-Pacific region with their peers in the rest of the world.
- **The fifth edition of the Asia Pacific Drosophila Research Conference (APDRC5) was held at Pune, organized by the Indian Institute of Science Education and Research (IISER), Pune.**
- The last four editions of this conference took place in Taipei, Seoul, Beijing and Osaka.

9. Correct Option: (d)

Explanation:

EACAO

- India is keen to be a part of the East Asian Observatories Consortium of eight countries committed to build large telescopes and pool resources.
- The EAO (East Asian Observatory) is formed by EACOA (East Asian Core Observatories Association) for the purpose of pursuing joint projects in astronomy within the East Asian region.
- **It consists of China, Japan, Taiwan, Korea as full members and Thailand, Vietnam, Malaysia and Indonesia as observers.**
- **It is chartered as a non-profit Hawaii corporation, based at Hilo, Hawaii.**

10. Correct Option: (a)

Explanation:

IndiGen initiative

- The IndiGen initiative was undertaken by CSIR in April 2019, **which was implemented by the CSIR-Institute of Genomics and Integrative Biology (IGIB), Delhi and CSIR-Centre for Cellular and Molecular Biology (CCMB), Hyderabad.**
- The objective is to enable genetic epidemiology and develop public health technologies applications using population genome data.
- This has enabled benchmarking the scalability of genome sequencing and computational analysis at population scale in a defined timeline.
- The ability to decode the genetic blueprint of humans through whole genome sequencing will be a major driver for biomedical science.
- IndiGen programme aims to undertake whole genome sequencing of thousands of individuals representing diverse ethnic groups from India.

11. Correct Option: (d)

Explanation:

World Health Organization

- The World Health Organization (WHO) is a specialised agency of the United Nations concerned with global public health.
- **It was established on 7 April 1948, a date which is celebrated every year as World Health Day as the successor to the Health Organisation, an agency of the League of Nations.**
- The WHO is headquartered in Geneva, Switzerland and is a **member of the United Nations Development Group.**

12. Correct Option: (c)

Explanation:

Drones Innovators Network

- Drone Innovators Network (DIN) was formed in 2018 at the World Economic Forum in Davos, Switzerland.

- It is a community of progressive governments, supported by industry and other key stakeholders who are accelerating the adoption of drones with progressive regulatory approaches.
- The Drone Innovators Network held its inaugural summit in Zurich, Switzerland.
- The Drone Innovators Network Summit-2019 was held in New Delhi.
- **It was organized by the World Economic Forum under the aegis of the Ministry of Civil Aviation.**

13. Correct Option: (d)

Explanation:

Gandhian Challenge

- **On the 150th birth Anniversary of Mahatma Gandhi, AIM, NITI Aayog's Atal Tinkering Labs (ATL) and UNICEF India, including Generation Unlimited, have launched 'The Gandhian Challenge'.**
- This innovation challenge provides a platform for every child across India to ideate innovative solutions for a sustainable India of their dreams, using Gandhi's principles.

14. Correct Option: (b)

Explanation:

International Intellectual Property Index 2020

- **Recently International Intellectual Property Index 2020 wasreleased by US Chamber of Commerce's Global InnovationPolicy Centre (GIPC).**
- The Index evaluates the IP infrastructure in each economy based on 45 unique indicators, which are critical to the growth of effective IP systems.
- The indicators encompass 8 categories of IP protection: patents, copyrights, trademarks, trade secrets, commercialization of IP assets, enforcement, systemic efficiency, and membership and ratification of international treaties.
- India's ranked 40th among 53 countries, while in 2019India was ranked at 36th position out of 50 countries.

15. Correct Option: (c)

Explanation:

International Organizations

- The International Civil Aviation Organization (**ICAO**) was founded in 1947. It codifies the principles and techniques of international air navigation and fosters the planning and development of international air transport to ensure safe and orderly growth. Its headquarters are located in the Quartier international de Montréal of Montreal, **Quebec**, Canada.
- The International Fund for Agricultural Development (**IFAD**) was established as an international financial institution in 1977, as one of the major outcomes of the 1974 World Food Conference and a response to the situation in the Sahel. It is dedicated to eradicating rural poverty in developing countries. Its headquarters are in **Rome**, Italy.
- The International Maritime Organization (**IMO**), formerly known as the Inter-Governmental Maritime Consultative Organization (IMCO), was established in 1948 through the United Nations to coordinate international maritime safety and related practices. However, the IMO did not enter into full force until 1958. It is headquartered in **London**, United Kingdom.
- The International Telecommunication Union (**ITU**) was established to standardize and regulate international radio and telecommunications.It is headquartered in **Geneva**, Switzerland, next to the main United Nations campus

16. Correct Option: (a)

Explanation:

DART Space Probe

- Double Asteroid Redirection Test (DART) is a planned space probe that will demonstrate the kinetic effects of crashing an impactor spacecraft into an asteroid moon for planetary defense purposes.
- DART would be NASA's first mission to demonstrate such capability.
- The mission is intended to test whether a spacecraft impact could successfully deflect an asteroid on a collision course with Earth.
- The target for DART is an asteroid that will have a distant approach to Earth in October 2022, and then again in 2024.
- The approaching asteroid is called Didymos -- Greek for "twin" -- because it's an asteroid binary

- system that consists of two bodies: Didymos A, about 780 meters in size, and a smaller asteroid orbiting it called Didymos B, about 160 meters in size.

17. Correct Option: (b)

Explanation:

Outer Space Missions

Hayabusa 2

- It is an asteroid sample-return mission operated by the Japanese space agency, JAXA.
- It follows on from Hayabusa mission which returned asteroid samples in 2010. Hayabusa2 was launched on 3
- December 2014 and rendezvoused with near-Earth asteroid 162173 Ryugu on 27 June 2018.

Gaia Mission

- It is a European Space Agency (ESA) mission to chart a three-dimensional map of our Galaxy, the
- Milky Way, in the process revealing the composition, formation, and evolution of the Galaxy.

MAVEN spacecraft

- It is NASA's mission that was launched in November 2013 and went into orbit around Mars in
- September 2014. Spacecraft has beamed back a selfie to mark its four years orbiting Mars and
- studying the upper atmosphere of the red planet. The image was obtained with the Imaging
- UltravioletSpectrograph(IUVS)instrument that normally looks at ultraviolet emissions from the Martian upper atmosphere.

Hongyun project

- China started the Hongyun project in September 2016.
- Under this project, China plans to give broadband internet connectivity to users all over the world by building a space-based communications network.
- The project also seeks to take the Internet connectivity to the underserved regions of the world.

18. Correct Option: (c)

Explanation:

NISAR Mission

- NISAR is a joint NASA-ISRO (Indian Space Research Organization) Earth-observing mission with the goal to make global measurements of the causes and consequences of land surface changes.
- Potential areas of research include ecosystem disturbances, ice sheet collapse, and natural hazards.
- The NISAR mission is optimized to measure subtle changes of the Earth's surface associated with motions of the crust and ice surfaces.
- NISAR will improve our understanding of the key impacts of climate change and advance our knowledge of natural hazards.
- NISAR will be the first satellite mission to use two different radar frequencies (L-band and S-band) to measure changes in our planet's surface less than a centimetre across.
- The NASA and ISRO teams are working closely together toward launch in 2022.
- The satellite will be launched from India aboard a Geosynchronous Satellite Launch Vehicle.
- The orbit will be a Sun-synchronous and the planned mission life is three years.
- The project has passed the first stage of the design validation phase and has been reviewed and approved by NASA.

19. Correct Option: (c)

Explanation:

YUVIKA Programme

- YUvaVIgyaniKAryakram, a "Young Scientist Programme" has been launched by the Indian Space
- Research Organisation (ISRO) in 2019 as a special program for School Children in tune with the
- Government's vision "Jai Vigyan, Jai Anusandhan".
- The Program is primarily aimed at imparting basic knowledge on Space Technology, Space Science
- and Space Applications to the younger ones with the intent of arousing their interest in the emerging areas of Space activities.

- The program is thus aimed at creating awareness amongst the youngsters who are the future building blocks of our Nation. ISRO has chalked out this program to "Catch them young".
- The program will be of two weeks duration during summer holidays and the schedule will include invited talks, experience sharing by the eminent scientists, facility and lab visits, exclusive sessions for discussions with experts, practical and feedback sessions.
- It is proposed to select 3 students each from each State/ Union Territory to participate in this program covering CBSE, ICSE and State syllabus.
- Those who have just completed the 9th standard (in the academic year 2018-19) and waiting to join 10th Std (or just joined 10th Std) will be eligible for the online registration.
- The selection is based on the 8th Standard academic performance.
- Students belonging to the rural area have been given special weightage in the selection criteria.

20. Correct Option: (c)

Explanation:

Spitzer Space Telescope

- The "Great Observatories" are four big-ticket space telescopes designed to view the universe in different and complementary wavelengths of light. These include:
  - Spitzer
  - Hubble Space Telescope
  - The Compton Gamma Ray Observatory (CGRO)
  - The Chandra X-ray Observatory
- Launched into solar orbit on August 25, 2003, Spitzer was initially scheduled for a minimum 2.5-year primary mission however it has lasted longer than its predicted period and completed 15 years of life.
- It is managed and operated by the Jet Propulsion Laboratory (JPL) of NASA.
- It captures infrared light, which is often emitted by "warm" objects that are not quite hot enough to radiate visible light.
- NASA's Spitzer Space Telescope – which was initially scheduled for 2.5-year primary mission – has completed 15 years of space exploration.
- Spitzer has illuminated some of the oldest galaxies in the universe, revealed a new ring around Saturn, and peered through shrouds of dust to study newborn stars and black holes.
- It assisted in the discovery of planets beyond our solar system, including the detection of seven Earth-size planets orbiting the star TRAPPIST-1, among other accomplishments.
- NASA's Spitzer Space Telescope will be switched off permanently on January 30, 2020, after nearly 16 years of exploring the cosmos in infrared light

21. Correct option: (d)

Explanation

All the above statements are correct.

Supplementary notes

- Silk Samagra Scheme is a Central Sector Scheme launched for three years i.e 2017-2020.
- Aim: To scale up production of Silk by improving the quality and productivity and to empower downtrodden, poor & backward families through various activities of sericulture in the country.
- Implementation: It is being implemented by the Central Silk Board (CSB).

Components:

  - a) Research & Development, Training and Transfer of Technology
  - b) Seed Organizations
  - c) Coordination and Market Development
  - d) Quality Certification Systems (QCS)/ Export Promotion and Technology Up-gradation
- Sericulture is the cultivation of silk through the rearing of the silkworm. It is an agro-based industry.

22. Correct option: (c)

Explanation

Statements 1 and 2 are incorrect: **The Exercise Search and Rescue Exercise (SAREX-2020) has been conducted biennially (NOT annually) since 2003 by Indian Coast Guard under the aegis of**

National Maritime Search and Rescue Board (NMSARB).

Supplementary notes

Search and Rescue Exercise (SAREX-2020)

- The exercise has been conducted biennially since 2003 by Indian Coast Guard under the aegis of National Maritime Search and Rescue Board (NMSARB).
- The aim is to test the efficiency of operations and coordination of the stakeholders involved in Search and Rescue in the Indian Ocean Region.
- Theme: Harmonization of Maritime and Aeronautical Search and Rescue named 'HAMSAR'.
- Further, the exercise witnessed the participation of around 24 overseas observers from 19 countries.
- National Maritime Search and Rescue Board (NMSARB) was constituted by the union government in 2002 with the Director-General of Indian Coast Guard (ICG) as its Chairman.

23. Correct option: (b)

Explanation

Only statement 1 is incorrect: **The Kisan Rail Scheme was proposed by the Union Ministry of Finance during the Union Budget 2020-21.**

Supplementary notes

- In the latest development, the Centre has formed a committee for implementation of the Kisan Rail scheme.
- The Committee has been formed with representatives from Ministry of Agriculture and Ministry of Railways.
- It will explore the options of creating a cold supply chain for perishable goods.
- The Kisan Rail was proposed by the Union Finance Minister during the Union Budget 2020-21.
- Under the scheme, the centre envisages setting up of a national cold supply chain to transport highly perishable goods including milk, fish and meat.
- It will be set up through a public-private-partnership (PPP) arrangement.

24. Correct option: (b)

Explanation

Only statement 1 is incorrect: **Senna Spectabilis is a plant species of the legume family (Fabaceae) native to South and Central America.**

Supplementary notes

Senna Spectabilis

- The Kerala Government is planning to stop the rampant growth of Senna spectabilis in the forest areas of the Nilgiri Biosphere Reserve (NBR).
- Senna spectabilis is a plant species of the legume family (Fabaceae) native to South and Central America.
- The plant has become an invasive alien species in parts of Africa, India and other countries.
- The thick foliage of the tree arrests the growth of other indigenous tree and grass species. Hence, it causes a food shortage for the wildlife population, especially herbivores.
- It also adversely affects the germination and growth of the native species.
- It is categorised as 'Least Concern' under IUCN Red List.
- The Nilgiri Biosphere Reserve is an International Biosphere Reserve in the Western Ghats and Nilgiri Hills ranges of South India.
- It is a part of the Western Ghats which was declared a World Heritage Site by UNESCO.

25. Correct Answer (c)

Explanation:

Both statements are correct.

Supplementary Notes

Article 35A

Article 35A is a provision incorporated in the Constitution giving the Jammu and Kashmir Legislature a carte blanche to decide who all are 'permanent residents' of the State and confer on them special rights and privileges in public sector jobs, acquisition of property in the State, scholarships and other public aid and welfare.

- The provision mandates that no act of the legislature coming under it can be challenged for violating the Constitution or any other law of the land.

How did it come about?

- Article 35A was incorporated into the Constitution in 1954 by an order of the then President Rajendra Prasad on the advice of the Jawaharlal Nehru Cabinet.
    - The controversial Constitution (Application to Jammu and Kashmir) Order of 1954 followed the 1952 Delhi Agreement entered into between Nehru and the then Prime Minister of Jammu and Kashmir Sheikh Abdullah, which extended Indian citizenship to the 'State subjects' of Jammu and Kashmir.
    - The Presidential Order was issued under Article 370 (1) (d) of the Constitution. This provision allows the President to make certain "exceptions and modifications" to the Constitution for the benefit of 'State subjects' of Jammu and Kashmir.
    - So, Article 35A was added to the Constitution as a testimony of the special consideration the Indian government accorded to the 'permanent residents' of Jammu and Kashmir.

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TEST
DAY - 66

Time Allowed: 30 mins **Maximum Marks: 50**

1. Which of the following statements is/ are correct?

1. The provision for enabling grant of compulsory license for export of medicines to countries which have insufficient or no manufacturing capacity was introduced by the Indian Patents (Amendment) Act 2005.
2. Ministry of finance is the nodal ministry to coordinate, guide and oversee the implementation and future development of IPRs in India

Select the correct option using the codes given below:

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

2. Which of the following are the applications of Artificial Intelligence?

1. Healthcare
2. Financial industry
3. Banking sector
4. Driverless car

Select the correct option using the codes given below:

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

3. Which of the following statements regarding Compulsory Licensing are correct?

1. It is the authorization to the third-party manufacturer without the need of the permission of the patent owner.
2. It is not permitted under the WTO's TRIPS (IPR) Agreement.
3. It can be permitted Suo motu by the Central Government.

Select the correct option using the codes given below:

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

4. Which of the following statements is/ are correct?

1. Artificial intelligence refers to the simulation of human intelligence in machines that are programmed to think like humans and mimic their actions.
2. Strong artificial intelligence systems carry on the tasks considered to be human-like whereas, the Weak AI carry out one particular job.

Select the correct option using the codes given below:

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

5. Special 301 report, related to the intellectual property rights, is published by___

(a) World Trade Organization
(b) World Economic Forum
(c) United States Trade Representative
(d) UNCTAD

6. Which of the following pairs regarding supercomputers and their installation centers under the National Supercomputing Mission?

1. Param Shivay: IIT BHU, Varanasi
2. Param Shakti: IIT Bombay
3. Param Brahma: IISER, Pune

Select the correct option using the codes given below:

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

7. Which of the following statements regarding the Machine Learning is/are correct?

1. It enables machines to learn from past data or experiences without being explicitly programmed.
2. It can work also for the non-specific domains.

Select the correct option using the codes given below:

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

8. International protection under the Berne Convention is related to__

(a) Literary and Artistic Works
(b) Trademarks
(c) Geographical Indication
(d) All of the above

9. Which of the following pairs is/are correctly matched?

1. Hague Agreement: Industrial designs
2. Paris Convention: Patents
3. Lisbon Agreement: Copyrights

Select the correct option using the codes given below:

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

10. Which of the following statements imply the difference between Artificial Intelligenceand Machine learning?

1. Machine learning is a holistic concept whereas, Artificial intelligence is mere a subset ofMachine learning.
2. Deep learning is the subset of machine learning only.
3. AI system is concerned about maximizing the chances of success whereas, ML is mainly concerned about accuracy and patterns.

Select the correct option using the codes given below:

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

11. Which of the following pairs is/are correctly matched?

Intellectual properties: Validity

1. Patent: 20 years
2. Industrial design: 20 years
3. Literary copyrights: Until lifetime of the author

Select the correct option using the codes given below:

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

12. Which of the following are the main features of the TRIPS Agreement?

1. Standards
2. Enforcement
3. Dispute Settlement

Select the correct option using the codes given below:

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

13. which of the following publish the Global Innovation Index report?

1. Cornell University
2. INSEAD
3. World Intellectual Property Organization

Select the correct option using the codes given below:

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

14. Which of the following is/are not included in the intellectual property of the TRIPS Agreement?

1. Integrated circuits
2. Test data
3. Generic medicines

Select the correct option using the codes given below:

(a) 1 and 3 only
(b) 2 and 3 only
(c) 3 only
(d) None of the above

15. For registration of a mark as a trademark in India, which of the following are the necessary conditions?

1. The mark should be generic
2. The mark should be non- deceptive
3. The mark should be non-identical to the existing marks
4. The mark should be descriptive

Select the correct option using the codes given below:

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

16. Consider the following statements with reference to Graphene:

1. It is the thinnest compound known to man.
2. Graphite can be formed by stacking layers of graphene on top of each other.
3. It is highly impermeable and photosensitive in its characteristics.

Which of the above statement is/are incorrect?

(a) 1 and 2 only
(b) 3 only
(c) 2 and 3 only
(d) None of the above

17. In the context of nuclear physics, consider the following statements:

1. Fissile materials are those that undergo fission reaction after absorbing a high energy neutron.
2. Fissile materials are a subset of fissionable materials.
3. Fertile materials are those that are not fissionable by thermal neutrons.

Which of the above statements is/are incorrect?

(a) 1 only
(b) 1 and 3 only
(c) 2 and 3 only
(d) None of the above

18. With reference to nuclear fission, consider the following statements:

1. It is an exothermic reaction releasing a huge amount of energy as gamma rays.
2. Spontaneous fission is a type of radioactive decay.
3. The enormous energy released in an atom bomb comes from uncontrolled fission.

Which of the above statements is/are correct?

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

19. Consider the following statements regarding the Nuclear Fuel Cycle:

1. It is the progression of nuclear fuel from the reactor to its disposal.
2. The approach to waste disposal is to immobilize the nuclides and then place them underground.

Which of the above statements is/are correct?

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2

20. Match the following:

Type of Radioactive Characteristic

Waste

A. Low-level Waste 1. Contaminated material from the decommissioned reactor

B. Intermediate- level Waste 2. Incinerated before disposal

C. High-level Waste 3. Requires cooling

Select the correct answer using the code given below:

A B C

(a) 1 3 2

(b) 2 1 3

(c) 3 1 2

(d) 2 3 1

21. With reference to "AT-1 Bonds" consider the following statements:

1. The Ministry of Finance is the regulator of AT-1 bonds.
2. These are the type of unsecured, perpetual bonds that banks issue to shore up their core capital base to meet the Basel-III norms.

Which of the statement(s) given above is/ are correct?

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2

22. Recently "World Climate and Security report" has been released by which organization?

(a) United Nations

(b) Organization for Security and Co-operation in Europe

(c) Intergovernmental Authority on Development

(d) The International Military Council on Climate and Security

23. Consider the following statements regarding Gaur or Indian bison:

1. It is the largest extant bovine.
2. It is native to South Asia and Southeast Asia.
3. The species is listed as 'Endangered' on the IUCN list.

Which of the statements given above are correct?

(a) 1 and 2 only

(b) 2 and 3 only

(c) 1 and 3 only

(d) 1, 2 and 3

24. "Sir Creek" is a disputed area between which two countries in Southeast Asia?

(a) India and Nepal

(b) Pakistan and China

(c) Bangladesh and Myanmar

(d) India and Pakistan

25. With reference to Kyasanur Forest Disease, consider the following statements:

1. The disease was first identified in 1957 in sick Fruit Bats from the Kyasanur Forest in Karnataka.
2. Transmission to humans is possible.
3. There is no specific treatment for the disease however, the vaccine is available.

Which of the statements given above are correct?

(a) 1 and 2 only

(b) 2 and 3 only

(c) 1 and 3 only

(d) 1, 2 and 3

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ANSWER HINTS

DAY - 66

1. Correct Option: (a)

Explanation:

IPR regime in India

- The legislations which deal with the protection and registration of patents in India are The Patent Act, 1970 and The Patent Rules 2003. The patent Act 1970 has undergone three (3) amendments in 1999, 2002 and 2005. In the 2005 amendment introduced product patent protection for food, pharma and chemical inventions.

Salient features of the Patents (Amendment) Act 2005 related to product patents

- Extension of product patent protection to products in sectors of drugs, foods and chemical.
- Term for protection of product patent shall be for 20 years.
- **Introduction of a provision for enabling grant of compulsory license for export of medicines to countries which have insufficient or no manufacturing capacity; provided such importing country has either granted a compulsory license for import or by notification or otherwise allowed importation of the patented pharmaceutical products from India (in accordance with the Doha Declaration on TRIPS and Public Health).**
- Section 3 (d) regarding patentability.

National IPR Policy

- The National Intellectual Property Rights (IPR) Policy 2016 was adopted in May 2016 as a vision document to guide future development of IPRs in the country.
- Its clarion call is "Creative India; Innovative India"
- **Department of Industrial Policy & Promotion (DIPP), Ministry of Commerce, Government of India, has been appointed as the nodal department to coordinate, guide and oversee the implementation and future development of IPRs in India.**
- The 'Cell for IPR Promotion & Management (CIPAM)', setup under the aegis of DIPP, is to be the single point of reference for implementation of the objectives of the National IPR Policy.

2. Correct Option: (d)

Explanation:

Applications of Artificial Intelligence

- The applications for artificial intelligence are endless. The technology can be applied to many different sectors and industries.
- AI is being tested and used in the **healthcare industry** for dosing drugs and different treatment in patients, and for surgical procedures in the operating room.
- Other examples of machines with artificial intelligence include computers that play chess and **self-driving cars.** Each of these machines must weigh the consequences of any action they take, as each action will impact the end result. In chess, the end result is winning the game. For self-driving cars, the computer system must account for all external data and compute it to act in a way that prevents a collision.
- **Artificial intelligence also has applications in the financial industry,** where it is used to detect and flag activity in banking and finance such as unusual debit card usage and large account deposits—**all of which help a bank's fraud department.**
- Applications for AI are also being used to help streamline and make trading easier. This is done by making supply, demand, and pricing of securities easier to estimate.

3. Correct Option: (a)

Explanation:

Compulsory licenses

- These are authorizations given to a third-party by the Controller General to make, use or sell a particular product or use a particular process which has been patented, without the need of the permission of the patent owner. This concept is recognized at both national as well as international levels, with express mention in both (Indian) Patent Act, 1970 and TRIPS Agreement.
- As per Section 84, any person, regardless of whether he is the holder of the license of that Patent, can make a request to the Controller for grant of compulsory license on expiry of three years, when any of the following conditions is fulfilled –
  - the reasonable requirements of the public with respect to the patented invention have not been satisfied
  - the patented invention is not available to the public at a reasonably affordable price
  - the patented invention is not worked in the territory of India.
- Further, **compulsory licenses can also be issued Suo motu by the Controller under section 92, pursuant to a notification issued by the Central Government if there is either a "national emergency" or "extreme urgency" or in cases of "public non-commercial use".**
- **CL is permitted under the WTO's TRIPS (IPR) Agreement provided conditions such as 'national emergencies, other circumstances of extreme urgency and anti-competitive practices' are fulfilled.**
- The Controller takes into account some more factors like the nature of the invention, the capability of the applicant to use the product for public benefit and the reasonability, but the ultimate discretion lies with him to grant the compulsory license. Even after a compulsory license is granted to a third party, the patent owner still has rights over the patent, including a right to be paid for copies of the products made under the compulsory licence.
- India's first ever compulsory license was granted by the Patent Office on March 9, 2012, to Natco Pharma for the generic production of Bayer Corporation's Nexavar, a lifesaving medicine used for treating Liver and Kidney Cancer. Bayers sold this drug at exorbitant rates, with one month's worth of dosage costing around Rs 2.8 Lakh. Natco Pharma offered to sell it around for Rs 9000, making it affordable for people belonging to every stratum. All the 3 conditions of section 84 were fulfilled and the decision was taken for the benefit of general public.

4. Correct Option: (c)

Explanation:

Artificial Intelligence

- Artificial intelligence (AI) refers to the simulation of human intelligence in machines that are programmed to think like humans and mimic their actions. The term may also be applied to any machine that exhibits traits associated with a human mind such as learning and problem-solving.
- Artificial intelligence is based on the principle that human intelligence can be defined in a way that a machine can easily mimic it and execute tasks, from the simplest to those that are even more complex. The goals of artificial intelligence include learning, reasoning, and perception.
- Artificial intelligence can be divided into two different categories: weak and strong. Weak artificial intelligence embodies a system designed to carry out one particular job. Weak AI systems include video games such as the chess example from above and personal assistants such as Amazon's Alexa and Apple's Siri. You ask the assistant a question, it answers it for you.
- Strong artificial intelligence systems are systems that carry on the tasks considered to be human-like. These tend to be more complex and complicated systems. They are programmed to handle situations in which they may be required to problem solve without having a person intervene. These kinds of systems can be found in applications like self-driving cars or in hospital operating rooms.

5. Correct Option: (c)

Explanation:

Special 301 report

- The Special 301 Report is prepared annually by the Office of the **United States Trade**

Representative (USTR) that identifies trade barriers to United States companies and products due to the intellectual property laws, such as copyright, patents and trademarks, in other countries.

- India has been on the priority watch list reportedly for over 25 years, for "lack of sufficient measurable improvements to its IP framework that have negatively affected US right holders".The office of the US Trade Representative identified 11 countries, including India, in its 'Priority Watch List'. The list topped by China also includes Indonesia, Russia, Saudi Arabia and Venezuela. Besides this, the US Trade body has placed 25 countries, including Pakistan, Turkey and the UAE, on the watchlist.

6. Correct Option: (c)

Explanation:

National Supercomputing Mission

- The first supercomputer designed and built under National Supercomputing Mission (NSM) by C-DAC at **Indian Institute of Technology (BHU), Varanasi is named "Param Shivay".** It uses more than one lakh twenty thousand compute cores (CPU + GPU cores) to offer a peak computing power of 833 TeraFlops.
- **Other supercomputers like the Param Shakti and Param Brahma were also installed at IIT-Kharagpur and at IISER, Pune.**

7. Correct Option: (a)

Explanation:

Machine learning

- **Machine learning is a subfield of artificial intelligence, which enables machines to learn from past data or experiences without being explicitly programmed.**
- Machine learning enables a computer system to make predictions or take some decisions using historical data without being explicitly programmed.
- Machine learning uses a massive amount of structured and semi-structured data so that a machine learning model can generate accurate result or give predictions based on that data.
- Machine learning works on algorithm which learn by its own using historical data.
- **It works only for specific domains** such as if we are creating a machine learning model to detect pictures of dogs, it will only give result for dog images, but if we provide a new data like cat image then it will become unresponsive. Machine learning is being used in various places such as for online recommender system, for Google search algorithms, Email spam filter, Facebook Auto friend tagging suggestion, etc.

8. Correct Option: (a)

Explanation:

International protection under the Berne Convention

- The Berne Convention for **the Protection of Literary and Artistic Works**was first adopted in 1886 as an agreement to honor the rights of all authors who are nationals of countries that are party to the convention.
- The convention is administered by the World Intellectual Property Organization, (WIPO).

9. Correct Option: (c)

Explanation:

IPR Agreements

- **The Hague System of international registrations of industrial designs** is applicable among the countries party to the Hague Agreement. It is administered by the International Bureau of WIPO.
- The important agreements that should be considered when contemplating **international patent protection** are The **Paris Convention** for the protection of Industrial Property & Patent Cooperation Treaty (PCT).
- The two agreements which relate to the international registration **of geographical indication** are the Lisbon Agreement for the Protection of Appellations of Origin, 1958 and the Paris Convention on industrial property, 1883 (Trademarks).

10. Correct Option: (b)

Explanation:

Key differences between Artificial Intelligence (AI) and Machine learning (ML)

- **Artificial intelligence is a technology which enables a machine to simulate human behavior. Machine learning**

is a subset of AI which allows a machine to automatically learn from past data without programming explicitly.

- The goal of AI is to make a smart computer system like humans to solve complex problems. The goal of ML is to allow machines to learn from data so that they can give accurate output.
- In AI, we make intelligent systems to perform any task like a human.In ML, we teach machines with data to perform a particular task and give an accurate result.
- Machine learning and deep learning are the two main subsets of AI. D e e p learning is a main subset of machine learning.
- AI has a very wide range of scope.Machine learning has a limited scope.
- AI is working to create an intelligent system which can perform various complex tasks.Machine learning is working to create machines that can perform only those specific tasks for which they are trained.
- **AI system is concerned about maximizing the chances of success. Machine learning is mainly concerned about accuracy and patterns.**
- The main applications of AI are Siri, customer support using catboats, Expert System, Online game playing, intelligent humanoid robot, etc.The main applications of machine learning are Online recommender system, Google search algorithms, Facebook auto friend tagging suggestions, etc.
- On the basis of capabilities, AI can be divided into three types, which are, Weak AI, General AI, and Strong AI.Machine learning can also be divided into mainly three types that are Supervised learning, Unsupervised learning, and Reinforcement learning.
- It includes learning, reasoning, and self-correction. It includes learning and self-correction when introduced with new data.
- AI completely deals with Structured, semi-structured, and unstructured data.Machine learning deals with Structured and semi-structured data, etc.

11. Correct Option: (a)

Explanation:

Indian IPR laws

- The Indian law of designs is enshrined in the Designs Act, 2000 and the Design Rules, 2001.In India, a design registration is valid for a period of **10 years**, renewable for a further period of 5 years.
- Patents generally cover innovations, products or processes that include new functional or technical aspects. It is granted by the Indian Patent Office and has a **term of 20 years**. After expiration of this 20-year monopoly the product/ invention will fall in the public domain for any third party to use it.
- The protection of copyright varies according to national legislations and the type of work. The Indian law extends copyright protection for the work made by **an individual for life time of the author plus sixty (60) years.**

12. Correct Option: (a)

Explanation:

TRIPS Agreement

- The three main features of the TRIPS Agreement are:
- **Standards**: In respect of each of the main areas of intellectual property covered by the TRIPS Agreement, the Agreement sets out the minimum standards of protection to be provided by each Member. Each of the main elements of protection is defined, namely the subject-matter to be protected, the rights to be conferred and permissible exceptions to those rights, and the minimum duration of protection.
- **Enforcement**: The second main set of provisions deals with domestic procedures and remedies for the enforcement of intellectual property rights. The Agreement lays down certain general principles applicable to all IPR enforcement procedures. In addition, it contains provisions on civil and administrative procedures and remedies, provisional measures, special requirements related to border measures and criminal procedures, which specify, in a certain amount of detail, the procedures and remedies that must be available so that right holders can effectively enforce their rights.
- **Dispute settlement**: The Agreement makes disputes between WTO Members about the respect of the TRIPS obligations subject to the WTO's dispute settlement procedures.

13. Correct Option: (d)

Explanation:

Global Innovation Index

- The Global Innovation Index (GII) ranks the innovation performance of some 130 countries and economies around the world, based on 80+ indicators.
- **Co-published by WIPO, Cornell University and INSEAD,** the report provides an annual ranking of the innovation capabilities and performance of economies around the world.

14. Correct Option: (c)

Explanation:

TRIPS Agreement

- The TRIPS Agreement, which came into effect on 1 January 1995, is to date the most comprehensive multilateral agreement on intellectual property.
- **The areas of intellectual property that it covers are: copyright and related rights (i.e. the rights of performers, producers of sound recordings and broadcasting organizations); trademarks including service marks; geographical indications including appellations of origin; industrial designs; patents including the protection of new varieties of plants; the layout-designs of integrated circuits; and undisclosed information including trade secrets and test data.**

15. Correct Option: (b)

Explanation:

Trademark in India

- For registration of a mark as a trademark in India, the mark has to fulfill certain criteria. These include the following requirements:
  - **The mark should be non- generic** – A generic trademark is a trademark or brand name that has become the colloquial or generic description for (or synonymous with) a general class of product or service, rather than the specific meaning intended by trademark's holder. A trademark typically becomes "genericized" when the products or services with which it is associated have acquired substantial mind share.
  - **The mark should be non-descriptive**– Descriptive trademarks are those which describe some aspect, characteristic or quality of the products on which they are used.
  - **The mark is not identical or similar to existing marks**- A proposed mark should not be similar or identical to that for which the earlier trademark is registered in the name of a different proprietor.
  - **The mark should be non-deceptive**– A deceptive trademark is one that wrongly indicates that the goods over which it is used have certain qualities but they do not.

16. Correct Option: (d)

Explanation:

Graphene

- Graphene is a single layer of carbon atoms, tightly bound in a hexagonal honeycomb structure.
- It is an allotrope of carbon in the form of a plane of sp2-bonded atoms and forms the basis of all graphitic nanostructures.
- It can be folded and moulded into different shapes to form Fullerenes and Carbon Nanotubes.
- Layers of graphene stacked on top of each other form graphite, with an interplanar spacing of 0.335 nanometres.

Properties of Graphene are:

- Graphene is the thinnest compound known to man (one atom thick).
- It is the lightest material known and is strongest compound discovered which is more than 100 times stronger than steel.
- It is the best conductor of heat at room temperature and also the best conductor of electricity known.
- It absorbs uniform light across the visible and near-infrared parts of the spectrum.
- Graphene has photosensitive properties and can be used in solar cells and photodetection devices.
- It is highly impermeable and can be used in water filtration or purification technology.

17. Correct Option: (a)

Explanation:

Fissionable, Fissile and Fertile Nuclear Materials

- In nuclear engineering, fissionable material (nuclide) is a material that is capable of undergoing fission reaction after absorbing either thermal (slow or low energy) neutron or fast (high energy) neutron.
- Fissile materials undergo fission reaction after absorption of the binding energy of the thermal neutron. They do not require additional kinetic energy for fission. If the neutron has higher kinetic energy, this energy will be transformed into additional excitation energy of the compound nucleus.
- Fissile materials are thus a subset of fissionable materials as they can be induced to fission with low-energy thermal neutrons with a high probability.
- U-238 is not fissile isotope, because U-238 cannot be fissioned by a thermal neutron.
- Fertile materials consist of isotopes that are not fissionable by thermal neutrons but can be converted into fissile isotopes (after neutron absorption and subsequent nuclear decay).

18. Correct Option: (d)

Explanation:

Nuclear Fission

- In the nucleus of each atom of uranium-235 (U-235) are 92 protons and 143 neutrons, for a total of 235. The arrangement of particles within uranium-235 is somewhat unstable and the nucleus can disintegrate if it is excited by an outside source. When a U-235 nucleus absorbs an extra neutron, it quickly breaks into two parts. This process is known as fission. Each time a U-235 nucleus splits, it releases two or three neutrons. Hence, the possibility exists for creating a chain reaction.
- A nuclear chain reaction occurs when one single nuclear reaction causes an average of one or more subsequent nuclear reactions, thus leading to the possibility of a self-propagating series of these reactions. The "one or more" is the key parameter of reactor physics. To raise or lower the power, the amount of reactions must be changed (using the control rods) so that the number of neutrons present (and hence the rate of power generation) is either reduced or increased.
- Control rods contain material that absorbs neutrons. Withdrawal of the rods increases the parameter one or more (multiplication factor), thus increasing the power. Insertion of the rods decreases the parameter one or more (multiplication factor), thus decrease the power.
- The fragment nuclei produced in fission are highly neutron-rich and unstable. They are radioactive and emit beta particles in succession until each reaches a stable end product.
- The fission of heavy elements is an exothermic reaction and can release substantial amounts of useful energy both as gamma rays and as the kinetic energy of the fragments (heating the bulk material where fission takes place). The disintegration energy in fission events first appears as the kinetic energy of the fragments and neutrons. Eventually, it is transferred to the surrounding matter appearing as heat.
- The enormous energy released in an atom bomb comes from uncontrolled nuclear fission.
- In nuclear physics, nuclear fission is either a nuclear reaction or a radioactive decay process. The case of the decay process is called spontaneous fission and it is a very rare process that is found only in very heavy chemical elements.

19. Correct Option: (b)

Explanation:

Nuclear Fuel Cycle

- The nuclear fuel cycle is the progression of nuclear fuel from creation to its disposal.
- It typically includes the following stages:
- Uranium recovery to extract Uranium ore and concentrate the ore to produce a Uranium
- ore concentrates.
- Uranium ore concentrate converted into Uranium hexafluoride.
- Enrichment to increase the concentration of Uranium-235 in Uranium hexafluoride.
- Deconversion to reduce the hazards associated with the depleted Uranium hexafluoride produced in earlier stages of the fuel cycle.
- Fuel fabrication to convert natural and enriched Uranium hexafluoride into UO2 or Uranium metal alloys for use as fuel for nuclear reactors.

- Use of the fuel in reactors such as nuclear power production, research, or naval propulsion.
- Interim storage of spent nuclear fuel.
- Reprocessing of high-level waste.
- The final disposition of used fuel.
- In the last stage, after getting energy out of the heavy atoms, there must be the disposition of the left-over ones and the dangerously radioactive minor actinides and fission products.
- The most common method of waste disposal is to first ensure that the nuclides are immobilized by putting them in a material with low leachability, good mechanical strength, and the capability to hold large amounts of waste. Then they are placed underground.
- Materials used for immobilization are typically ceramics or glass because to protect against criticality accidents, these materials often have neutron-eating atoms such as boron mixed in. The place to bury these dangerous nuclides is to have as many barriers as possible between them and the environment.

20. Correct Option: (b)

Explanation:

Radioactive Waste

- Low-level Radioactive Wastes (LLW) comes from reactor operations and from medical, academic,
- industrial, and other commercial uses of radioactive materials. These include paper, rags, tools, clothing, filters, and other materials which contain small amounts of mostly short-lived radioactivity.
- LLW usually does not require shielding during handling and transport, most LLW is suitable for shallow land burial. To reduce its volume, it is often compacted or incinerated before disposal.
- Intermediate-Level Radioactive Wastes (ILW) contains higher amounts of radioactivity and it generally requires shielding, but the heat it generates is not sufficient to be taken into account in the design or selection of storage and disposal facilities. They include ion-exchange resins, chemical sludge, contaminated materials from reactor decommissioning and some radioactive sources used in radiation therapy.
- High-Level Radioactive Wastes (HLW) is primarily spent fuel removed from reactors after producing electricity. It is also created by the reprocessing of spent nuclear fuel. They require cooling and sufficient shielding because of the high decay heat.

21. Correct option: (b)

Explanation

- ***Statement 1 is incorrect:*** The Reserve Bank of India (RBI) is the regulator of AT-1 bonds.

Supplementary notes

AT-1 bonds

- Additional tier-1 bonds also called AT1 are a type of unsecured, perpetual bonds that banks issue to shore up their core capital base to meet the Basel-III norms.
- The Reserve Bank of India (RBI) is the regulator of AT-1 bonds.
- Bonds are perpetual and carry no maturity date. Instead, they carry call options that allow banks to redeem them after five or 10 years. However, banks are not obliged to use this call option and can opt to pay only interest on these bonds for eternity.
- Basel norms refer to broad supervisory standards formulated by a group of central banks- called the Basel Committee on Banking Supervision (BCBS).
- The norms aim to ensure that financial institutions have enough capital on account to meet obligations and absorb unexpected losses.

22. Correct option: (d)

Explanation

- The International Military Council on Climate and Security (IMCCS) has released the World Climate and Security report.

Supplementary notes

World Climate and Security report

- The International Military Council on Climate and Security (IMCCS) has released the World Climate and Security report.
- It is an umbrella network of senior military leaders across the globe that meets regularly to drive policies in support of international actions on the security implications of a changing climate.
- It is administered by the Center for Climate and Security, a non-profit organization.

- The World Climate and Security Report 2020 provides global and regional assessments of the security risks of a changing climate, as well as opportunities for addressing them.
- It is the first report of its kind and is intended to inform future climate and security policy and analysis.
- This report addresses a broad spectrum of the security risks of climate change, including:
  - Where human security risks spill over into higher-order security risks, such as political instability, conflict, major natural disasters involving the significant military and humanitarian responses, mass displacements of peoples, and threats to critical resources and infrastructure
  - Geopolitical impacts of climate change including regional and inter-state tensions and conflicts
  - Impacts of climate change on military and defence, including military infrastructure, force readiness, military operations and military strategy

23. Correct option: (a)

Explanation

Only statement 3 is incorrect: **Gaur or Indian bison is listed as 'vulnerable' on the International Union for Conservation of Nature's Red List of Threatened Species since 1986.**

Supplementary notes

Gaur back in Valmiki Reserve after an increase in grassland cover

- Gaur (Bos Gaurus), the largest extant bovine in the world, has not only returned to Bihar's Valmiki Tiger Reserve (VTR) but is also breeding there due to an increase in grassland cover.
- The Gaur also called the Indian bison is the largest extant bovine.
- It is native to South Asia and Southeast Asia.
- Gaurs are grassland specialists and their main food is grass.
- Valmiki Tiger Reserve was set up in the early 1990s. It is spread over 899 square kilometres in Bihar's West Champaran district, bordering Nepal's Chitwan National Park to its north and Uttar Pradesh to its west.
- The species is listed as 'vulnerable' on the International Union for Conservation of Nature's Red List of Threatened Species since 1986.
- They are heavily built, with bodyweight varying between 400 and 1,200 kilograms.
- The Gaur is a social animal. They generally live in group size of about 30 to 40.
- The Indian Bison is very much prevalent in the Western Ghats.
- They prefer evergreen forests and moist deciduous forests.
- They are not found in the Himalayas with an altitude greater than 6,000 ft. They generally stick to the foothills only.
- **Threat**: Many possible threats have led to a decline in the population of the Indian Bison.
  - **Food Scarcity**: The destruction in the grasslands has led to a decline in the availability of food for these animals. Due to the planting of commercially important trees, the lush grassland has diminished which is the prime source of fodder for these wild cattle.
  - **Poaching:** The illegal hunting of the Indian bison is done for their commercial value as well as due to the high demand of gaur meat in the illegal market of Nepal – India border.
- The Indian Bison is deemed as vulnerable according to the IUCN list.
- Hence, the Indian Government has already included the protection of wild bison in the Schedule I of the Wild Life Protection Act, 1972.
- It is the State animal of Goa.
- The local names of the Gaur are:
  - Seladang — Malaysia
  - Pyoung — Myanmar
  - Gayal or Mithun — a domesticated form of gaur.

24. Correct option: (d)

Explanation

- Sir Creek is a 96-km strip of water disputed between India and Pakistan in the Rann of Kutch marshlands.

Supplementary notes

Sir Creek Issue

- Sir Creek is a 96-km strip of water disputed between India and Pakistan in the Rann of Kutch marshlands.
- The Creek opens up in the Arabian Sea and roughly divides the Kutch region of Gujarat from the Sindh Province of Pakistan.
- Sir Creek's core importance is fishing resources. It is considered to be among the largest fishing grounds in Asia.
- The creek is also important due to possible presence of great oil and gas concentration under the sea which is currently unexploited due to dispute on the issue.
- The dispute lies in the interpretation of the maritime boundary line between Kutch and Sindh.
- Before India's independence, the provincial region was a part of the Bombay Presidency of British India. But after India's independence in 1947, Sindh became a part of Pakistan while Kutch remained a part of India.
- Pakistan claims the entire creek as per Bombay Government Resolution of 1914 signed between then the Government of Sindh and Rao Maharaj of Kutch.

25. Correct option: (b)

Explanation

- ***Only statement 1 is incorrect:*** The disease was first identified in 1957 in a sick monkey (NOT Bat) from the Kyasanur Forest in Karnataka.

Supplementary notes

Kyasanur Forest Disease

- KFD is caused by Kyasanur Forest disease Virus (KFDV), a member of the virus family Flaviviridae.
- The disease was first identified in 1957 in a sick monkey from the Kyasanur Forest in Karnataka. Since then, between 400-500 human cases per year have been reported.
- Rodents, shrews and monkeys are common hosts for KFDV after being bitten by an infected tick.
- Transmission to humans may occur after a tick bite or contact with an infected animal, most importantly a sick or recently dead monkey.
- There is no specific treatment for the disease but the vaccine is available.
- After an incubation period of 3-8 days, the symptoms like chills, fever, headache, severe muscle pain, vomiting, gastrointestinal symptoms and bleeding may occur.

❖❖❖❖❖❖

TEST
DAY - 67

Time Allowed: 30 mins **Maximum Marks: 50**

1. Which of the following statements is/ are correct?

1. The universe is mostly consisted by the baryonic matter.
2. Only 5 percent of the universe is the normal matter.
3. The dark energy can be a property of space or a kind of dynamical energy fluid.

Select the correct option using the codes given below:

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

2. Which of the following conditions are prerequisite for a celestial body to qualify a planet as per the International Astronomical Union?

1. It must orbit a star.
2. It must have a spherical shape.
3. It must have at least one moon.

Select the correct option using the codes given below:

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

3. Which of the following statements regarding the dark matter are correct?

1. The evidences indicate that the dark matter cannot be baryonic matter.
2. It is dark because the light cannot escape from it.
3. The dark matter may predate the Big Bang.

Select the correct option using the codes given below:

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

4. Which of the following statements is/ are correct?

1. Singularities are regions of space where the curvature of spacetimebecomes infinite.
2. Within the event horizon, the escape speedis less than the speed of the light.
3. All black holes contain singularities.

Select the correct option using the codes given below:

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

5. Which of the following statements regarding the Schwarzschild radius is/ are correct?

1. The Schwarzschild radius of an object is inversely proportional to the mass.
2. Any object whose radius is smaller than its Schwarzschild radius is called a black hole.

3. It was discovered by Einstein during solving the theory of general relativity in 1916.

Select the correct option using the codes given below:

(a) 2 only

(b) 1 and 3 only

(c) 3 only

(d) 1, 2, and 3

6. Which of the following statements regarding the gravitational lensing is/ are correct?

1. Black holes can also cause the gravitational lensing.
2. It can be used to detect planets around other stars.
3. It was first introduced in the Einstein's General Theory of Relativity.

Select the correct option using the codes given below:

(a) 1 and 2 only

(b) 1 and 3 only

(c) 2 and 3 only

(d) 1, 2, and 3

7. In what ways the black holes are different from the dark matter?

1. Black holes formed after big bang whereas the dark matter might be formed before.
2. Black holes do not interact the electromagnetic radiations whereas the dark matter does.

Select the correct option using the codes given below:

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2

8. What are the conditions for the formation of the black holes?

1. Supernova explosion
2. Neutron star formation
3. White Dwarfs formation
4. Stars having masses about 1.4 times the mass of our Sun

Select the correct option using the codes given below:

(a) 2, 3, and 4 only

(b) 1, 2, and 4 only

(c) 1, 3, and 4 only

(d) 1, 2, and 3 only

9. Arrange the following list of forces into increasing strength:

1. Gravitational force
2. Nuclear Force
3. Weak Force
4. Electromagnetic force

Select the correct option using the codes given below:

(a) 1-4-2-3

(b) 2-4-3-1

(c) 1-3-4-2

(d) 3-1-4-2

10. Which of the following is the real-world application of the Doppler Effect?

1. Medical Diagnosis
2. Measuring red and blue shift
3. Speed Gun

Select the correct option using the codes given below:

(a) 1 only

(b) 2 only

(c) 2 and 3 only

(d) 1, 2, and 3

11. Ceres, Pallas, and Vesta are related to _____

(a) Antarctica region

(b) Asteroid belt between Mars and Jupiter

(c) Kuiper belt

(d) Supercomputer

12. Which of the following form the atmosphere of the Sun?

1. Photosphere
2. Chromosphere
3. Corona

Select the correct option using the codes given below:

(a) 3 only

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

13. Which of the following statements regarding Hyperspectral Imaging Satellite (HysIS) is correct?

1. It is an earth observation satellite, placed into polar sun-synchronous orbit.
2. It will be used to measure chemical and physical properties different materials.
3. It has been launched by NASA.

Select the correct option using the codes given below:

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

14. Which of the following statements regarding leptonsare correct?

1. They take part in the both weak and strong nuclear interactions.
2. Both neutrinos and electrons are examples of leptons.
3. Leptons have charges either 1 or 0.

Select the correct option using the codes given below:

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

15. Which of the following are units of length?

1. Parsec
2. Light Year
3. Angstrom
4. Chandrasekhar Limit

Select the correct option using the codes given below:

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

16. Ohm's Law is related to which of the following?

(a) Refraction of Light
(b) Phenomenon of Echo of sound
(c) Resistance in an electric circuit
(d) Scattering of Light

17. Which of the following processes indicate chemical change?

1. Change of colour
2. Evolution of gas
3. Change in Temperature

Select the correct answer using the code given below:

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

18. Consider the following statements about refractive Index:

1. The refractive index determines the relative speed of light in different media
2. The optical density of a medium depends on the refractive index of the medium

Which of the above statements is/are correct?

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

19. Consider the following statements about the effect of temperature on the particle of the matter:

1. The energy supplied by heat overcomes the forces of attraction between the particles
2. The particles leave their fixed positions and start moving more freely

Which of the above statements is/are correct?

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

20. Which of the following is/are correctly matched?

1.	Vision Defect	Correction Lens
2.	1. Myopia	Bifocal lens
3.	2. Hypermetropia	Convex lens
4.	3. Presbyopia	Concave lens

Select the correct answer using the code given below:

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

21. Consider the following statements about 'Sahyadri Megha' that was in news recently:

1. It is a new variety of wheat developed by the University of Agricultural and Horticultural Sciences (UAHS).
2. It is resistant to blast disease.

Which of the statement(s) given above is/ are correct?

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

22. Which of the following statement(s) is/ are correct about 'TRAFFIC' that was seen in the news recently?

1. TRAFFIC is a non-governmental organisation working globally on trade in wild animals and plants.
2. It was established under WWF and IUCN in 1980.

Select the correct answer using the codes given below:

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

23. Consider the following statements about the Cord Blood Banking:

1. Cord blood banking is recommended as a source of hematopoietic stem cell transplantation for haematological cancers and disorders.
2. The Indian Council of Medical Research (ICMR) recommends commercial stem cell banking.

Which of the statement(s) given above is/ are **correct**?

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

24. Which of the following statement(s) is/are correct about the regulation of web content in India?

1. The Ministry of Electronics and Information Technology (MeitY), has prepared the revised Information Technology (Intermediary Guidelines) Rules 2018 to replace the rules notified in 2011 which will be in force after law ministry's approval.
2. The guidelines have overarching rules for all the intermediaries operating in India, such as a proper privacy policy and updating users about it regularly.

Select the correct answer using the codes given below:

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

25. Consider the following statements about the problems faced by food processing sector in India:

1. Inadequate cold chain
2. Lack of integration and clarity in-laws
3. Despite having many incentives, there is a need for vital peripheral infrastructural linkages and legislation for contract and corporate farming
4. High capital investment in the sector

Which of the statements given above are correct?

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

ANSWER HINTS

DAY - 67

1. Correct Option: (b)

Explanation:

Dark energy and matter

- **One explanation for dark energy is that it is a property of space.** Albert Einstein was the first person to realize that empty space is not nothing. Space has amazing properties, many of which are just beginning to be understood. The first property that Einstein discovered is that it is possible for more space to come into existence. Then one version of Einstein's gravity theory, the version that contains a cosmological constant, makes a second prediction: "empty space" can possess its own energy. Because this energy is a property of space itself, it would not be diluted as space expands. As more space comes into existence, more of this energy-of-space would appear. As a result, this form of energy would cause the universe to expand faster and faster. Unfortunately, no one understands why the cosmological constant should even be there, much less why it would have exactly the right value to cause the observed acceleration of the universe.
- Another explanation for how space acquires energy comes from the quantum theory of matter. In this theory, "empty space" is actually full of temporary ("virtual") particles that continually form and then disappear.
- **Another explanation for dark energy is that it is a new kind of dynamical energy fluid or field**, something that fills all of space but something whose effect on the expansion of the universe is the opposite of that of matter and normal energy. Some theorists have named this "quintessence," after the fifth element of the Greek philosophers. But, if quintessence is the answer, we still don't know what it is like, what it interacts with, or why it exists. So, the mystery continues.
- **It turns out that roughly 68% of the universe is dark energy. Dark matter makes up about 27%. The rest - everything on Earth, everything ever observed with all of our instruments, all normal matter (baryonic matter) - adds up to less than 5% of the universe.** In short, we are unsure about what's there in 95% of the universe.

2. Correct Option: (a)

Explanation:

Planets

- The most recent definition of a planet was adopted by the International Astronomical Union in 2006. It says a planet must do three things:
  - ➤ It must orbit a star (in our cosmic neighbourhood, the Sun).
  - ➤ It must be big enough to have enough gravity to force it into a spherical shape.
  - ➤ It must be big enough that its gravity cleared away any other objects of a similar size near its orbit around the Sun.
- Moons, also known as natural satellites — orbit planets and asteroids.There are more than 200 moons in our solar system. Most orbit the giant planets — with Saturn and Jupiter leading moon counts — but even smaller worlds like Pluto can have five moons in orbit. Both Mercury and Venus do not have any moon but they are planets. **Hence, having moons does not qualify a planet.**

3. Correct Option: (c)

Explanation:

Dark Matter

- For the first 150 million years after the Big Bang, there were no galaxies or stars or

planets. The universe was featureless.As time passed, the first stars formed. Stars collected into galaxies. Galaxies began to cluster together. Those clusters are made up of the galaxies and all the material between the galaxies. Clumps of matter in smashed into each other, and the planets in our solar system began to form around the sun.Something must hold our solar system, galaxies and clusters of galaxies together. And gravity is that "glue."In some clusters, the space between galaxies is filled with gas so hot, scientists cannot see it using visible light telescopes. The gas only can be seen as X-rays or gamma rays. Scientists look at that gas and measure how much there is between galaxies in clusters. By doing this, they discovered that there must be five times more material in the clusters than we can detect. **The invisible matter that we can't detect is called "dark matter."**

- **The nature of dark matter is unknown. A substantial body of evidence indicates that it cannot be baryonic matter, i.e., protons and neutrons.**
- The favoured model is that dark matter is mostly composed of exotic particles formed when the universe was a fraction of a second old.
- Such particles, which would require an extension of the so-called Standard Model of elementary particle physics, could be WIMPs (weakly interacting massive particles), or axions, or sterile neutrinos.
- The non-baryonic candidates can be grouped into three broad categories: hot, warm and cold.
- Hot dark matter refers to particles, such as the known types of neutrinos, which are moving at near the speed of light when the clumps that would form galaxies and clusters of galaxies first began to grow. Cold dark matter refers to particles that were moving slowly when the pre-galactic clumps began to form, and warm dark matter refers to particles with speeds intermediate between hot and cold dark matter.
- **The name dark matter refers to the fact that it does not appear to interact with observable electromagnetic radiation, such as light**.Dark matter interacts with the rest of the universe only through its gravity.
- **The new study done by the researchers of the John Hopkins university reveals that the dark matter existed even before the Big Bang. The theory says that after the Big bang, dark matter influenced the way regular matter clumped together. This resulted in the formation of galaxies and the clusters.**

4. Correct Option: (c)

Explanation:

Black hole

- The basic structure of a black hole consists of a singularity hidden by an event horizon.
- Within the event horizon, the escape speed (vesc) exceeds the speed of the light (c) and an object is trapped forever. Outside the event horizon, vesc< c and the object is able to escape.
- The 'event horizon' is the boundary defining the region of space around a black hole from which nothing (not even light) can escape. In other words, **the escape velocity for an object within the event horizon exceeds the speed of light.** The name arises since it is impossible to observe any event taking place inside it – it is a horizon beyond which we cannot see. The event horizon therefore effectively hides the singularity at the centre of the black hole, a boon for astrophysicists discomforted by the breakdown of the laws of physics at such a point.
- **Singularities are regions of space where the density of matter, or the curvature of spacetime, becomes infinite.**In such locales, the standard concepts of space and time cease to have any meaning.
- It is a location in spacetime where the gravitational field of a celestial body is predicted to become infinite by general relativity in a way that does not depend on the coordinate system.
- **Singularities are predicted to occur in all black holes**and also in certain models of the Universe. For example, open Friedmann models of the Universe possess a singularity in the finite past, while the closed models have both an initial and final singularity.
- In general, cosmic censorship hides singularities behind event horizons, the

exception being the initial singularity of the Big Bang.

5. Correct Option: (a)

Explanation:

Schwarzschild radius

- The Schwarzschild radius (sometimes historically referred to as the gravitational radius) is a physical parameter that shows up in the Schwarzschild solution to Einstein's field equations, corresponding to the radius defining the event horizon of a Schwarzschild black hole. It is a characteristic radius associated with every quantity of mass.
- **The Schwarzschild radius was named after the German astronomer Karl Schwarzschild, who calculated this exact solution for the theory of general relativity in 1916.**
- **The Schwarzschild radius of an object is proportional to the mass.**A small mass has an extremely small Schwarzschild radius.
- **Any object whose radius is smaller than its Schwarzschild radius is called a black hole.**The surface at the Schwarzschild radius acts as an event horizon in a non-rotating body (a rotating black hole operates slightly differently). Neither light nor particles can escape through this surface from the region inside, hence the name "black hole".

6. Correct Option: (c)

Explanation:

Gravitational lensing

- A gravitational lens is a distribution of matter (such as a cluster of galaxies) between a distant light source and an observer, that is capable of bending the light from the source as the light travels towards the observer. This effect is known as gravitational lensing.
- **Black holes can also cause the gravitational lensing.**When the black hole is in alignment with a distant star, due to gravitational attraction, light rays are bent inwards like a lens, making the star appear brighter. This is called `gravitational lensing'.This rare phenomenon can occur only when the star, the black hole and the observer on the Earth are aligned in a straight line.
- **This phenomenon was first proposed in Albert Einstein's General Theory of Relativity.**
- Astronomers use gravitational microlensing to detect planets around other stars. The foreground star acts as a lens for a background star. As the star brightens up, you can detect further distortions which indicate there are planets.

7. Correct Option: (a)

Explanation:

Difference between dark matter and black hole

- An international research team has ruled out the possibility that primordial black holes (formed in the early age of the universe) might be the primary source of dark matter.The theory that primordial black holes are a source of dark matter was proposed by Professor Stephen Hawking.
- **The dark matter is 'dark' because it does not seem to interact with light (or any part of the electromagnetic spectrum). Whereas, the black hole is a region of space having a gravitational field so intense that no matter or radiation can escape. So, black holes do interact light but dark matter does not.**
- **Black holes form when stars die via supernovae explosion. Hence it must have been formed after the Big Bang. Whereas, the dark matter may have existed before the Big Bang.**

8. Correct Option: (c)

Explanation:

Formation of the black holes

- Every star has a fixed life. When a star has fused all the hydrogen in its core, nuclear reactions cease. Deprived of the energy production needed to support it, the core begins to collapse into itself and becomes much hotter. Hydrogen is still available outside the core, so hydrogen fusion continues in a shell surrounding the core. The increasingly hot core also pushes the outer layers of the star outward, causing them to expand and cool, transforming the star into a red giant.If the star is sufficiently massive, the collapsing core may become hot enough to support more exotic nuclear reactions that consume helium and

produce a variety of heavier elements up to iron. However, such reactions offer only a temporary reprieve. Gradually, the star's internal nuclear fires become increasingly unstable - sometimes burning furiously, other times dying down. These variations cause the star to pulsate and throw off its outer layers, enshrouding itself in a cocoon of gas and dust. What happens next depends on the size of the core.

Average Stars Become White Dwarfs

- For average stars like the Sun, the process of ejecting its outer layers continues until the stellar core is exposed. This dead, but still ferociously hot stellar cinder is called a White Dwarf. The more massive the core, the denser the white dwarf that is formed. Thus, the smaller a white dwarf is in diameter, the larger it is in mass! These paradoxical stars are very common - our own Sun will be a white dwarf billions of years from now. White dwarfs are intrinsically very faint because they are so small and, lacking a source of energy production, they fade into oblivion as they gradually cool down.
- This fate awaits only those stars with a mass up to about 1.4 times the mass of our Sun. Above that mass, electron pressure cannot support the core against further collapse. Such stars suffer a different fate as described below.

White Dwarfs May Become Novae

- If a white dwarf forms in a binary or multiple star system, it may experience a more eventful demise as a nova. Sometimes, particularly massive white dwarfs (those near the 1.4 solar mass limit mentioned above) may accrete so much mass in the manner that they collapse and explode completely, becoming what is known as a **supernova**.

Supernovae Leave Behind Neutron Stars or Black Holes

- Main sequence stars over eight solar masses are destined to die in a titanic explosion called a supernova. A supernova is not merely a bigger nova. In a nova, only the star's surface explodes. In a supernova, the star's core collapses and then explodes.
- **If the collapsing stellar core at the centre of a supernova contains between about 1.4 and 3 solar masses, the collapse continues until electrons and protons combine to form neutrons, producing a neutron star.** Neutron stars are incredibly dense - similar to the density of an atomic nucleus. Because it contains so much mass packed into such a small volume, the gravitation at the surface of a neutron star is immense.
- **If the collapsed stellar core is larger than three solar masses, it collapses completely to form a black hole: an infinitely dense object whose gravity is so strong that nothing can escape its immediate proximity, not even light.**

9. Correct Option: (c)

Explanation:

Fundamental forces

- **Gravity is the attraction between two objects that have mass or energy. It is the weakest force in nature.**
- The weak force, also called the weak nuclear interaction, is responsible for particle decay and change of one type of subatomic particle into another. Physicists describe this interaction through the exchange of force-carrying particles called bosons. **It is stronger than Gravity.**
- The electromagnetic force, also called the Lorentz force, acts between charged particles. It is the most abundant force in nature for example- Tension, friction, spring forces. **Also, it much stronger than gravity and weak force.**
- The nuclear force, also called the strong nuclear interaction, **is the strongest of the four fundamental forces of nature.** It is 6*1039 times stronger than the force of gravity. Like the weak force, the strong force operates only when subatomic particles are extremely close to one another.

10. Correct Option: (d)

Explanation:

Doppler Effect and its applications

- Doppler's effect can be defined as an observed change in frequency of a wave (for eg., Sound wave) when an observer and source have a relative motion between them.
- The Doppler effect has several real-world applications. Some of them are given below.
  - Police radar "gun" to check the speed of oncoming vehicles.

- ➢ Inmeteorology, to track storms.
- ➢ In the medical field such as to draw echocardiograms and in medical ultrasonography to diagnose heart and vascular problems.
- ➢ It is used to measure the speed at which stars and galaxies are approaching or receding from us, in a mechanism named red shift or blue shift.

11. Correct Option: (b)

Explanation:

Protoplanets of the solar system

- **Ceres, Pallas, and Vesta are the protoplanets or asteroids found in the asteroid belt between Mars and Jupiter.**
- The Dawn mission of NASA had visited Vesta and Ceres.

12. Correct Option: (c)

Explanation:

Sun's structure

- The Sun has six regions: the core, the radiative zone, and the convective zone in the interior; the visible surface, called the photosphere; the chromosphere; and the outermost region, the corona.
- At the core, the temperature is about 27 million degrees Fahrenheit (15 million degrees Celsius), which is sufficient to sustain thermonuclear fusion.
- Energy from the core is carried outward by radiation, which bounces around the radiative zone, taking about 170,000 years to get from the core to the top of the convective zone.
- The temperature drops below 3.5 million degrees Fahrenheit (2 million degrees Celsius) in the convective zone, where large bubbles of hot plasma (a soup of ionized atoms) move upwards.
- The surface of the Sun, the photosphere, is a 300-mile-thick (500-kilometer-thick) region, from which most of the Sun's radiation escapes outward. This is not a solid surface like the surfaces of planets. Instead, this is the outer layer of the gassy star.We see radiation from the photosphere as sunlight when it reaches Earth about eight minutes after it leaves the Sun. The temperature of the photosphere is about 10,000 degrees Fahrenheit (5,500 degrees Celsius).

Atmosphere

- **Above the photosphere lie the tenuous chromosphere and the corona (crown), which make up the thin solar atmosphere.** This is where we see features such as sunspots and solar flares.
- Visible light from these top regions is usually too weak to be seen against the brighter photosphere, but during total solar eclipses, when the moon covers the photosphere, the chromosphere looks like a red rim around the Sun, while the corona forms a beautiful white crown with plasma streamers narrowing outward, forming shapes that look like flower petals.
- Strangely, the temperature in the Sun's atmosphere increases with altitude, reaching as high as 3.5 million degrees Fahrenheit (2 million degrees Celsius). The source of coronal heating has been a scientific mystery for more than 50 years.

13. Correct Option: (a)

Explanation:

- Hyperspectral Imaging Satellite (HysIS)
- **HysIS is an earth observation satellite built by ISRO.**
- **Launched by PSLV C43, it was placed into polar sun-synchronous orbit.**
- The primary goal of HysIS is to study the earth's surface in the visible, near-infrared and shortwave infrared regions of the electromagnetic spectrum.
- **India's first such satellite will be used to identify, measure and locate different materials and their chemical and physical properties.**

14. Correct Option: (b)

Explanation:

Quarks and Leptons

- The two most fundamental types of particles are quarks and leptons. The quarks and leptons are divided into 6 flavours corresponding to three generations of matter.
- Quarks (and antiquarks) have electric charges in units of 1/3 or 2/3's. **Leptons have charges in units of 1 or 0.**
- Matter is affected by forces or interactions (the terms are interchangeable). There are four fundamental forces in the Universe:

- gravitation (between particles with mass)
- electromagnetic (between particles with charge/magnetism)
- strong nuclear force (between quarks)
- weak nuclear force (operates between neutrinos and electrons)

Leptons

- **A lepton is a particle not affected by the strong nuclear forces**, but is only subjected to the weak forces.
- There are total of six leptons of two types.
  - Charged leptons viz. electrons, muon, and tau.
  - Uncharged leptons viz. three types of neutrinos.

15. Correct Option: (c)

Explanation:

Unit of distance

- **Both Parsec and light-year are used to measure the distance of astronomical objects.** One parsec is approximately equal to 31 trillion kilometres while one light-year is equal to 9.46 trillion kilometres.
- **Angstrom is a unit of length at a subatomic level.** One angstrom equals 10□10 m.
- The Chandrasekhar limit is the maximum mass of a stable white dwarf star, currently accepted value of the Chandrasekhar limit is about 1.4 times the mass of the Sun. **Hence, it is a unit of mass.**

16. Correct Option: (c)

Explanation:

Ohm's Law

- It deals with the relationship between voltage and current in an ideal conductor. This relationship states that:
- The potential difference (voltage) across an ideal conductor is proportional to the current through it.
- The constant of proportionality is called the "resistance", R.
- Ohm's Law is given by V = I R
- where V is the potential difference between two points which include a resistance R. I is the current flowing through the resistance. For biological work, it is often preferable to use the conductance, g = 1/R; In this form, Ohm's Law is: I = g V

17. Correct Option: (d)

Explanation:

Chemical Change

- A change in which one or more new substances are formed is called a chemical change. A chemical change is also called a chemical reaction. Chemical changes are very important in our lives.
- Rusting of iron familiar is a familiar chemical change. When we leave a piece of iron in the open for some time, it acquires a film of brownish substance. This substance is called rust and the process is called rusting.
- All new substances are formed as a result of chemical changes. For example, if a metal is to be extracted from an ore, such as iron from iron ore, we need to carry out a series of chemical changes.
- Example of chemical change are:
  - Change of state
  - Change of colour
  - Evolution of gas
  - Change in Temperature

18. Correct Option: (c)

Explanation:

Refractive Index

- Light propagates with different speeds in different media. The relative speed of propagation of light in different media is related to an important quantity known as a refractive index. It is defined as the ratio of the speed of light in a vacuum to that in a medium. Light travels the fastest in a vacuum with the highest speed of 3×10^{8} m s^{-1} .
- In the air, the speed of light is only marginally less, compared to that in a vacuum. It reduces considerably in glass or water. The value of the refractive index for a given pair of media depends upon the speed of light in the two media.
- The ability of a medium to refract light is also expressed in terms of its optical density. Optical density has a definite connotation. It is not the same as mass density. It actually means 'optically rarer medium' and 'optically denser medium', respectively.

19. Correct Option: (d)

Explanation:

Effect of Temperature on the matter

- On increasing the temperature of solids, the kinetic energy of the particles increases.
- Due to the increase in kinetic energy, the particles start vibrating with greater speed.
- The energy supplied by heat overcomes the forces of attraction between the particles.
- The particles leave their fixed positions and start moving more freely.
- A stage is reached when the solid melts and is converted to a liquid. The temperature at which solid melts to become a liquid at the atmospheric pressure is called its melting point.
- The state of a matter changes at a constant temperature when pressure is fixed and there is no increase or decrease in temperature when the state changes. Example: When a solid melts, its temperature remains the same.
- The particles of a colloid are uniformly spread throughout the solution. Due to the relatively smaller size of particles, as compared to that of a suspension, the mixture appears to be homogeneous. But actually, a colloidal solution is a heterogeneous mixture, for example, milk.
- Alloys are mixtures of two or more metals or a metal and a non-metal and cannot be separated into their components by physical methods. But still, an alloy is considered as a mixture because it shows the properties of its constituents and can have variable composition.

20. Correct Option: (c)

Explanation:

Vision Defects

Myopia

- Near-sightedness: A person with Myopia can see nearby objects clearly. A person with myopia cannot see faraway objects clearly. The far point for the myopic eye is nearer than infinity occurs due to excessive curvature of the eye lens and elongation of the eyeball. The image of a distant object is formed in front of the retina and not on the retina
- Defected is corrected by using Concave lenses such that the lens will bring the image back on to the retina.

Hypermetropia

- A person with Hypermetropia can see faraway objects clearly. A person with Hypermetropia cannot see nearby objects clearly. The near point of the eye is more than 25cm. This arises mostly during latter stages in life, as a result of the weakening of the ciliary muscles and/or the decreased flexibility of the lens. The image of a distant object is formed behind the retina and not on the retina.
- Defected is corrected by using Convex lenses such that the lens will bring the image back on to the retina.

Presbyopia

- The power of accommodation of the eye usually decreases with aging. The ciliary muscles weaken and thereby the flexibility of the eye lens reduces.
- The near point moves away.
- Spectacles with convex lenses are recommended.

21. Correct Answer (b)

Explanation:

- ***Only statement 1 is incorrect.*** Sahyadri Megha is a new variety of paddy (NOT wheat), developed by the University of Agricultural and Horticultural Sciences (UAHS), Shivamogga (Karnataka).

Supplementary Notes

- The University of Agricultural and Horticultural Sciences (UAHS), Shivamogga (Karnataka), has developed a new variety of paddy, 'Sahyadri Megha'.
- The University has developed the new variety to prevent a decline in the area under paddy cultivation.

Reasons behind developing the new variety

- Paddy growers are switching over to commercial crops like areca nut, ginger and rubber for lucrative returns.
- The area under paddy that was around 1.5 lakh hectares in Shivamogga district in 1990, has come down to around 1.05 lakh hectares.
- The 'Jyothi' variety which is widely cultivated in the command areas of the

Bhadra and the Tunga reservoirs and semi-arid areas in Sorab, Shikaripur, Hanagal and Sirsi taluks in Karnataka has become vulnerable to blast disease and other infestations.

- Demand by customers in urban areas for red rice which is rich in fibre and protein.
- The red variety gets its rich colour from an antioxidant called anthocyanins, which are also found in deep purple or reddish fruits and vegetables.
- The compound is believed to have properties that can reduce inflammation, allergy, prevent risks of cancer and help in weight management.

Sahyadri Megha

- Sahyadri Megha is a red variety of paddy that is resistant to blast disease and also rich in nutrients.
- It was developed under the hybridization breeding method by cross-breeding the best among the 'Jyothi' variety with that of 'Akkalu', a disease-resistant and protein-rich paddy variety.
- The new variety will be notified under the Indian Seed Act 1966 shortly after which it will become part of the seed chain.
- Key Attributes:
  - The protein content in it is 12.48%, higher than the other red rice varieties grown.
  - The yield per hectare from 'Sahyadri Megha' is around 65 quintals, substantially higher than other red paddy varieties.
  - It is a medium-term paddy that can be grown when there is a delay in the onset of monsoon. It can be harvested after 120 days of sowing.

22. Correct Answer: (a)

Explanation:

- ***Only statement 2 is incorrect.*** TRAFFIC is a joint program of WWF and IUCN – the International Union for Conservation of Nature, created in 1976.

Supplementary Notes

- TRAFFIC – The Wildlife Trade Monitoring Network
  - TRAFFIC is a leading non-governmental organisation working globally on trade in wild animals and plants in the context of both biodiversity conservation and sustainable development.
  - It is a joint program of WWF and IUCN – the International Union for Conservation of Nature created in 1976.
  - TRAFFIC focuses on leveraging resources, expertise and awareness of the latest globally urgent species trade issues such as tiger parts, elephant ivory and rhino horn.

23. Correct Answer (a)

Explanation:

- ***Only statement 2 is incorrect.*** The Indian Council of Medical Research (ICMR) does not recommend commercial stem cell banking.

Supplementary Notes

- Recently, Poona Citizen Doctors' forum dispels beliefs on commercial cord blood banking. It has warned to-be parents against falling prey to the emotional marketing tactics by stem cell banking companies.
- **Cord blood (**short for umbilical cord blood) is the blood that remains in the umbilical cord and placenta post-delivery.
- It contains special cells called hematopoietic stem cells that can be used to treat some types of diseases.
- **Cord blood banking** is the process of collecting the cord blood and extracting and cryogenically freezing its stem cells and other cells of the immune system for potential future medical use.
- Globally, cord blood banking is recommended as a source of hematopoietic stem cell transplantation for haematological cancers and disorders where its use is recommended. For all other conditions, the use of cord blood as a source of stem cells is not yet established.
- Stem cell banking has been aggressively marketed even as its use is still in experimental stages. But these companies charge enormous fees from parents to preserve cells.
- The concern here is that it is merely by emotional marketing that companies

convince parents to bank the cells for several years promising future therapeutic use.

- Private companies who have forayed into this field offer packages anywhere between Rs 50,000 and Rs 1 lakh to store and preserve the cells in right conditions.
- So far there is no scientific basis for preservation of cord blood for future self-use and this practice, therefore, raises ethical and social concerns.
- The Indian Council of Medical Research (ICMR) does not recommend commercial stem cell banking.

Uses of Cord Blood

- The umbilical cord fluid is loaded with stem cells. They can treat cancer, blood diseases like anaemia, and some immune system disorders, which disrupt your body's ability to defend itself.
- The fluid is easy to collect and has 10 times more stem cells than those collected from bone marrow.
- Stem cells from cord blood rarely carry any infectious diseases and are half as likely to be rejected as adult stem cells.

24. Correct Answer: (c)

Explanation:

Both statements are correct.

Supplementary Notes

- Recently, the Ministry of Electronics and Information Technology (MeitY), has prepared the revised Information Technology (Intermediary Guidelines) Rules 2018 to replace the rules notified in 2011 which will be in force after law ministry's approval.
- **The Information Technology Act (IT Act), 2000** was enacted with a view to give a fillip to electronic transactions, to provide legal recognition for e-commerce and e-transactions, to facilitate e-governance, to prevent computer-based crimes and ensure security practices and procedures. The Act came into force on 17th October 2000.
- **Section 79 of the IT Act** elaborates on the exemption from liabilities of intermediaries in certain cases. **Section 79(2)(c)** mentions that intermediaries must observe due diligence while discharging their duties, and also observe such other guidelines as prescribed by the Central Government. Accordingly, the Information Technology (Intermediaries Guidelines) Rules, 2011 were notified in April 2011.
- A calling attention motion on "Misuse of Socal Media platforms and spreading of fake news" was admitted in the Parliament (Rajya Sabha) in 2018 (Monsoon session). Hon'ble Minister for Electronics and IT, responding to the calling attention motion made a detailed statement where he inter alia conveyed to the House the resolve of the Government to strengthen the legal framework and make the social media platforms accountable under the law.
- Subsequently, MeitY has prepared the draft Information Technology (Intermediary Guidelines) Rules 2018 to replace the rules notified in 2011.
- MeitY will seek the law ministry's views on the validity of the provisions in the draft document before notifying the rules. MeitY wants to make sure that the provisions in the draft do not overshoot the due diligence required under the larger IT Act.
- The guidelines propose additional responsibilities on social media companies. These include verifying users through mobile numbers, tracing the origin of messages required by court order and building automated tools to identify child pornography and terror-related content. All these requirements come under the ambit of under due diligence.

Concerns with the proposed Guidelines

- The guidelines have overarching rules for all the intermediaries operating in India, such as a proper privacy policy and updating users about it regularly
- Social media companies, as well as intermediaries, will have to operate with a certain degree of responsibility.
- Each clause in the guidelines is being scrutinized as these rules will set a "global precedent.
- The government's move to classify intermediaries based on function better reflects the modern nature of the internet and will help ensure that the open internet remains a space for innovation and knowledge sharing.
- The traceability and 24-hour content takedown timelines continue to threaten

the freedom of expression, privacy and security of users and should be urgently reformed before the rules are enacted.

- The central criticism against the proposed amendment is that it contravenes a landmark Supreme Court judgement.
- In the 2015 **Shreya Singhal** writ case on online freedom of speech, the court clearly stated that online content could be removed from intermediary platforms only by government or court order.
- This protected the platforms from liability and served as a brake on frivolous or agenda-driven take-down demands.
- Tech giants and security experts have joined the free speech lobby in opposing the liability regime on account of the technical problems.
- They complain that many of the proposals would be impossible to implement and ought to be dropped, such as the use of automated tools to proactively identify and remove unlawful content.

25. Correct Answer (c)

Explanation:

- ***Only statement 4 is incorrect.*** Low capital investment and not a high capital investment in the sector is a big problem plaguing the sector.

Supplementary Notes

- Food Processing includes process under which any raw product of agriculture, dairy, animal husbandry, meat, poultry or fishing is transformed through a process (involving employees, power, machines or money) in such a way that its original physical properties undergo a change and the transformed product has commercial value and is suitable for human and animal consumption.
- It also includes the process of value addition to produce products through methods such as preservation, the addition of food additives, drying etc. with a view to preserve food substances in an effective manner, enhance their shelf life and quality.

Status of Food Processing in India

- India is the world's second-largest producer of fruits & vegetables after China but hardly 2% of the produce is processed.
- Despite a large production base, the level of processing is low (less than 10%). Approximately 2% of fruits and vegetables, 8% marine, 35% milk, 6% of poultry are processed. Lack of adequate processable varieties continues to pose a significant challenge to this sector.
- India's livestock population is largest in the world with 50% of the world's buffaloes and 20% of cattle, but only about 1% of total meat production is converted to value-added products.
- More than 75% of the industry is in the unorganized sector.
- Processing can be delineated into primary and secondary processing. Rice, sugar, edible oil and flour mills are examples of primary processing. Secondary processing includes the processing of fruits and vegetables, dairy, bakery, chocolates and other items.
- Most processing in India can be classified as primary processing, which has lower value-addition compared to secondary processing. There is a need to move up the value chain in processed food products to boost farmer incomes. For instance, horticulture products, such as fruits and vegetables, carry the potential for higher value-addition when compared to cereal crops.
- At present, India's agricultural exports predominantly consist of raw materials, which are then processed in other countries, again indicating the space to move up the value chain.

Problems in Food Processing Industries

- Supply Side Bottlenecks
  - ➤ Small and dispersed marketable surplus due to fragmented holdings, low farm productivity, high reasonability, perishability and intermediation
- Infrastructure Bottlenecks
  - ➤ Inadequate cold chain (30% of the produce is lost from farm gate)
  - ➤ FPI in Unorganised
- Deficiencies in the Regulatory Environment
  - ➤ Lack of integration and clarity in-laws
- Lack of Holistic Approach
  - ➤ Despite having many incentives, there is a need for vital peripheral infrastructural linkages and legislation for contract and corporate farming

TEST
DAY - 68

Time Allowed: 30 mins **Maximum Marks: 50**

1. Melatonin, that influences the sleeping cycle of humans, is released by___

(a) Thyroid gland
(b) Pituitary gland
(c) Pineal gland
(d) Hypothalamus

2. Which of the following statements regarding Liver are correct?

1. It is the largest gland in the human body.
2. It can regenerate completely.
3. It helps in the blood clotting.
4. Gluconeogenesis,that results in the generation of glucose from the non-carbohydrate carbon substrates takes place primarily in the liver.

Select the correct option using the codes given below:

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

3. Consider the following statements regarding the International Committee on Taxonomy of Viruses:

1. It is a subsidiary of the World Health Organization.
2. Its role is to name the diseases that are caused by the Viruses.

Which of the above statements is/are ***incorrect***?

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

4. Which of the following pairs regarding Proteins and their sources is/are correctly matched?

1. Albumin: Muscles
2. Ossein: Bones
3. Myoglobin: Blood

Select the correct option using the codes given below:

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

5. Which of the following statements regarding the biosafety levels (BSL) is/ are correct?

1. The BSL-1 is the lowest level of biological safety.
2. Working with Ebola needs BSL-3.
3. As per the WHO guidelines, BSL-4 is required for the isolation and characterization of the virus of COVED-19.

Select the correct option using the codes given below:

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

6. Match the following lists:

Glands	Hormones
A. Pituitary	1. Epinephrine
B. Thyroid	2. Growth hormone
C. Adrenal	3. Calcitonin
D. Hypothalamus	4. Dopamine

Select the correct option using the codes given below:

	A	B	C	D
(a)	1	2	3	4
(b)	2	3	1	4
(c)	4	2	1	3
(d)	2	1	4	3

7. Which of the following statements is/ are correct?

1. Type 1 diabetes is the most common form of diabetes.
2. In the Type 2 diabetes, the body does not produce insulin at all.
3. Type 1 diabetes used to be called juvenile diabetes

Select the correct option using the codes given below:

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

8. Consider the following statements:

1. Human papillomavirus (HPV) is one of the most common sexually transmitted infection in the world.
2. It causes cervical cancer in women.

Which of the above statements is/are correct?

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

9. Zika virus disease isspread to people through___

1. The bite of both *Aedes aegypti* and *Aedes albopictus*mosquitoes.
2. During pregnancy
3. Sexual relationship

Select the correct option using the codes given below:

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

10. Consider the following statements regarding the Nipah virus (NiV):

1. It is a type of corona virus.
2. It was first observed from the East Africa.
3. Both Bats and the Flying foxes are the reservoirs for the NiV.

Which of the above statements is/are ***incorrect***?

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

11. Which of the following statements regardingthe Ebola virus disease (EVD) is/are correct?

1. It affects only primates.
2. Its fatality rate is nearly same as of the COVID-19.
3. Fruit bats are the natural reservoir.

Select the correct option using the codes given below:

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

12. Tuberculosis is *not* spread by__

1. shaking someone's hand
2. sharing food or drink
3. touching bed linens or toilet seats
4. kissing

Select the correct option using the codes given below:

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

13. Consider the following pairs regarding pancreatic isletsand their hormones:

1. Alpha cells: somatostatin
2. Beta cells: insulin
3. Delta cells: glucagon

Which of the above pairs is/are correctly matched?

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

14. Multidrug-resistant TB (MDR-TB)is resistant to___

1. Isoniazid
2. Levofloxacin
3. Amikacin
4. Rifampicin

Select the correct option using the codes given below:

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

15. Consider the following statements regarding the International Classification of Diseases?

1. It is the international standard diagnostic tool for epidemiology, health management and clinical purposes supervised by the World Health Organization.
2. It was introduced by the World Health Organization in 1967.
3. Currently, the ICD-11 version is being used across the world.

Which of the above statements is/are correct?

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

16. With reference to the 'Oxytocin', seen in the news recently, consider the following statements:

1. It is a natural hormone secreted by pituitary glands in mammals.
2. It is listed in the National List of Essential Medicines (NLEM) as it is crucial in preventing post-partum hemorrhage.
3. It also helps in the formation of milk after the birth of a baby.

Which of the above statements is/are correct?

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

17. Recently the Delhi High Court put a stay on Delhi government's Measles-Rubella vaccine campaign.

In this context, consider the following statements regarding measles and rubella:

1. Measles and Rubella are both viral diseases spreading through respiratory droplets of sick people.
2. Rubella also is known as German Measles is more contagious and severe than Measles.

Which of the above statements is/are correct?

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

18. Diseases can be classified into various types. In this context, consider the following statements:

1. Congenital diseases are those that are transmitted from parent to offspring from generation to generation.

2. Non-communicable diseases are chronic diseases that can be caused due to behavioural factors.

Which of the above statements is/are correct?

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

19. Food fortification refers to the deliberate addition of one or more micronutrients to reduce the burden of micronutrient malnutrition in India. In this context, consider the following statements:

1. Milk, salt and edible oil are the only items that are fortified in India at present.
2. Fortification of staple food is not mandatory as per the Fortification of Food Regulations 2018.
3. Double fortified salt delivers a crucial amount of iodine and vitamin B12.

Which of the above statements is/are correct?

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

20. In the context of active and passive immunity, consider the following statements:

1. Provision of ready-made antibodies to protect the body against foreign agents is called active immunity.
2. Deliberately injecting the microbes during immunization is an example of passive immunity.
3. Active immunity takes more time than passive immunity to give full effective response.

Which of the above statements is/are incorrect?

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

21. Which of the following statement(s) is/are correct about greenhouse gases (GHGs)?

1. Greenhouse gases absorb the infrared radiations.
2. Among all the greenhouse gases, carbon dioxide is the most dangerous because of its higher concentration and heat-absorbing capacity.

Choose the most appropriate option:

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

22. Consider the following statements about Article 35 of the Constitution of India:

1. It provides for restrictions on fundamental rights while martial law is in operation in any area within the territory of India.
2. It empowers both the parliament and state legislatures to make laws to give effect to certain fundamental rights.

Which of the statement(s) given above is/ are **NOT correct**?

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

23. Which of the following statement(s) is/ are correct about the Pi Day?

1. Pi Day is celebrated on March 14 dedicated to Pi (Greek letter ϖ).
2. The first calculation of ϖ was done by Ramanujum of India.

Choose the correct option:

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

24. Consider the following statements about the Wasp-76b, an exo-planet that was in news recently:

1. Wasp-76b is a huge gas planet that is twice the width of Jupiter.
2. It experiences iron rain.

Which of the statement(s) given above is/ are **correct**?

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

25. Consider the following statements regarding the 'Epidemic Disease Act 1897' which has been advised to all states and Union Territories to invoke:

1. The Act was introduced by the British in 1897 to tackle the epidemic of bubonic plague that broke out in the then state of Bombay.
2. Section 2 of the Act empowers state governments/UTs to take special measures and formulate regulations for containing the outbreak.

Which of the statement(s) given above is/ are correct?

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

❖❖❖❖❖❖

ANSWER HINTS

DAY - 68

1. Correct Option: (c)

Explanation:

Melatonin

- **Melatonin is a hormone produced by the pineal gland in the brain.** It controls the body's night and day cycles.
- When it gets dark, the body produces more melatonin to help a person to fall asleep. When it is light, the body produces less melatonin and prepares to awake.
- Melatonin controls the body's sleeping and waking cycles. It is also claimed that melatonin is an antioxidant that can boost the immune system and prevent ageing and cancer. But these claims aren't proven.
- Too little melatonin can lead to sleep problems, depression and other mental illnesses. Too much melatonin can cause headaches, drowsiness, dizziness and nausea.
- The body's natural melatonin level tends to go down as we age. Low levels of melatonin can also be caused by not having enough sleep, travelling across time zones, doing shift work and taking some medicines. Coffee, alcohol and nicotine can also lower melatonin levels.

2. Correct Option: (d)

Explanation:

Liver

- The liver is the largest solid organ and **the largest gland in the human body**. It carries out over 500 essential tasks.
- Because of the importance of the liver and its functions, evolution has ensured that it can regrow rapidly as long as it is kept healthy. This ability is seen in all vertebrates from fish to humans.The liver is the only visceral organ that can regenerate.It can regenerate completely, as long as a minimum of 25 percent of the tissue remains.
- The major functions of the liver include:
  - Bile production: Bile helps the small intestine break down and absorb fats, cholesterol, and some vitamins. Bile consists of bile salts, cholesterol, bilirubin, electrolytes, and water.
  - Absorbing and metabolizing bilirubin: Bilirubin is formed by the breakdown of haemoglobin. The iron released from haemoglobin is stored in the liver or bone marrow and used to make the next generation of blood cells.
  - **Supporting blood clots**: Vitamin K is necessary for the creation of certain coagulants that help clot the blood. Bile is essential for vitamin K absorption and is created in the liver. If the liver does not produce enough bile, clotting factors cannot be produced.
  - Fat metabolization: Bile breaks down fats and makes them easier to digest.
  - **Metabolizing carbohydrate**s: Carbohydrates are stored in the liver, where they are broken down into glucose and siphoned into the bloodstream to maintain normal glucose levels. They are stored as glycogen and released whenever a quick burst of energy is needed. **In case of hypoglycaemia, it synthesizes glucose by gluconeogenesis, that results in the generation of glucose from certain non-carbohydrate carbon substrates. In vertebrates, gluconeogenesis takes place mainly in the liver and, to a lesser extent, in the cortex of the kidneys.**
  - Vitamin and mineral storage: The liver stores vitamins A, D, E, K, and B12. It keeps significant amounts of these vitamins stored. In some cases,

several years' worth of vitamins is held as a backup. The liver stores iron from haemoglobin in the form of ferritin, ready to make new red blood cells. The liver also stores and releases copper.

- ➢ Helps metabolize proteins: Bile helps break down proteins for digestion.
- ➢ Filters the blood: The liver filters and removes compounds from the body, including hormones, such as estrogen and aldosterone, and compounds from outside the body, including alcohol and other drugs.
- ➢ Immunological function: The liver is part of the mononuclear phagocyte system. It contains high numbers of Kupffer cells that are involved in immune activity. These cells destroy any disease-causing agents that might enter the liver through the gut.
- ➢ Production of albumin: Albumin is the most common protein in blood serum. It transports fatty acids and steroid hormones to help maintain the correct pressure and prevent the leaking of blood vessels.
- ➢ Synthesis of angiotensinogen: This hormone raises blood pressure by narrowing the blood vessels when alerted by production of an enzyme called renin in the kidneys.

3. Correct Option: (c)

Explanation:

ICTV

- **The International Committee on Taxonomy of Viruses (ICTV) is concerned with the designation and naming of virus taxa** (i.e. species, genus, family, etc.) rather than the designation of virus common names or disease names.
- For an outbreak of a new viral disease, there are three names to be decided: **the disease, the virus and the species.**
- **The World Health Organization (WHO) is responsible for the first, expert virologists for the second, the ICTV for the third.**

4. Correct Option: (b)

Explanation:

Proteins and their sources

- Albumin: Blood serum
- Ossein: Bone
- Myoglobin: Muscle

5. Correct Option: (a)

Explanation:

Biosafety and Biosafety Levels

- Biosafety is the application of safety precautions that reduce a laboratorian's risk of exposure to a potentially infectious microbe and limit contamination of the work environment and, ultimately, the community.
- There are four biosafety levels. Each level has specific controls for containment of microbes and biological agents. The primary risks that determine levels of containment are infectivity, severity of disease, transmissibility, and the nature of the work conducted. Origin of the microbe, or the agent in question, and the route of exposure are also important.
- Each biosafety level has its own specific containment controls that are required for the following:
  - ➢ Laboratory practices
  - ➢ Safety equipment
  - ➢ Facility construction
- **In a BSL-1, the microbes there are not known to consistently cause disease in healthy adults and present minimal potential hazard to laboratorians and the environment.** An example of a microbe that is typically worked with at a BSL-1 is a non-pathogenic strain of E. coli.
- BSL-2 builds upon BSL-1. In this, the microbes there pose moderate hazards to laboratorians and the environment. The microbes are typically indigenous and associated with diseases of varying severity. An example of a microbe that is typically worked with at a BSL-2 laboratory is Staphylococcus aureus.
- BSL-3 builds upon the containment requirements of BSL-2. If you work in a lab that is designated BSL-3, the microbes there can be either indigenous or exotic, and they can cause serious or potentially lethal disease through respiratory transmission. Respiratory transmission is the inhalation route of exposure. One example of a microbe that is typically worked with in a BSL-3 laboratory is Mycobacterium tuberculosis, the bacteria that causes tuberculosis.

- **BSL-4 builds upon the containment requirements of BSL-3 and is the highest level of biological safety.** There are a small number of BSL-4 labs around the world. The microbes in a BSL-4 lab are dangerous and exotic, posing a high risk of aerosol-transmitted infections. Infections caused by these microbes are frequently fatal and without treatment or vaccines. Two examples of microbes worked with in a BSL-4 laboratory include **Ebola,** and Marburg viruses, etc.

Specific Guidance by CDC and WHO regarding COVID-19

- **Virus isolation in cell culture and initial characterization of viral agents recovered in cultures of SARS-CoV-2 specimens are NOT recommended at this time, except in a Biosafety Level 3 (BSL-3) laboratory.**
- Routine diagnostic testing of specimens, such as the following activities, can be handled in a BSL-2 laboratory using Standard Precautions.

6. Correct Option: (b)

Explanation:

Key hormones

- **Calcitonin** is a hormone that is produced in humans by the parafollicular cells (commonly known as C-cells) of the **thyroid gland**. Calcitonin is involved in helping to regulate levels of calcium and phosphate in the blood, opposing the action of parathyroid hormone.
- **Dopamine** is an organic chemical of the catecholamine and phenethylamine families. It functions both as a hormone and a neurotransmitter, and plays several important roles in the brain and body.**It is released by Hypothalamus.**
- **Epinephrine, also known as adrenaline,is normally produced by both the adrenal glands** and a small number of neurons in the brain where it acts as a neurotransmitter. It plays an important role in the fight-or-flight response by increasing blood flow to muscles, output of the heart, pupil dilation, and blood sugar.
- **Growth hormone** (GH) or somatotropin, also known as human growth hormones (hGH or HGH) in its human form, is a peptide hormone that stimulates growth, cell reproduction, and cell regeneration in humans and other animals. It is thus important in human development. It is released by the **Pituitary gland.**

7. Correct Option: (a)

Explanation:

Diabetes

- There are two main types of diabetes: type 1 and type 2. Both types of diabetes are chronic diseases that affect the way the body regulates blood sugar, or glucose.

Type 1 diabetes

- **In this, the body doesn't produce any insulin to handle the glucose.** Insulin deficiency causes a range of complications, so people with type 1 diabetes have to take insulin to help their body use glucose appropriately.
- Type 1 diabetes used to be called juvenile diabetes because the majority of people who were diagnosed with it were kids and young adults. But it's possible to develop it later in life, too.

Type 2 diabetes

- **Type 2 diabetes is much more prevalent than type 1.People with type 2 diabetes may be able to produce insulin, but their bodies don't use it correctly.** They might also be unable to produce enough insulin to handle the glucose in their body. Or, the cells in the muscles, liver and fat tissue are inefficient at absorbing the insulin and cannot regulate glucose well. Lifestyle choices, such as diet and exercise, play a major role in managing and preventing type 2 diabetes.
- Type 2 diabetes is a progressive condition, meaning that the longer someone has it, the more "help" they will need to manage blood glucose levels. This may require more medications and eventually, injected insulin could be needed.

8. Correct Option: (c)

Explanation:

HPV

- HPV is the most common sexually transmitted infection (STI). HPV is a different virus than HIV and HSV (herpes).
- In most cases, HPV goes away on its own and does not cause any health problems.

But when HPV does not go away, it can cause health problems like genital warts and cancer.**HPV can cause cervical and other cancers.**

- Cervical cancer, mainly caused by Human Papillomavirus infection, is the leading cancer in Indian women and the second most common cancer in women worldwide.

9. Correct Option: (d)

Explanation:

Zika virus disease

- Zika virus disease is caused by the Zika virus, which is spread to people primarily through the bite of an infected mosquito (Aedes aegypti and Aedes albopictus). The illness is usually mild with symptoms lasting up to a week, and many people do not have symptoms or will have only mild symptoms. However, Zika virus infection during pregnancy can cause a serious birth defect called microcephaly and other severe brain defects.
- **Zika is spread to people primarily through the bite of an infected Aedes species mosquito (Aedes aegypti and Aedes albopictus). A pregnant woman can pass Zika to her foetusduring pregnancy or around the time of birth. Also, a person with Zika can pass it to his or her sex partners.**

10. Correct Option: (c)

Explanation:

Nipah virus (NiV)

- **Nipah virus (NiV) is a member of the family Paramyxoviridae, genus Henipavirus. NiV** was initially isolated and identified in 1999 during an outbreak of encephalitis and respiratory illness among pig farmers and people with close contact with pigs in Malaysia and Singapore.
- **Its name originated from Sungai Nipah, a village in the Malaysian Peninsula where pig farmers became ill with encephalitis.**
- **The main reservoir, or carrier, animal of Nipah virus is a species of fruit bat found in Southeast Asia. Fruit bats do not get sick from Nipah virus. However, they can pass the virus to other animals such as pigs, flying foxes, etc which can get sick. These animals can then pass the virus along to people.**

11. Correct Option: (c)

Explanation:

EVD

- **Ebola virus disease (EVD), formerly known as Ebola haemorrhagic fever, is a severe, often fatal illness affecting humans and other primates.**
- The virus is transmitted to people from wild animals (such as fruit bats, porcupines and non-human primates) and then spreads in the human population through direct contact with the blood, secretions, organs or other bodily fluids of infected people, and with surfaces and materials (e.g. bedding, clothing) contaminated with these fluids.
- **The average EVD case fatality rate is around 50%. Case fatality rates have varied from 25% to 90% in past outbreaks. The fatality rate of the COVID-19 is around 2%.**
- The first EVD outbreaks occurred in remote villages in Central Africa, near tropical rainforests. The 2014–2016 outbreak in West Africa was the largest and most complex Ebola outbreak since the virus was first discovered in 1976. There were more cases and deaths in this outbreak than all others combined. It also spread between countries, starting in Guinea then moving across land borders to Sierra Leone and Liberia.
- It is thought that fruit bats of the **Pteropodidae family are natural Ebola virus hosts.**

12. Correct Option: (d)

Explanation:

Spread of TB

- As per the WHO, TB is not spread by
  - ► shaking someone's hand
  - ► sharing food or drink
  - ► touching bed linens or toilet seats
  - ► sharing toothbrushes
  - ► kissing

13. Correct Option: (b)

Explanation:

Pancreas

- The pancreas is unique in that it's both an endocrine and exocrine gland. In

other words, the pancreas has the dual function of secreting hormones into blood (endocrine) and secreting enzymes through ducts (exocrine).

- The pancreas is a 6-inch-long flattened gland that lies deep within the abdomen, between the stomach and the spine. It is connected to the duodenum, which is part of the small intestine.
- Only about 5% of the pancreas is comprised of endocrine cells. These cells are clustered in groups within the pancreas and look like little islands of cells when examined under a microscope. These groups of pancreatic endocrine cells are known as pancreatic islets or more specifically, islets of Langerhans.
- Hormones produced in the pancreatic islets are secreted directly into the blood flow by (at least) five types of cells.
  - Alpha cells produce glucagon
  - Beta cells produce insulin and amylin
  - Delta cells producing somatostatin
  - Epsilon cells producing ghrelin
  - PP cells (gamma cells or F cells) producing pancreatic polypeptide
- Gastrin: This hormone aids digestion by stimulating certain cells in the stomach to produce acid.
- Glucagon: Glucagon helps insulin maintain normal blood glucose by working in the opposite way of insulin. It stimulates your cells to release glucose, and this raises your blood glucose levels.
- Insulin: This hormone regulates blood glucose by allowing many of your body's cells to absorb and use glucose. In turn, this drops blood glucose levels.
- Somatostatin: When levels of other pancreatic hormones, such as insulin and glucagon, get too high, somatostatin is secreted to maintain a balance of glucose and/or salt in the blood.
- Vasoactive intestinal peptide (VIP): This hormone helps control water secretion and absorption from the intestines by stimulating the intestinal cells to release water and salts into the intestines.

14. Correct Option: (b)

Explanation:

Multidrug-resistant TB (MDR-TB)

- Multidrug-resistant TB (MDR-TB) is TB that does not respond to at least **isoniazid and rifampicin**, the 2 most powerful anti-TB drugs.
- XDR-TB, an abbreviation for extensively drug-resistant (XDR) tuberculosis (TB), is a form of TB which is resistant to at least 4 of the core anti-TB drugs. XDR-TB involves resistance to the 2 most powerful anti-TB drugs, **isoniazid and rifampicin**, also known as multidrug-resistance (MDR-TB), **in addition to resistance to any of the fluoroquinolones (such as levofloxacin or moxifloxacin) and to at least 1 of 3 injectable second-line drugs (amikacin, capreomycin or kanamycin).**
- MDR-TB and XDR-TB both take substantially longer to treat than ordinary (drug-susceptible) TB, and require the use of second-line anti-TB drugs, which are more expensive and have more side-effects than the first-line drugs used for drug-susceptible TB.

15. Correct Option: (a)

Explanation:

International Classification of Diseases

- **The ICD provides a common language for reporting and monitoring diseases**. This allows the world to compare and share data in a consistent and standard way – between hospitals, regions and countries and over periods of time. It facilitates the collection and storage of data for analysis and evidence-based decision-making.
- Users include physicians, nurses, other providers, researchers, health information managers and coders, health information technology workers, policy-makers, insurers and patient organizations.
- All Member States are expected to use the most current version of the ICD for reporting death and disease statistics (according to the WHO Nomenclature Regulations adopted by the World Health Assembly in 1967).
- It is the international "standard diagnostic tool for epidemiology, health management and clinical purposes." Its full official name is International Statistical Classification of Diseases and Related Health Problems
- **The first international classification edition, known as the International List of Causes of Death, was adopted by**

the International Statistical Institute in 1893.

- WHO was entrusted with the ICD at its creation in 1948 and published the 6th version, ICD-6, that incorporated morbidity for the first time.
- The WHO Nomenclature Regulations, adopted in 1967, stipulated that Member States use the most current ICD revision for mortality and morbidity statistics. The ICD has been revised and published in a series of editions to reflect advances in health and medical science over time.
- **A version of ICD-11 was released on 18 June 2018 to allow Member States to prepare for implementation, including translating ICD into their national languages. ICD-11 will be submitted to the 144th Executive Board Meeting in January 2019 and the Seventy-second World Health Assembly in May 2019 and, following endorsement, Member States will start reporting using ICD-11 on 1 January 2022.**

16. Correct Option: (b)

Explanation:

Oxytocin

- It was in the news as the Health Ministry notified a ban on private firms from manufacturing and selling oxytocin, stating that it wanted to restrict the responsibility of supplying the drug to a Karnataka-based public sector manufacturer to avoid its misuse in the veterinary field.
- It is also known as the 'love hormone', is a hormone secreted by the pituitary glands of mammals during sex, childbirth, lactation or social bonding. However, it can also be chemically manufactured and is sold by pharma companies for use during childbirth.
- Oxytocin is a uterine stimulant hormone, prescribed for the initiation of uterine contractions and induction of labour in women as well as stimulation of contractions during labour. It is also used to help abort the fetus in cases of incomplete abortion or miscarriage, and control bleeding after childbirth.
- It may promote the release of breast milk. Its use is especially crucial to prevent new mothers from excessively bleeding after giving birth—a common cause of maternal deaths.
- Oxytocin is listed in the National List of Essential Medicines (NLEM) for reproductive health.
- Oxytocin is a controversial hormonal injection that is used widely in the dairy industry, agriculture and horticulture. Authorities are also concerned that the misuse of this growth booster is reported among trafficked children, injected to accelerate puberty among girls.

17. Correct Option: (a)

Explanation:

Measles-Rubella (MR) Vaccine

- Measles-Rubella (MR) Vaccine was introduced in the Universal Immunization Programme in 2017, as the Measles-Rubella combination vaccine to provide protection against congenital birth defects caused by Rubella infection for children aged between 9 months and 15 years.
- Recently, the New Delhi High Court stopped the implementation of the 'Measles and Rubella Vaccine Immunization Campaign' by the Delhi government. Court's order said that 'measles vaccination cannot be administered "forcibly" and without the consent of parents,' it introduced a dimension to vaccination — the question of consent — that had not been adequately dealt with earlier.
- Measles and Rubella are two different viral diseases. Generally, Rubella causes milder infections than measles but it is of concern when a pregnant woman is infected by the virus because it results in severe birth defects.
- Both Measles and Rubella are caused by an RNA virus and are generally spread through respiratory droplets of sick people.
- It is important to note that Rubella is not the same as measles. Though both diseases share the same characteristics including the red rash and have similar symptoms, they are distinct.
- Measles is far more contagious and severe an illness than rubella (also called German Measles).
- Swollen lymph nodes always occur with rubella but not often with measles.

18. Correct Option: (b)

Explanation:

Types of Diseases

Congenital diseases:

- Congenital anomalies are also known as birth defects, congenital disorders or congenital malformations. Congenital anomalies can be defined as structural or functional anomalies (for example, metabolic disorders) that occur during intrauterine life and can be identified prenatally, at birth, or sometimes may only be detected later in infancy, such as hearing defects.
- In simple terms, congenital refers to the existence at or before birth.
- Congenital disorders can be due to fault in the chromosome structure or damage inflicted on the developing embryo.
- Hereditary diseases:
- Diseases that are transmitted from parent to offspring from generation to generation are termed hereditary diseases. For e.g. Haemophilia, colour blindness etc.
- Communicable Diseases:
- These are caused due to the entry of disease-causing germs called pathogens into the body and are easily transmitted from person to person by direct or indirect contact or through a carrier which is called a vector, e.g., mosquito (Anopheles) is a vector of malaria.
- Indirect contact may be through clothes, beddings, utensils, etc.
- Non-Communicable Diseases:
- Non-communicable diseases (NCDs), also known as chronic diseases, tend to be of long duration and are the result of a combination of genetic, physiological, environmental and behavioural factors.
- The main types of NCDs are cardiovascular diseases (like heart attacks and stroke), cancers, chronic respiratory diseases (such as chronic obstructive pulmonary disease and asthma) and diabetes.

19. Correct Option: (b)

Explanation:

Food Fortification

- Food fortification is usually regarded as the deliberate addition of one or more micronutrients to particular foods, so as to increase the intake of these micronutrients in order to correct or prevent a demonstrated deficiency and provide a health benefit.
- In October 2016, FSSAI operationalized the Food Safety and Standards (Fortification of Foods)Regulations, 2016 for fortifying staples namely Wheat Flour and Rice (with Iron, Vitamin B12 and Folic Acid), Milk and Edible Oil (with Vitamins A and D) and Double Fortified Salt (with Iodine and Iron) to reduce the high burden of micronutrient malnutrition in India.
- The '+F' logo has been notified to identify fortified foods.

Food Safety and Standards (Fortification of Foods) Regulations, 2018

As per these rules:

- The fortification of staples is not compulsory.
- The fortification of the products and use of the +F logo is allowed to FBO only if the enrichment of the food is done according to the standards laid under it.
- Adding iodine to commercial salt is mandatory in India.
- Whenever the food articles standards stated under 'Food Safety and Standards Regulations' instructs for adding specific minerals or vitamins as an obligatory demand of that particular standard, the same shall comply, but the +F logo shall not be used.
- New standards now provide a minimum and a maxima range for the fortification of staples like wheat flour, maida, rice, salt, vegetable oil and milk.
- The dosage of the micronutrients has been adjusted so that they provide 30 to 50 percent of the daily requirements.

20. Correct Option: (a)

Explanation:

Active and Passive Immunity

- When a host is exposed to antigens, which may be in the form of living or dead microbes or other proteins, antibodies are produced in the host body. This type of immunity is called active immunity.Active immunity is slow and takes time to give its full effective response.
- Injecting the microbes deliberately during immunization or infectious organisms gaining access into body during natural infection induce active immunity.
- When ready-made antibodies are directly given to protect the body against foreign agents, it is called passive immunity.

- The yellowish fluid colostrum secreted by mother during the initial days of lactation has abundant antibodies (IgA) to protect the infant. The foetus also receives some antibodies from their mother,through the placenta during pregnancy. These are some examples of passive immunity.

21. Correct Answer (c)

Explanation:

Both the statements are correct.

Supplementary Notes

- **Greenhouse gases are the gases that absorb the infrared radiations and create a greenhouse effect**. For example, carbon dioxide and chlorofluorocarbons.
- **Greenhouse effect is the process by which radiations from the sun are absorbed by the greenhouse gases and not reflected into space**.
- This insulates the surface of the earth and prevents it from freezing.
- **Green house gases are life-saving gases and their presence is important for the existence of both plants and animal life.**
- **In the absence of GHGs, the temperature of the earth may go down to minus 18 degrees.**
- The major **contributors to the greenhouses gases are factories, automobiles, deforestation**, etc.
- The increased number of factories and automobiles increases the amount of these gases in the atmosphere.
- The greenhouse gases never let the radiations to escape from the earth and increase the surface temperature of the earth.
- This then leads to global warming.

22. Correct Answer (b)

Explanation:

- ***Only statement 2 is incorrect.*** Article 35 empowers the parliament and not the state legislatures to make laws to give effect to certain fundamental rights.

Supplementary Notes

- ARTICLE 35: LEGISLATION TO GIVE EFFECT TO THE PROVISIONS OF Part III
- Notwithstanding anything in this Constitution, Parliament shall have, and the Legislature of a State shall not have, the power to make laws –
- With respect to any of the matters which under clause (3) of Article 16, clause (3) of Article 32, article 33 and article 34 may be provided for by law made by Parliament; and
- for prescribing punishment for those acts which are declared to be offences under this part, and Parliament shall, as soon as may be after the commencement of this Constitution, make laws for prescribing punishment for the acts referred to in sub-clause (ii);
- any law in force immediately before the commencement of this Constitution in the territory of India with respect to any of the matters referred to in sub-clause (i) of clause (a) or providing for punishment for any act referred to in sub-clause (ii) of that clause shall, subject to the terms thereof and to any adaptations and modifications that may be made therein under article 372, continue in force until altered or repealed or amended by Parliament.

23. Correct Answer: (a)

Explanation:

- ***Only statement 2 is incorrect.*** **The first calculation of ϖ was done by Archimedes of Syracuse.**

Supplementary Notes

- Pi Day is celebrated on March 14 dedicated to Pi (Greek letter ϖ).
- The idea originated in the United States, where the convention is to write dates in a format that expresses March 14 as 3/14.
- These three digits match the value of pi up to two decimal places, at 3.14.
- By definition, pi is the ratio of the circumference of a circle to its diameter. Pi is also the area of a circle divided by the square of its radius. The ratio is always constant.
- A pi is an irrational number. It is denoted by a symbol 'ϖ'.
- Pi has its use in geometry, trigonometry, physics, astronomy and other sciences. It appears in various formulae.
- Few important formulae are:
  - Area of a circle is ϖr2.

- Volume of a cylinder is ϖr2h.
- Surface area of a sphere is 4ϖr2.
- Volume of a sphere is 4/3 (ϖr3).
- Volume of a cone is 1/3 (ϖr2h).

24. Correct Answer (c)

Explanation: Both the statements are correct.

Wasp-76b

- Wasp-76b is a huge gas planet that is twice the width of Jupiter. Its name comes from the UK-led Wasp telescope system that detected it in 2016.
  - The UK Wide Angle Search for Planets (WASP) is a collaborative project involving several UK universities. The primary aim is the discovery of exoplanets.
- It is 640 light-years from the Earth and is so close to its star that it takes just 43 hours to complete one revolution.
- Wasp-76b orbits so close to its host star that its dayside temperatures exceed 2,400 degrees Celsius - hot enough to vaporise metals like iron.
- The planet's nightside, on the other hand, is 1,000 degrees cooler, allowing those metals to condense and rain out.
- Another of the planet's interesting features is that it always presents the same face to the star - a behaviour scientists call being "tidally locked". Earth's Moon does the same thing.
  - Tidal locking is the name given to the situation when an object's orbital period matches its rotational period.
  - The moon takes 28 days to go around the Earth and 28 days to rotate once around its axis. This results in the same face of the Moon always facing the Earth.

25. Correct option: (c)

Explanation

Both the above statements are correct.

Supplementary notes

Epidemic Disease Act 1897

- The Epidemic Diseases Act, 1897 is a law which was first enacted to tackle bubonic plague in Bombay state in former British India.
- The law is meant for containment of epidemics by providing special powers that are required for the implementation of containment measures to control the spread of the disease.
- The Epidemic Diseases Act is routinely enforced across the country for dealing with outbreaks of diseases such as swine flu, dengue, and cholera.
- At present, at least 60 COVID-19 cases have been confirmed in India. Around the world, more than 119,100 people have been infected and nearly 4,300 have died.
- The Act, which consists of four sections, aims to provide "for the better prevention of the spread of Dangerous Epidemic Diseases."
- **Section 2** empowers state governments/ UTs to take special measures and formulate regulations for containing the outbreak. It is as follows
  - When at any time the State Government is satisfied that the State or any part thereof is visited by, or threatened with, an outbreak of any dangerous epidemic disease, the State Government, if it thinks that the ordinary provisions of the law for the time being in force are insufficient for the purpose, may take, or require or empower any person to take, such measures and, by public notice, prescribe such temporary regulations to be observed by the public or by any person or class of persons as it shall deem necessary to prevent the outbreak of such disease or the spread thereof and may determine in what manner and by whom any expenses incurred (including compensation if any) shall be defrayed.
  - In particular and without prejudice to the generality of the foregoing provisions, the State Government may take measures and prescribe regulations for:
  - The inspection of persons travelling by railway or otherwise, and the segregation, in hospital, temporary accommodation or otherwise, of persons suspected by the inspecting officer of being infected with any such disease.
- **Section 3** provides penalties for disobeying any regulation or order made under the Act. These are according to section 188 of the Indian Penal Code (disobedience to order duly promulgated by public servant).
- **Section 4** gives legal protection to the implementing officers acting under the Act.