



## PRELIMS MISSION TEST-05 (10-02-2024)

### EXPLANATION

1. Consider the following statements about 'Project Q\*' recently seen in news

- It is particle physics experiment being carried to achieve nuclear fission reaction
- It is an AI algorithm being developed by OpenAI to solve elementary mathematics
- It is a project of ISRO to setup a space station by 2030
- It is a project between India and USA to jointly developed fighter jet engines

Ans: b (Is an AI algorithm being developed by OpenAI to solve elementary mathematics)

**Explanation:** Project Q\* is essentially an algorithm that is capable of solving elementary mathematical problems by itself, including those that are not part of its training data. • This makes it a significant leap towards the much-anticipated Artificial General Intelligence (AGI). \*\*AGI is a hypothetical capability of AI that makes it perform any intellectual task that the human brain can do.

2. Consider the following necessary conditions to declare any virus variant as the 'Variant of Declaration' by World Health Organization (WHO)

- Its ability to spread
- How easily it may be detected and treated
- Substantial impact on the ability of health systems to provide care to patients and requires major public health interventions
- Significant decrease in effectiveness of available vaccines on new variant

How many statements given above are correct?

- Only one
- Only two
- Only three
- All four

Ans: b (Only two)

**Explanation:** Necessary conditions to declare any virus variant as variant of interest and variant of concern are given below

#### A Variant of Interest (VoI):

- Variant that known to effect how the virus behaves/Its potential impact on Human health.
- Ability spread
- Ability to cause serious diseases

- How easily it may be detected and treated
- Potential emerging risk to global public health

#### A Variant of Concern:

- Should be declared as a Variant of Interest (VoI)
- Detrimental change in disease severity
- Substantial impact on the ability of health systems to provide care to patients and requires major public health interventions
- Significant decrease in effectiveness of available vaccines on new variant

3. Consider the following statements about Methotrexate (MTX)

- It is used in chemotherapy to treat certain types of cancers including leukemia and breast cancers
- It inhibits the activity of enzyme called dihydrofolate reductase, which is essential for synthesis of DNA, RNA and proteins
- MTX value of more than 10  $\mu\text{M}$  in blood plasma can have poisoning effect on lungs, stomach and can leads to heart strokes

How many statements given above are correct?

- Only one
- Only two
- Only three
- None

Ans: c (All three)

**Context:** A new highly fluorescent material has been developed using phosphorene, cystine, and gold (Ph-Cys-Au) for detecting anti-cancer drug MTX overdose of which has toxic effect on lungs, stomach, and heart

**Statement 1 is correct:** It is commonly used in chemotherapy to treat certain types of cancers including leukemia, lymphoma, and breast cancer.

**Statement 2 is correct:** It works by inhibiting the activity of an enzyme called dihydrofolate reductase, which is essential for the synthesis of DNA, RNA, and proteins. This interference hampers the growth of cancer cells and suppresses the immune system in autoimmune conditions.

**Statement 3 is correct:** The MTX value of more than 10  $\mu\text{M}$  in blood plasma is hazardous. If it remains in



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the system for more than 10 hours, it can result in poisoning effects on the lungs, ulcers of the stomach, and heart stroke.

**Challenges:** MTX is highly expensive, and the detection of unwanted overdoses using traditional procedures is time-consuming and involves complex instrumentation.

**Precautions:** Regular monitoring of blood counts and liver function is often necessary during Methotrexate treatment & Folic acid supplementation is often prescribed alongside Methotrexate to help mitigate some of its side effects.

4. Consider the following statements about Anthrobots

1. These are created from human tracheal cells
2. They can spontaneously fuse together to form superbots
3. They are used in regenerative medicine, wound healing and disease treatment

Which of the statements given above are correct?

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

Ans: d (1, 2 and 3)

**Statement 1 is correct:** Anthrobots are self-assembling biological robots made from human tracheal cells without any genetic modification, making them a potential patient-specific therapeutic tool. Anthrobots self-construct in vitro, via a fully scalable method that requires no external form-giving machinery, manual sculpting, or embryonic tissues.

**Statement 2 is correct:** These are capable of both movement and healing neurons within a laboratory setting. They can spontaneously fuse together to form a larger structure called a superbot, which was able to encourage the growth of neurons.

**Statement 3 is correct:** They can be used in regenerative medicine, wound healing, disease treatment

5. Higgs boson is also called as Gods particle due to which of the following reasons?

- (a) It is crucial to a final understanding of the structure of matter.

- (b) It is the most powerful particle found till date.
- (c) It is extremely difficult to produce and detect
- (d) It validates the Standard Model through the mechanism of mass generation.

Answer: A

Explanation:

In popular culture the Higgs boson is often called the “God particle,” after the title of Nobel physicist. The God Particle: If the Universe Is the Answer, What Is the Question? (1993), and contained the author’s assertion that the discovery of the particle is crucial to a final understanding of the structure of matter. The nickname was meant to poke fun at how difficult it was to detect the particle. It took nearly half a century and a multi-billion-dollar particle accelerator to do it.

6. Which of the following organization initiated the ‘Project Kuiper’?

- (a) Amazon
- (b) SpaceX
- (c) BlueDot
- (d) Jio

Ans: a (Amazon)

**Explanation:** Kuiper Systems LLC, also known as Project Kuiper, is a subsidiary of Amazon that was established in 2019 to deploy a large satellite internet constellation to provide low-latency broadband internet connectivity. The name Kuiper was a company codename for the project inspired by the outer Solar System’s Kuiper belt.

The Federal Communications Commission (FCC) granted Amazon approval to deploy its planned constellation of 3,236 satellites in low Earth orbit. Deployment is planned in five phases, and internet service will begin once the first 578 satellites are launched. Under its granted FCC license, Amazon is required to launch and operate 50% of its satellites no later than July 30, 2026, and must launch and operate the remaining satellites no later than July 30, 2029.

7. Consider the following statements about Pompe disease

1. It is an autosomal recessive disorder
2. It is most prevalent in females
3. Mutations in Alpha-Glucosidase prevents Alpha-Glucosidase from breaking down



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glycogen into glucose resulting into this disease

4. Enzyme Replacement Therapy is the only treatment available to cure this disease

How many statements given above are correct?

- (a) Only one
(b) Only two
(c) Only three
(d) All four

Ans: c (Only three)

Statement 1 is correct: It is an autosomal recessive disorder, meaning that it occurs when a person inherits two copies of an abnormal gene (one from each parent) responsible for producing the enzyme acid alpha-glucosidase (GAA)

Statement 2 is incorrect: It is a rare inherited disorder that affects one child per million. It affects males & females equally.

Statement 3 is correct: Normally the GAA gene provides instructions for producing an enzyme called acid alpha-glucosidase (also known as acid maltase). This enzyme is active in lysosomes, which are structures that serve as recycling centres within cells. Acid alpha-glucosidase normally breaks down glycogen into a simpler sugar called glucose, which is the main energy source for most cells. Mutations in the GAA gene prevent acid alpha-glucosidase from breaking down glycogen effectively, which allows this sugar to build up to toxic levels in lysosomes. This buildup damages organs and tissues throughout the body, particularly the muscles, leading to the progressive signs and symptoms of Pompe disease.

Statement 4 is correct: Treatment: The treatment includes enzyme replacement therapy (ERT) where a synthetic form of the missing enzyme (recombinant human acid alpha-glucosidase) is administered intravenously. ERT aims to reduce the accumulation of glycogen in tissues and alleviate symptoms.

8. Consider the following pairs about the different solar missions and associated states

Table with 2 columns: Mission Name, Associated Country. Rows include Solar Orbiter (Japan), Parker Solar Probe (USA), Kuafu-1 (European Union), Aditya L1 (India).

How many pairs given above are correctly matched?

- (a) Only one
(b) Only two
(c) Only three
(d) All four

Ans: b (Only two)

Pair 1 is incorrectly matched: Solar Orbiter is a joint mission between European Space Agency and NASA, launched with the objective to provide unprecedented insight into how the sun works.

Pair 2 is correctly matched: NASA's Parker Solar Probe: It is a spacecraft that launched in 2018 to study the Sun's upper atmosphere and solar wind.

Pair 3 is incorrectly matched: Kuafu-1: China launched its first space-based solar observatory-Advanced Space-based Solar Observatory (ASO-S), nicknamed Kuafu-1, to solve the mystery of the Sun's eruptions. It will provide insights into how the Sun's magnetic field causes coronal mass ejections (CMEs) and other eruptions.

Pair 4 is correctly matched: Aditya-L1: It is India's first space-based observatory to study the Sun. The mission's goal is to observe the Sun's particle and plasma environment, and to study the physics of the solar corona and its heating mechanism.

9. Which of the following are known as 'Suicidal Bags' of a cell?

- (a) Mitochondrion
(b) Lysosomes
(c) Golgi apparatus
(d) Ribosomes

Ans: b (Lysosomes)

Explanation: Lysosomes are often referred to as the "suicidal bags" or "suicide sacs" of a cell because they contain powerful digestive enzymes capable of breaking down various molecules, including proteins, nucleic acids, lipids, and carbohydrates. These enzymes are highly acidic and can cause significant damage if they leak out of the lysosomes.

The term "suicidal" refers to the fact that under certain circumstances, lysosomes can rupture or release their contents into the cytoplasm, leading to the destruction of the cell. This process, known as lysosomal membrane permeabilization (LMP), can occur in response to various stimuli such as cellular



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stress, injury, or aging. When lysosomal enzymes are released into the cytoplasm, they can initiate a cascade of destructive processes, ultimately resulting in cell death.

Despite their potential for causing cell death, lysosomes play crucial roles in maintaining cellular homeostasis by degrading and recycling cellular waste, clearing damaged organelles, and participating in various cellular processes such as autophagy (self-eating) and apoptosis (programmed cell death). Thus, while they can be destructive if their contents are released uncontrollably, lysosomes are essential for the overall health and function of the cell.

10. Consider the following statements about 'Gemini AI Model'

1. It is being developed by Google works based on Massive Multitask Language Understanding
2. It has the problem-solving abilities in 57 subjects
3. Gemini can't work across text, audio, video, images and code whereas ChatGPT can work on all available mediums
4. It comes in Ultra, Pro and Nano sizes to cater different processing needs

How many statements given above are correct?

- (a) Only one
- (b) Only two
- (c) Only three
- (d) All four

Ans: c (Only three)

**Statement 1 is correct:** Gemini is a family of multimodal AI models developed by Alphabet's Google DeepMind. Gemini is the first model to outperform human experts (State-of-the-Art Performance) on MMLU (Massive Multitask Language Understanding), one of the most popular methods to test the knowledge and problem solving abilities of AI models.

**Statement 2 is correct:** MMLU uses a combination of 57 subjects such as math, physics, history, law, medicine, and ethics for testing both world knowledge and problem-solving abilities.

**Statement 3 is incorrect:** Gemini can work across text, code, audio, image & video. ChatGPT can't work

on video natively. ChatGPT's free version offers only GPT-3.5 (Not for GPT-4). Gemini Pro will be free and integrated into Google's chatbot Bard and across Google Apps.

**Statement 4 is correct:** Gemini comes in three sizes – Ultra, Pro, and Nano – to cater to different processing needs and computational resources. This makes it adaptable to a wide range of applications, from mobile devices to data centres.

11. Consider the following countries, who are part of International Thermonuclear Experiment Reactor (ITER)?

1. India
2. China
3. Australia
4. European Union

How many statements given above are correct?

- (a) Only one
- (b) Only two
- (c) Only three
- (d) All four

Ans: c (Only three)

**Explanation:** ITER (initially the International Thermonuclear Experimental Reactor) is an international nuclear fusion research and engineering megaproject aimed at creating energy through a fusion process similar to that of the Sun. Upon completion of construction of the main reactor and first plasma, planned for late 2025, it will be the world's largest magnetic confinement plasma physics experiment and the largest experimental tokamak nuclear fusion reactor. It is being built next to the Cadarache facility in southern France. ITER will be the largest of more than 100 fusion reactors built since the 1950s, with ten times the plasma volume of any other tokamak operating today.

The long-term goal of fusion research is to generate electricity. ITER's stated purpose is scientific research, and technological demonstration of a large fusion reactor, without electricity generation. ITER's goals are to achieve enough fusion to produce 10 times as much thermal output power as thermal power absorbed by the plasma for short time periods; to demonstrate and test technologies that would be needed to operate a fusion power plant including



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cryogenics, heating, control and diagnostics systems, and remote maintenance; to achieve and learn from a burning plasma; to test tritium breeding; and to demonstrate the safety of a fusion plant

ITER is funded and run by seven member parties: China, the European Union, India, Japan, Russia, South Korea and the United States. The United Kingdom participates through EU's Fusion for Energy (F4E), Switzerland participates through Euratom and F4E, and the project has cooperation agreements with Australia, Canada, Kazakhstan and Thailand.

12. 'JT-60SA Nuclear Fusion Reactor' is a joint collaboration between?

- (a) India-Japan
- (b) Japan-USA
- (c) Japan-European Union
- (d) Japan-South Korea

Ans: c (Japan-European Union)

**Explanation:** The EU (European Union) and Japan have marked the start of operations of the biggest and most advanced tokamak-type fusion reactor in the world – JT-60SA located in Japan. A tokamak is a type of magnetic confinement device used in nuclear fusion research to contain hot plasma in the shape of a torus (doughnut). The JT-60SA, a six-story-high tokamak, is designed to contain and control plasma heated to a staggering 200 million degrees Celsius.

**Objective:** To explore the viability of fusion as a secure, expansive, and carbon-neutral net energy source, where the energy produced surpasses more than the input required for its production

13. Consider the following statements about Nuclear Energy in India

- 1. Kakrapar nuclear power plant was India's first indigenously developed heavy water reactor
- 2. Heavy water reactor uses deuterium oxide as coolant and neutron as moderator

Which of the statements given above are correct?

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

Ans: c (Both 1 and 2)

**Statement 1 is correct:** Kakrapar reactor-3 (KAPP-3), the first indigenously developed 700 MWe Pressurised Heavy Water Reactor (PHWR) in India, achieved full capacity operation in August 2023.

**Statement 2 is correct:** A pressurized heavy-water reactor (PHWR) is a nuclear reactor that uses heavy water (deuterium oxide D<sub>2</sub>O) as its coolant and neutron moderator. PHWRs frequently use natural uranium as fuel, but sometimes also use very low enriched uranium. The heavy water coolant is kept under pressure to avoid boiling, allowing it to reach higher temperature (mostly) without forming steam bubbles, exactly as for a pressurized water reactor.

14. Consider the following statements about DRESS Syndrome

- 1. It is serious drug reaction to certain antibiotics, anticonvulsants, and antivirals
- 2. Symptoms include fever, skin rash, lymphadenopathy, hematological abnormalities
- 3. There is no treatment available to cure this disease
- 4. Drugs manufactured in India have to be labelled with the mandatory non-proprietary drug name with the suffix *I.P.*

How many statements given above are correct?

- (a) Only one
- (b) Only two
- (c) Only three
- (d) All four

Ans: c (Only three)

**Statement 1 is correct:** A Potentially Serious Drug Reaction to certain medications. It affects multiple organs and systems throughout the body. It is sometimes referred to as DIHS (Drug Induced Hypersensitivity Syndrome). Certain medications, mostly antibiotics, anticonvulsants, and antivirals.

**Statement 2 is correct:** Symptoms include Fever, skin rash, lymphadenopathy, hematological abnormalities.

**Statement 3 is incorrect:** A combination of clinical presentation, blood tests, and sometimes skin biopsies. Immediate discontinuation of adverse medication and supportive care with medication like corticosteroids can cure the disease.



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**Statement 4 is correct:** Indian Pharmacopoeia Commission (IPC) is an autonomous institution of the Ministry of Health and Family Welfare which sets standards for all drugs that are manufactured, sold and consumed in India. The set of standards are published under the title Indian Pharmacopoeia (IP) which has been modelled on and historically follows from the British Pharmacopoeia. The standards that are in effect since 1 December 2010, are the Indian Pharmacopoeia 2010 (IP 2010). The Pharmacopoeia 2014 was released by Health Minister Ghulam Nabi Azad on 4 November 2013. The Pharmacopoeia 2018 was released by Secretary, Ministry of Health & Family Welfare, Government of India.

I.P., the abbreviation of 'Indian Pharmacopoeia' is familiar to the consumers in the Indian sub-continent as a mandatory drug name suffix. Drugs manufactured in India have to be labelled with the mandatory non-proprietary drug name with the suffix I.P. This is similar to the B.P. suffix for British Pharmacopoeia and the U.S.P. suffix for the United States Pharmacopoeia.

15. 'Aktocyte', recently seen in news is a?
- Tablet used for cancer patient
  - Testing methodology to identify certain types of cancers
  - New variant of virus
  - New methodology to cure cervical cancer

Ans: a (Table used for cancer patient)

**Explanation:** Scientists from the Department of Atomic Energy and M/s. IDRS Labs Pvt. Ltd. Bengaluru have jointly developed nutraceutical AKTOCYTE tablets. Nutraceuticals are products that are derived from food sources and provide extra health benefits beyond basic nutritional value.

AKTOCYTE is a tablet used during cancer treatment to reduce the side effects of radiotherapy. The tablets, designed as an adjuvant to cancer radiotherapy, regenerative nutraceutical, immunomodulator, and antioxidant, mark a significant advancement in cancer care. The AKTOCYTE tablets have shown remarkable results, particularly in pelvic cancer patients suffering from radiotherapy-induced Cystitis (Blood in urine). Patients treated with AKTOCYTE tablets demonstrated an extraordinary recovery,

eliminating the need for surgical removal of the urinary bladder.

16. Consider the following statements about 'PACE' mission of NASA

- The main objective of this mission is to understand the interplay between ocean, atmosphere and climate
- Polarization and Spectral Exposure Corrected Sensor provides information about aerosols and clouds
- It will help in improving weather forecasting and climate modeling

Which of the statements given above are correct?

- 1 and 2 only
- 1 and 3 only
- 2 and 3 only
- 1, 2 and 3

Ans: d (1, 2 and 3)

**Statement 1 is correct:** NASA is gearing up to enhance our understanding of Earth's atmosphere with the upcoming Plankton, Aerosol, Cloud, Ocean Ecosystem (PACE) mission, scheduled for launch in early 2024 (with a planned End of Life in March 2027).

It's an endeavor by NASA aimed at expanding our understanding of our planet's delicate interplay between oceans, atmosphere, and climate. The mission is also used to clarify the exchange of carbon dioxide between the ocean and atmosphere, a crucial factor in understanding climate change.

**Statement 2 is correct:** Key instruments

Ocean Color Instrument (OCI): Measures the color of ocean water to determine the abundance and type of phytoplankton, tiny marine plants that form the base of the ocean food web.

Polarization and Spectral Exposure Corrected Sensor (SPeXone): Provides additional information on aerosols and clouds, enhancing atmospheric data collection.

Hyper Angular Rainbow Polarimeter-2 (HARP-2): Delivers even more detailed data on aerosols and clouds, particularly their three-dimensional structure and properties.

**Statement 3 is correct:** PACE data will benefit oceanographers, meteorologists, climatologists, and



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environmental scientists by providing them with a more comprehensive picture of Earth's interconnected systems. It will improve weather forecasting and climate models, ultimately informing strategies for sustainable management of our planet's resources.

17. Winter vomiting disease is caused by?

- (a) Virus
- (b) Bacteria
- (c) Protozoa
- (d) Fungal

Ans: a (Virus)

**Explanation:** Norovirus, also known as Norwalk virus and sometimes referred to as the winter vomiting disease, is the most common cause of gastroenteritis. Infection is characterized by non-bloody diarrhea, vomiting, and stomach pain. Fever or headaches may also occur. Symptoms usually develop 12 to 48 hours after being exposed, and recovery typically occurs within one to three days. Complications are uncommon, but may include dehydration, especially in the young, the old, and those with other health problems.

The virus is usually spread by the fecal–oral route. This may be through contaminated food or water or person-to-person contact. It may also spread via contaminated surfaces or through air from the vomit of an infected person. Risk factors include unsanitary food preparation and sharing close quarters. Diagnosis is generally based on symptoms. Prevention involves proper hand washing and disinfection of contaminated surfaces. There is no vaccine or specific treatment for norovirus.

18. Consider the following statements about ‘Noma’ disease

1. It is listed under WHO’s official list of Neglected Tropical disease
2. It is a severe gangrenous disease of mouth and face
3. The mortality rate of this disease is approximately 99%
4. Malnutrition, poor access to sanitation and oral hygiene are the major reasons for this disease

How many of the above statements given above are correct?

- (a) Only one
- (b) Only two
- (c) Only three
- (d) All four

Ans: c (Only three)

**Statement 1 is correct:** The World Health Organization (WHO) has added one of the world’s most underrecognized health challenges, noma, to its official list of neglected tropical diseases (NTD).

**Statement 2 is correct:** A severe gangrenous disease of the mouth & face with a mortality rate of approximately 90 per cent. The name of the disease comes from the Greek word “nomē”, meaning “to devour”, as noma eats away facial tissue and bones if not treated early.

**Statement 3 is incorrect:** The WHO global incidence, prevalence and case fatality figures from 1998 (global incidence 140 000 cases per year, prevalence 770 000, case fatality 90%) remain the most widely cited, but methodological limitations mean that the true magnitude of noma’s burden and the quantification of noma survivors is largely unknown. Recent evidence suggests that the reported noma case fatality rate could now be less than 90%, and it can be greatly reduced with early treatment.

**Option 4 is correct:** Major reasons of Noma disease include Malnutrition, poor access to sanitation & oral hygiene.

19. Which of the following correctly describes the phenomenon known as “Meissner effect”?

- (a) Building up of magnetic field inside a material when it makes the transition from the normal to superconducting state.
- (b) Exclusion of magnetic field from the interior of a material when it makes the transition from the normal to superconducting state.
- (c) Building up of electric field inside a material when it makes the transition from the normal to superconducting state.
- (d) Exclusion of electric field from the interior of a material when it makes the transition from the normal to superconducting state.

Answer: B



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Explanation:

When a material makes the transition from the normal to superconducting state, it actively excludes magnetic fields from its interior; this is called the Meissner effect. One of the theoretical explanations of the Meissner effect comes from the London equation. It shows that the magnetic field decays exponentially inside the superconductor over a distance of 20-40 nm.

20. Consider the following statements

1. Shale gas is a conventional hydrocarbon present in the permeable rock.
2. Methane is the primary constituent of natural gas
3. Guar gum plays a significant role in the extraction of shale gas.
4. India is the largest producer of Guar gum in the world.

How many statements given above are correct?

- (a) Only one
- (b) Only two
- (c) Only three
- (d) All four

Ans: c (Only three)

**Statement 1 is incorrect:** Conventional hydrocarbons can be extracted easily from permeable rocks, but Shale gas is an unconventional hydrocarbon because the rock it is extracted from acts as the source, reservoir, and cap rock and is trapped under low-permeable rocks. The gas is produced, stored, and sealed within impermeable shale and can be released only after the shale is drilled and artificially fractured during an extraction process. It requires pressurized water or chemicals to break the low-permeable rocks and extract them

**Statement 2 is correct:** Natural gas primarily consists of methane (50 to 90 % volume by methane), the simplest hydrocarbon. It also contains small amounts of heavier gaseous hydrocarbons such as ethane (C<sub>2</sub>H<sub>6</sub>), propane (C<sub>3</sub>H<sub>8</sub>), and butane (C<sub>4</sub>H<sub>10</sub>) and also small amounts of highly toxic hydrogen sulphide (H<sub>2</sub>S).

**Statement 3 is correct:** The shale gas industry uses the gum in fracking—a process where a mixture of water (95 percent), Sand (4.5 percent), and guar gum

(0.5 percent) is injected under high pressure into an oil-or gasbearing rock to fracture it. The gum's viscous property decreases fluid loss and friction, reducing energy consumption and increasing gas or oil recovery.

**Statement 4 is correct:** The consumption pattern of guar seeds is largely influenced by the demands of the petroleum industry. India accounts for 80 percent of the world's guar produce, of which 72 percent comes from Rajasthan. About 90 percent of guar gum processed in India is exported.

21. Consider the following statements

1. Eukaryotic cell is a free-floating genetic material with the absence of a nucleus.
2. Prokaryotes can live with or without oxygen while eukaryotes live only with oxygen.

Which of the statements given above is/are correct?

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

Ans: d (Neither 1 nor 2)

**Statement 1 is incorrect:** The name “Eukaryotic” itself means: eu = true, karyon = nucleus. They contain an organised nucleus with a nuclear envelope. The DNA is enclosed in a nuclear membrane forming a nucleus.

**Statement 2 is incorrect:** Prokaryotes and eukaryotes both may perform both aerobic (oxygen-requiring) and anaerobic (nonoxygen-based) metabolism. So, both of them can live with or without oxygen.

22. Which of the below pesticides are banned by the Government of India for its manufacture, import and use?

1. Aldrin
2. Endosulfan
3. Methyl Parathion
4. Caprolactam

How many of the statements given above are correct?

- (a) Only one
- (b) Only two
- (c) Only three
- (d) All four





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Ans: c (Only three)

**Explanation:** To regulate the import, manufacture, sale, transport, distribution and use of insecticides to prevent risk to humans or animals. The term pesticide covers insecticides, fungicides, herbicides, rodenticides, molluscicides, nematocides, plant growth regulators and others. In India, pesticides are regulated under the Insecticides Act of 1968 and Insecticides Rules of 1971.)

The Central Insecticides Board (CIB), under the Ministry of Agriculture and Farmers Welfare, is the nodal agency regulating pesticides in India. It has banned the following pesticides.

- Aldrin
- Methyl Parathion
- Trifluralin.
- Endosulfan
- Methyl Parathion etc.

23. Consider the following statements about Raman Effect

1. The Raman Effect is the very weak effect which deals with scattering of light by molecules of a medium when they are excited to different energy levels.
2. A light travelling from one medium to another medium changes its path
3. The Raman spectroscopy is used in identifying the illegal drugs without damaging the packaging materials.

Which of the statements given above are correct?

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

Ans: d (1, 2 and 3)

**Statement 1 is correct:** C.V. Raman had discovered the Inelastic scattering of light by molecules. He found that, the monochromatic light is scattered when it is allowed to pass through a substance. The scattered light contains some additional frequencies other than that of incident frequency. This is known as Raman effect. The phenomenon of scattering of light by colloidal particles is called the Tyndall effect.

**Statement 2 is correct:** A ray of light traveling from one medium to another changes its path because there

is a change in the speed of the ray of light. This change in speed is caused due to the difference in the optical density of the two mediums. The optical density of the medium decides how much the ray of light will be bent. This phenomenon of bending the ray of the light is referred to as refraction.

**Statement 3 is correct:** Raman Spectra is widely used in almost all branches of science. Raman Spectra of different substances enable to classify them according to their molecular structure and to analyse the chemical constitution. Raman spectroscopy identifies the contents of drugs within their packaging without damaging, measures the composition and uniformity of drug pills, identifies street drugs, and determines drug authenticity.

24. Consider the following statements about Lipids in Human body

1. Lipids are homogeneous group of compounds
2. Pancreas secretes lipase enzyme which converts fat into fatty acid.
3. Saturated fat consists of a double bond between carbon atoms
4. Very low-density lipoprotein (VLDL) that is produced in the liver is a major cause of heart attack in human beings.

How many statements given above are correct?

- (a) Only one
- (b) Only two
- (c) Only three
- (d) All four

Ans: b (Only two)

**Statement** steroids, waxes, and related compounds, and can be divided into two major classes nonsaponifiable and saponifiable lipids.

**Statement 2 is correct:** The pancreas which secretes the enzyme lipase is critical for the digestion and absorption of dietary fats. They break down triglycerides (fat) into free fatty acids and glycerol. Understanding the lipase function is crucial for the pathophysiology of fat necrosis and acute and chronic pancreatitis. Also, they play an essential role in the mechanism of some cholesterol-lowering medications.

**Statement 3 is incorrect:** Saturated fatty acids do not have any double bonds. Animal fats are a source of



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saturated fatty acids. Unsaturated fatty acids can have one or more double bonds along their hydrocarbon chain. Plants are the source of unsaturated fatty acids. **Statement 4 is correct:** Very-low-density lipoprotein (VLDL) cholesterol is produced in the liver and released into the bloodstream to supply body tissues with a type of fat (triglycerides). This is the category of "bad" cholesterols because they can contribute to the buildup of plaque in your arteries. This buildup is called atherosclerosis. The plaque that builds up is a sticky substance made up of fat, cholesterol, calcium, and other substances found in the blood. Over time, the plaque hardens and narrows your arteries. This limits the flow of oxygen-rich blood to your body. It can lead to coronary artery disease and heart disease in human beings. VLDL level should be less than 30 mg/dL (milligrams per deciliter). Anything higher than that puts you at risk for heart disease and stroke.

25. Consider the following pairs about the commonly used products and chemicals found in them

Commonly used product	Chemicals found
Noodles	Lead
Air Freshener	Formaldehyde
Cosmetics	Bisphenol-A
Whey proteins	Phenoxyethanol

How many pairs given above are correct?

- (a) Only one
- (b) Only two
- (c) Only three
- (d) All four

Ans: b (Only two)

**Pair 1 is correctly matched:** Exposure to high levels of lead may cause anaemia, weakness, and kidney and brain damage. Recently the controversy around the permissible limits of lead in noodles has arisen.

**Pair 2 is correctly matched:** Air fresheners consist of formaldehyde, petrochemicals, p-dichlorobenzene and aerosol pollutants. Formaldehyde is a toxic compound that may cause cancer and irritation of the throat and nose. It is a volatile organic compound (VOC).

**Pair 3 is incorrectly matched:** Phenoxyethanol is a preservative in many cosmetics and personal care products like face wash, shampoo, etc. The incidents of bad skin reactions and nervous system interaction

in infants are the major concerns of using these cosmetics and not a Bisphenol-A

**Pair 4 is incorrectly matched:** Bisphenol-A is a synthetic compound that is an important addition to many single-use plastics. The whey proteins are packed in the Bisphenol-A-made containers. When these containers are stored at room temperature, Bisphenol-A leaches into the protein powder and has health implications.

26. Consider the following statements:

- 1. Incidental nanomaterials are those arise as a by-product from human activity.
- 2. Gold and soot are examples of Incidental Nanomaterials.

Select the incorrect answer using the code given below.

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

Answer: B

Explanation:

**Statement 1 is correct and Statement 2 is incorrect** Incidental nanomaterials, which arise as a by-product from human activity, have become unintentionally abundant since the beginning of the Industrial Revolution

Examples: Nano Plastics, soot and welding plastics are example of incidental nano materials.

- Engineered nanomaterials—A nanomaterial conceived, designed, and intentionally produced by humans.

Examples: carbon buckeyballs or fullerenes, carbon nanotubes, metal or metal oxide nanoparticles (e.g. gold or titanium dioxide), and quantum dots etc

27. A fresh egg sinks in pure water but floats in salt water. This is because:

- (a) saline water is denser than pure water
- (b) saline water is lighter than pure water
- (c) the viscosity of saline water is higher than that of pure water
- (d) None of these

Answer: a

Explanation:



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The density of water increases with the addition of salt. As salt is added to water its density increases. If the amount of salt added is enough to increase the density of salt water greater than the density of egg, the egg floats.

28. Oil spreads over the surface of water because:

- (a) Oil is more dense than water
- (b) Oil is less dense than water
- (c) Oil has more surface tension than water
- (d) Oil has less surface tension than water

Answer: d

Explanation:

Oil spreads over the surface of water because the surface tension of water is greater than that of oil. When oil is poured over water, the greater value of surface tension of water pulls oil in all directions, and as such it spreads on the water. The part of water surface outside the oil-water interface shrinks and as a result the drop of oil spread over the water surface.

29. River water is harder than the rain water because it

- (a) Is always flowing
- (b) Contains sodium chloride
- (c) Contains salts of calcium and magnesium
- (d) Is exposed to the atmosphere

Answer: c

Explanation:

River water is harder than rain water because it **contains salts of calcium and magnesium**. These minerals make the water hard by increasing its alkalinity and reducing its solubility. Rain water, on the other hand, is soft because it has low mineral content and high acidity.

30. Consider the following

- 1. Louse
- 2. Mosquito
- 3. Tick
- 4. Housefly

Which of the above given organisms are not parasites?

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

(d) 2 and 4 only

Answer: d

Explanation:

A parasite is an organism that lives on or in another organism and benefits from its host's resources, while harming it.

The louse (plural: lice) is a **parasite** that attaches itself to human hair and feeds on human blood.

A mosquito is **not a parasite** because it does not remain attached to its host for an extended period of time, and it does not need blood to reproduce. A parasite is a creature that cannot live or breed without completely depending on another being. A mosquito is a **predator** that feeds on the blood of its host. However, some mosquito species carry pathogenic viruses that can be seen as parasites.

Ticks are **parasitic beings**, that need a host to survive and breed. Like mosquitoes, ticks suck the host's blood, the only difference being that they get under the skin and live there for a few days.

A housefly is not a parasite, but a pest. A pest is an organism that causes annoyance or damage to humans or their property, but does not necessarily depend on them for survival

31. Consider the following:

- 1. Disinfection and fluoridation
- 2. Screening and mixing
- 3. Flocculation and sedimentation
- 4. Filtration and sludge processing

Arrange the above in a sequence for the treatment of polluted surface water?

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

Answer: c

Explanation:

Conventional surface water treatment plants are still being used throughout India. They typically consist of several steps in the treatment process. These include (1) Collection; (2) Screening and mixing; (3) Chemical Addition; (4) Sedimentation and Flocculation; (5) Filtration and sludge process (6) Disinfection; (7) Storage; (8) and finally Distribution



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32. Consider the following statements regarding Lab-grown diamonds (LGDs).

1. Lab-grown diamonds are produced using two technology such as High pressure, high temperature method and Chemical Vapor Deposition
2. LGDs are chemically, physically and optically similar to natural diamond and thus it is difficult to differentiate between LGD and an Earth Mined Diamond.

Which of the above statement sis/are correct?

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

Answer: c

Explanation:

Lab-grown diamonds are diamonds that are produced using specific technology which mimics the geological processes that grow natural diamonds. They are not the same as “diamond simulants” – LGDs are chemically, physically and optically diamond and thus are difficult to identify as “lab-grown.”

While materials such as Moissanite, Cubic Zirconia (CZ), White Sapphire, YAG, etc. are “diamond simulants” that simply attempt to “look” like a diamond, they lack the sparkle and durability of a diamond and are thus easily identifiable. However, differentiating between an LGD and an Earth Mined Diamond is hard, with advanced equipment required for the purpose.

There are multiple ways in which LGDs can be produced. The most common (and cheapest) is the “High pressure, high temperature” (HPHT) method. As the name suggests, this method requires extremely heavy presses that can produce up to 730,000 psi of pressure under extremely high temperatures (at least 1500 celsius). Usually graphite is used as the “diamond seed” and when subjected to these extreme conditions, the relatively inexpensive form of carbon turns into one of the most expensive carbon forms.

Other processes include “Chemical Vapor Deposition” (CVD) and explosive formation that

creates what are known as “detonation nanodiamonds”.

33. To meet its rapidly growing energy demand, some opine that India should pursue research and development on Thorium as the future fuel of nuclear energy. In this context, what advantage does Thorium hold over uranium?

1. Thorium is far more abundant in nature than uranium
2. On the basis of per unit mass of mined mineral, thorium can generate more energy compared to natural uranium.
3. Thorium produces less harmful waste in comparison to uranium.

Which of the statements given above is/are Correct?

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

Answer: d

Explanation:

- Thorium is more abundant in nature than uranium. It is fertile rather than fissile, and can only be used as a fuel in conjunction with a fissile material such as recycled plutonium. Thorium fuels can breed fissile uranium-233 to be used in various kinds of nuclear reactors.

- It is estimated that one ton of thorium can produce as much energy as 35 tons of uranium in a liquid fluoride thorium reactor.

- Compared to uranium reactors, thorium reactors produce far less waste and the waste that is generated is much less radioactive and much shorter-lived.

34. Consider the following pairs

Technique/Technology	Application/Use
1. Somatic Cell	Reproductive Nuclear Transfer Cloning
2. DNA sequencing	Forensic tests
3. Polymerase Chain Manufacture of Reaction	Biodegradable Plastics

Which of the above pairs are correctly matched?

- (a) Only 1



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

Answer: b

Explanation:

Somatic cell nuclear transfer is a technique for cloning in which the nucleus of a somatic cell is transferred to the cytoplasm of an enucleated egg. After the somatic cell transfers, the cytoplasmic factors affect the nucleus to become a zygote.

DNA profiling (also called DNA fingerprinting) is the process of determining an individual's DNA characteristics. DNA analysis intended to identify a species, rather than an individual, is called DNA barcoding

The polymerase chain reaction is a chemical reaction that molecular biologists use to amplify pieces of DNA. This reaction allows a single or a few copies of DNA to be replicated into millions or billions of copies

35. With reference to “Generic drugs” and “Biosimilars”, consider the following statements.

1. Generics are modelled after drugs that use living organisms as important ingredients, while biosimilars are copies of synthetic drugs
2. Both are designed to have the same clinical effect as their pricier counterparts. .

Which of the above statements is/are incorrect?

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

Answer: d

Explanation:

Biosimilar drugs are often confused with generic drugs. Both are marketed as cheaper versions of costly name-brand drugs. Both are available when drug companies' exclusive patents on expensive new drugs expire. And both are designed to have the same clinical effect as their pricier counterparts.

But 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 modelled

after drugs that use living organisms as important ingredients.

But many experts hope the two will share a critical commonality and that, like generics, biosimilars will dramatically lower the cost of biologic drugs.

36. In the context of Graphene, consider the following statements:

1. It is a three-dimensional form of carbon arranged in an octagonal lattice.
2. Graphene-based products can be used to make a water filter.
3. Graphene is stronger than steel.
4. The electrical conductivity for doped graphene is quite low.

Which of the following Statements given above is /are correct?

- (a) 1 Only
- (b) 1 and 4 Only
- (c) 2 and 3 Only
- (d) All of the above

Answer: c

Explanation:

Statement 1 is incorrect: Graphane is a two-dimensional form (allotrope) of carbon that consists of a single layer of carbon atoms arranged in a hexagonal lattice. Graphene has unique properties with tremendous potential applications, such as chemical sensors, nanoelectronic devices, hydrogen storage systems, or polymer nanocomposites.

Statements 2 and 3 are correct: Graphene has been described as “wondrous stuff” — of being the strongest material ever tested, almost 300 times stronger than steel. It is also the best heat- and electricity-conducting material. The electrical conductivity for doped graphene is potentially quite high. Graphene is practically transparent. It is thin, mechanically very strong, transparent and flexible conductor. Graphene has the potential to revolutionize entire industries - in the fields of electricity, conductivity, energy generation, batteries, sensors and more.



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Researchers from Australia announced recently that they used a graphene-based product to make a water filter that can make highly-polluted sea water drinkable after just one pass.

37. Which of the following is/are benefits of using “biodiesel”?

1. It can be prepared locally.
2. Increases engine performance
3. Increased safety in storage and transport.
4. Reduction of greenhouse gases.

Select the correct answer using the code given below.

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

ANSWER: d

Explanation

Bio-diesel is an eco-friendly, alternative diesel fuel prepared from domestic renewable resources i.e. vegetable oils (edible or non-edible oil) and animal fats.

These natural oils and fats are primarily made up of triglycerides.

These triglycerides when reacts chemically with lower alcohols in presence of a catalyst result in fatty acid esters. These esters show striking similarity to petroleum derived diesel and are called "Biodiesel".

As India is deficient in edible oils, non-edible oil may be material of choice for producing biodiesel. Examples are *Jatropha curcas*, *Pongamia*, *Karanja*, etc.

The benefits of using biodiesel are as follows:

- It reduces vehicle emission which makes it eco-friendly.
- It is made from renewable sources and can be prepared locally.
- Increases engine performance because it has higher cetane numbers as compared to petrodiesel.
- It has excellent lubricity.
- Increased safety in storage and transport because the fuel is nontoxic and biodegradable (Storage, high flash point)

- Production of bio diesel in India will reduce dependence on foreign suppliers, thus helpful in price stability.
- Reduction of greenhouse gases at least by 3.3 kg CO<sub>2</sub> equivalent per kg of biodiesel.

38. Red Mud recently in news, is related to?

- (a) Waste to Energy generation.
- (b) Plastic Pollution
- (c) Land reclamation
- (d) Aluminium Production

Answer: d

Explanation:

- Red mud (Bauxite tailings/ Bauxite Residue) is a side-product of the Bayer process, the principal means of refining bauxite en route to alumina.
- This is an environmental concern due to presence of impurities such as caustic soda and others minerals.
- Global generation of red mud is more than 150 million tons and there exists a global inventory of more than 3 billion tons.
- It is composed of a mixture of solid and metallic oxides. The red colour arises from iron oxides, which comprise up to 60% of the mass.
- The mud is highly basic with a pH ranging from 10 to 13. In addition to iron, the other dominant components include silica, unleached residual alumina, and titanium oxide.

39. Consider the following statements related to Green Hydrogen:

1. It is produced via natural gas combined with carbon capture storage technologies
2. National Green Hydrogen Mission aim for development of green hydrogen production capacity of at least 500 MMT (Million Metric Tonne) per annum.
3. It also lead to cumulative reduction in fossil fuel imports

How many of the above given statements is/are incorrect?

- (a) 1 Only



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- (b) 2 Only
- (c) 3 Only
- (d) None

Answer: b

Explanation:

#### TYPES OF HYDROGEN BASED ON EXTRACTION METHODS

Depending on the nature of the method of its extraction, hydrogen is categorised into three categories, namely, Grey, Blue and Green.

- Grey Hydrogen: It is produced via coal or lignite gasification (black or brown), or via a process called steam methane reformation (SMR) of natural gas or methane (grey). These tend to be mostly carbon-intensive processes.
- Blue Hydrogen: It is produced via natural gas or coal gasification combined with carbon capture storage (CCS) or carbon capture use (CCU) technologies to reduce carbon emissions.
- Green Hydrogen: It is produced using electrolysis of water with electricity generated by renewable energy. The carbon intensity ultimately depends on the carbon neutrality of the source of

The National Green Hydrogen Mission was approved by the Union Cabinet on 4 January 2022, with the intended objectives of:

- Making India a leading producer and supplier of Green Hydrogen in the world
- Creation of export opportunities for Green Hydrogen and its derivatives
- Reduction in dependence on imported fossil fuels and feedstock
- Development of indigenous manufacturing capabilities
- Attracting investment and business opportunities for the industry
- Creating opportunities for employment and economic development
- Supporting R&D projects

The mission outcomes projected by 2030 are:

- Development of green hydrogen production capacity of at least 5 MMT (Million Metric Tonne) per annum with an associated

renewable energy capacity addition of about 125 GW in the country

- Over Rs. Eight lakh crore in total investments
- Creation of over Six lakh jobs
- Cumulative reduction in fossil fuel imports over Rs. One lakh crore
- Abatement of nearly 50 MMT of annual greenhouse gas emissions

40. Consider the following related to Parboiled Rice

1. Parboiled rice refers to rice that has been partially boiled at the paddy stage, before milling.
2. Parboiling makes rice tougher
3. Parboiling also increases the nutrient value of the rice.
4. Parboiled rice has a higher resistance to insects and fungi.
5. Parboiling of rice is a recent phenomenon to increase the resistance of rice

Which of the above statements is incorrect?

- (a) 1 and 3 Only
- (b) 2 and 5 Only
- (c) 5 Only
- (d) None of the Above

Answer: c

Explanation:

Are all rice varieties suitable for parboiling?

Generally, all varieties can be processed into parboiled rice, but it is ideal to use long slender varieties to prevent breakage during milling.

However, aromatic varieties should not be parboiled because the process can make it lose its aroma.

Benefits

Parboiling makes rice tougher: this reduces the chances of the rice kernel breaking during milling.

Parboiling also increases the nutrient value of the rice.

Parboiled rice has a higher resistance to insects and fungi.

Parboiled rice refers to rice that has been partially boiled at the paddy stage, before milling.

However, there is no specific definition of parboiled rice of the Food Corporation of India or the Food Ministry.

Parboiling of rice is not a new practice and has been followed in India since ancient times



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41. Consider the following statements regarding Dada Saheb Phalke Award:

1. It is presented annually at the National Film Awards ceremony by the Directorate of Film Festivals, an organisation set up by the Ministry of Culture.
2. Devika Rani was the first recipient of this award.

Select the incorrect answer using the codes below.

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

Answer: a

Explanation:

- It is presented annually at the National Film Awards ceremony by the Directorate of Film Festivals, an organisation set up by the Ministry of Information and Broadcasting.
- The award comprises a Swarna Kamal (Golden Lotus) medallion, a shawl, and a cash prize of ₹1,000,000 (US\$13,000).
- Presented first in 1969, the award was introduced by the Government of India to commemorate Dadasaheb Phalke's contribution to Indian cinema.
- Phalke (1870–1944), who is popularly known as and often regarded as "the father of Indian cinema", was an Indian filmmaker who directed India's first full-length feature film, Raja Harishchandra (1913).
- The first recipient of the award was actress Devika Rani, who was honoured at the 17th National Film Awards.

42. Consider following statements regarding Dioxins:

1. Burning of Poly Vinyl Chloride materials release dioxins.
2. It is yet to be part of the 'dirty dozen' group of chemicals.
3. They are carcinogenic compounds.

Select the correct answer using the codes below.

- (a) 1 and 2 Only
- (b) 1 and 3 Only
- (c) 2 and 3 Only
- (d) All of the above

Answer: b

Explanation:

- Burning of plastics, especially PVC releases dioxin and also furan into the atmosphere.
- They belong to the so-called "dirty dozen" – a group of dangerous chemicals known as persistent organic pollutants (POPs).
- The name "dioxins" is often used for the family of structurally and chemically related polychlorinated dibenzo para dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs).
- Dioxin (highly carcinogenic and toxic) by-product of the manufacturing process is one of the chemicals believed to be passed on through breast milk to the nursing infant.

43. Consider the following statements regarding Ammonia.

1. Ammonia is a colourless, pungent gas made up of hydrogen and nitrogen.
2. It is not naturally found and is produced artificially.
3. In its concentrated form, ammonia is dangerous and caustic.

How many of the above statements is/are correct?

- (a) Only one
- (b) Only two
- (c) All three
- (d) None

Answer: b

Explanation:

**Statement 1 is correct.** Ammonia is a colourless, pungent gas with the chemical formula  $\text{NH}_3$ . It's made up of hydrogen and nitrogen. In its aqueous form, it's called ammonium hydroxide.

**Statement 2 is incorrect.** Ammonia is a natural byproduct and respiratory stimulant. It's produced naturally in the human body and in nature, including in water, soil, and air. In human health, ammonia and the ammonium ion are important components of metabolic processes.

**Statement 3 is correct** In its concentrated form, ammonia is dangerous and caustic.

Signs and symptoms of ammonia exposure include:

Nausea





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Vomiting  
Abdominal pain  
Burns of the mouth, throat, oesophagus, and stomach

44. Agar, commonly used as a synthetic growth medium and in bakery, is obtained from

- (a) Algae
- (b) Pine
- (c) Cycas
- (d) Mosses

Answer: a

Explanation:

Agar, commonly used as a synthetic growth medium and in bakery, is obtained from red algae or seaweeds. Agar is primarily composed of polysaccharide agarose, along with smaller molecules called agaropectin. Agar has no taste or smell and is often added to food with other ingredients.

Some examples of red algae genera that produce agar are Gelidium, Gracilaria, Ahnfeltia, and Pterocladia. Agar is extracted from the cell walls of these algae by boiling them in water and filtering the resulting mixture. Agar is then purified and dried into flakes, powder, or strips.

45. Honey that has a high concentration of sugar does not decay because

- (a) Bacteria cannot survive in an active state as it is totally deprived of oxygen
- (b) It contains natural antioxidant that prevents bacterial attack
- (c) Bacteria cannot survive in an active state in a solution of high osmotic strength as water is drawn out
- (d) None of these

Answer: c

Explanation:

Honey that has a high concentration of sugar does not decay because the sugar acts as a natural preservative. The high sugar content creates a very high osmotic pressure, which draws water out of any microorganisms that might try to grow in the honey, killing them and preventing spoilage.

Honey also has a low water activity, which means that most of the water molecules are bound to the sugar molecules and are not available for microbial

growth. Additionally, honey is acidic and contains antimicrobial enzymes produced by bees, which further inhibit the growth of bacteria and fungi. These factors make honey a very stable and long-lasting food that can resist decay for thousands of years.

46. Consider the following pairs about food products and adulterants used

Food item	Adulterant used
Turmeric powder	Chalk powder
Red chilli powder	Brick powder
Apples	Argemone oil
Milk	Urea

How many pairs given above are correct?

- (a) Only one
- (b) Only two
- (c) Only three
- (d) All four

Ans: c (Only three)

**Pair 1 is correctly matched:** Turmeric Powder: Adulterants used in Turmeric powder include Chalk powder, lead chromate and metanil yellow.

**Pair 2 is correctly matched:** Red chili powder: Adulterants used in Chilli powder is Brick powder and Artificial colours.

**Pair 3 is incorrectly matched:** Apples Wax coating not Argemone oil. Argemone oil is an alternative botanical source of sanguinarine, that comes from the seeds of Argemone mexicana Linn, and has independently been shown to possess genotoxic potential. A genotoxin is a chemical or agent that can cause DNA or chromosomal damage.

**Pair 4 is correctly matched:** Milk Water, urea, starch, detergent and synthetic milk. Urea is added to milk to increase the density of the milk.

47. "Horizon scanning" recently seen in media related to

- (a) It is a technique used in diagnosis of cancer cells in the human body
- (b) It is the early detection and assessment of emerging technologies or threats that helps policy decisions
- (c) It is a global network of synchronized radio observatories that work in unison to observe radio sources associated with black holes.



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(d) It involves scanning the soil surface to identify physical, chemical and biological characteristics of soil.

Ans: b (It is the early detection and assessment of emerging technologies or threats that helps policy decisions)

**Explanation:** Horizon scanning is a technique to detect the early predictions of potentially important developments through a systematic examination of threats and opportunities, emphasizing new technology and its effects that are likely to have important consequences over the next decade. It helps in assessing whether one is adequately prepared for future changes or threats. If performed consistently and effectively, horizon scanning, when combined with other forecasting tools, can assist in policy making by identifying important needs or gaps. It is also an effective tool for bringing experts in different subject areas together to discuss a common issue and develop viable solutions.

48. Consider the following statements about Nuclear fuels

1. Fissile material are atoms in which neutrons can split in a sustaining manner
2. Uranium-235 occurs naturally
3. Unlike uranium, thorium alone can be directly used as nuclear fuel in a reactor.
4. Kerala has the highest monazite resources in India.

How many statements given above are correct?

- (a) Only one
- (b) Only two
- (c) Only three
- (d) All four

Ans: b (Only two)

**Statement 1 is correct:** Fissile materials are atoms that neutrons can split in a self-sustaining chain reaction to release enormous amounts of energy.  $\frac{3}{4}$  In nuclear reactors, the fission process is controlled, and the energy is harnessed to produce electricity. In nuclear weapons, fission energy is released all at once to produce an explosion.

**Statement 2 is correct:** The most important fissile materials for nuclear energy and nuclear weapons are an isotope of plutonium, plutonium-239, and an

isotope of uranium, uranium-235. Uranium-235 occurs in nature. There are two basic fertile materials: uranium-238 and thorium-232. When these fertile materials capture neutrons, they are converted into fissile plutonium-239 and uranium-233, respectively.

**Statement 3 is incorrect:** Both Uranium and Thorium have got distinctive characteristics governing their utilization in nuclear reactors. Unlike uranium, thorium alone cannot be directly used as nuclear fuel in a reactor because it does not contain enough fissile material to initiate a nuclear chain reaction. So utilization of Thorium is necessary either with uranium or plutonium, without going through the second stage of Fast Breeder Reactors, to build a sufficient inventory of plutonium first, will be counterproductive by limiting thorium utilization to a very small fraction of the total available resources in the country. The utilization of Thorium in the third stage makes it available as a sustainable energy resource for centuries. With this mode of utilization, Thorium offers not only a sustainable energy resource but also excellent fuel performance characteristics in a reactor, better than Uranium with respect to a lower inventory of long-lived nuclear waste.

**Statement 4 is incorrect:** state Andhra Pradesh (not Kerala) has the largest monazite resource in India

49. Consider the following statements about Urea

1. Nano urea is a patented, indigenously made nitrogenous fertilizer developed by the Indian Council of Agriculture Research
2. Natural gas is the major raw material in the production of Urea
3. Urea has the highest nitrogen content of all solid nitrogenous fertilizers in common use.
4. Indian is biggest consumer of Urea in the world

How many statements given above are correct?

- (a) Only one
- (b) Only two
- (c) Only three
- (d) All four

Ans: b (Only two)

**Statement 1 incorrect:** Nano urea liquid is a nanotechnology-based fertilizer to increase the growth of crops by restoring nitrogen to plants as an



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alternative to conventional Urea. Nano-urea (liquid nano urea) is a product developed by the Indian Farmers and Fertilizer Cooperative (IFFCO). Nano urea is a patented and indigenously made liquid containing Urea nanoparticles, the most crucial chemical fertilizer for farmers in India.

**Statement 2 is correct:** The primary raw material used to manufacture Urea is natural gas. Hydrogen gas obtained from natural gas is used in the production of fertilisers (urea). Ammonia is synthesised from hydrogen (from natural gas) and nitrogen (from the air). Urea is made from ammonia and carbon dioxide.

**Statement 3 is correct:** Urea has the highest nitrogen content of all solid nitrogenous fertilizers in common use (46.7%) because it has the lowest transportation costs per unit of nitrogen nutrients.

**Statement 4 is incorrect:** India is the 2nd largest consumer of Urea after China in the world but only the third-largest producer.

50. Consider the following statements about Human Immune System

1. When our body encounters a pathogen for the first time, it produces anamnestic immune response
2. Cell mediated immune responses mediated by cytotoxic T-cells and natural killer cells.
3. T-lymphocytes produce antibodies into our blood to fight with pathogens, while B-lymphocytes help T- cells to produce them
4. Hydrochloric Acid (HCL) produced in stomach is an example for innate immune response.

How many statements given above are correct?

- (a) Only one
- (b) Only two
- (c) Only three
- (d) All four

Ans: b (Only two)

**Statement 1 is incorrect:** The primary immune response is one that is initiated when the immune system does not have prior experience with the pathogen and encounters it for the first time. Anamnestic immune response is one which is

initiated when the immune system is exposed multiple times to the same pathogen.

**Statement 2 is correct:** Cell mediated immune responses: Mediated by cytotoxic T-cells and natural killer cells. These constitute major defence against intracellular viruses and cancer cells. A natural killer cell is a type of white blood cell. Also called NK cell and NK-LGL. NK cells develop in bone marrow as well as in some extramedullary sites, such as lymph nodes, thymus, liver, and uterus. NK cell development is controlled by both extracellular and intracellular factors. Killer cell is a type of immune cell that has granules (small particles) with enzymes that can kill tumor cells or cells infected with a virus.

**Statement 3 is incorrect:** B-cells initiate the antibody-mediated immune response. Activated B-cells transform into plasma cells which secrete antibodies. B-cells mature in the bone marrow and then are carried by the blood to the peripheral lymphoid organs. Whereas, T-cells induce the B-cells to produce antibody and regulate the immune response by mediating the cell-mediated immune (CMI) response.

**Statement 4 is correct:** A healthy individual is generally immune to potentially harmful microorganisms by a number of very effective mechanisms. Innate immunity is one which provides an immediate but relatively nonspecific response to contain pathogens at the site of entry into the body. It is also known as natural immunity. Innate immune defences include inflammatory and acute phase responses, as well as the anatomical and chemical barriers provided by the skin and mucous membranes. The hydrochloric acid (HCL) by the stomach plays an important role in protecting the body against pathogens ingested with food or water. It is an example of Innate immune response.

51. The term 90-90-90 strategy recently seen in news is related to which one of the following diseases?

- (a) AIDS
- (b) Measles virus
- (c) Nipah virus
- (d) SARS

Ans: a (AIDS)



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**Explanation:** The United Nations Programme on HIV/AIDS (UNAIDS) has developed an ambitious strategy to end the AIDS epidemic, which is called as 90-90-90 Strategy.

The Targets were

- By 2020, 90% of all people living with HIV will know their HIV status.
- By 2020, 90% of all people with diagnosed HIV infection will receive sustained antiretroviral therapy (ART).
- By 2020, 90% of all people receiving antiretroviral therapy will have viral suppression.

At the end of 2020, 78% of PLHIV knew their HIV status, 83% of PLHIV who knew their HIV status were on ART, and 85% of PLHIV were on ART.

52. Consider the following statements about Li-Fe batteries

1. It cannot be recharged in partially discharged conditions
2. Repeated partial discharge in Li-Fe batteries can cause a battery to 'remember' a lower capacity.
3. It uses organic compounds as an electrolyte
4. Solid-state batteries offer higher safety than Li-ion electrolyte batteries.

How many statements given above are correct?

- (a) Only one
- (b) Only two
- (c) Only three
- (d) All four

Ans: b (Only two)

**Statement 1 is incorrect:** A lithium-ion (Li-ion) battery is an advanced battery technology that uses lithium ions as a key component of its electrochemistry. One of the main advantages of this battery over other batteries is that it can be recharged at any time even in partially discharged conditions.

**Statement 2 is incorrect:** Repeated partial discharge/charge cycles cannot cause a Li fe battery to 'remember' a lower capacity because there is no memory effect, hence the battery does not need periodic full discharge cycles to prolong life. The memory effect in batteries is also called the lazy battery effect. If the battery is not discharged

completely before the charging, small crystals are formed on the electrodes and they reduce the possibility to accept a charge. Therefore if the batteries do not discharge completely one time after another, the operational times become increasingly shorter

**Statement 3 is correct:** The electrolytes used in lithium-ion batteries are a mixture of both organic and inorganic compound. Lithium hexafluorophosphate (LiPF<sub>6</sub>) salt (inorganic) is dissolved in Organic carbonates (ethanol, acetonitrile, dimethyl carbonate, dimethyl sulfoxide, and propylene carbonate). This electrolyte is the non-aqueous solution (The solution in which any liquid other than water acts as a solvent is called a non-aqueous solution).

**Statement 4 is correct:** The electrolyte used in liquid li-ion batteries is volatile and flammable at high temperatures. This makes electric vehicles that use Li-Fe batteries more vulnerable to fire and chemical leaks. But the solid-state batteries use a thin layer of solid electrolyte that carries lithium ions between electrodes. Thus Solid-state batteries offer higher safety than Li-ion electrolyte batteries.

53. Consider the following statements about BCG vaccine?

1. BCG vaccine has a protective effect against meningitis and disseminated TB in children
2. BCG vaccine can be administered to all people
3. BCG vaccine is not included in India's universal immunisation programme
4. Extensively drug-resistant tuberculosis (XDR-TB) in HIV patients leads to high mortality.

How many statements given above are correct?

- (a) Only one
- (b) Only two
- (c) Only three
- (d) All four

Ans: b (Only two)

**Statement 1 is correct:** BCG vaccine has a documented protective effect against meningitis and disseminated TB in children (75–87%). However, It does not prevent primary infection and, more importantly, does not prevent reactivation of latent



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pulmonary infection, the principal source of bacillary spread in the community. The impact of BCG vaccination on transmission of Mycobacterium tuberculosis (Mtb) is therefore limited.

**Statement 2 is incorrect:** Considering the significant risk of dBCG disease, these data strongly support the WHO recommendation of not giving BCG to children who are known to be infected with HIV.

**Statement 3 is incorrect:** Ministry of Health and Family Welfare, Government of India provides several vaccines to infants, children and pregnant women through the Universal Immunisation Programme. Vaccines provided under UIP:

- BCG (Bacillus Calmette-Guerin vaccine)
- OPV (Oral Polio Vaccine)
- Hepatitis B vaccine  $\frac{3}{4}$  Pentavalent Vaccine

**Statement 4 is correct:** Extensively drug-resistant tuberculosis (XDR-TB) is a form of TB which is resistant to at least four of the core anti-TB drugs.

- XDR-TB involves resistance to x The two most powerful anti-TB drugs, isoniazid and rifampicin,
- Any of the fluoroquinolones (such as levofloxacin or moxifloxacin)
- At least one of the three injectable second-line drugs (amikacin, capreomycin or kanamycin).

The persons infected with HIV are more likely to experience XDR-TB. XDR-TB is virtually untreatable with available TB medications. Thus, this increase the mortality rate among HIV patients.

54. Consider the following statements with respect to Mars

1. The planets appear to move slower when they are farther from the sun and faster when they are nearer.
2. Mars Orbiter Mission(MOM) is ISRO's first interplanetary mission to planet Mars with an orbiter craft designed to orbit Mars in an eccentric orbit of 372 km to 80,000 km
3. Density of Martian atmosphere is higher than Earth's atmospheric density.
4. Mars does not have any natural satellites

How many statements given above are correct?

- (a) Only one
- (b) Only two

(c) Only three

(d) All four

Ans: b (Only two)

**Statement 1 is correct:** According to Kepler's Law of planetary mission, the line that joins any planet to the sun sweeps equal areas in equal intervals of time. This law comes from the observations that planets appear to move slower when they are farther from the sun than when they are nearer. And also the speed at which a planet orbits the Sun changes depending on how far it is from the Sun. When a planet is closer to the Sun the Sun's gravitational pull is stronger, so the planet moves faster. When a planet is further away from the sun the Sun's gravitational pull is weaker, so the planet moves slower in its orbit.

**Statement 2 is correct:** Mars Orbiter Mission (MOM), India's first interplanetary mission by the Indian Space Research Organisation (ISRO) to planet Mars was launched onboard PSLV-C25 on November 05, 2013. It carries an orbiter craft designed to orbit Mars in an elliptical orbit of 372 km by 80,000 km. This mission can be termed as a challenging technological mission and a science mission considering the critical mission operations and stringent requirements on propulsion, communications, and other bus systems of the spacecraft.

**Statement 3 is incorrect:** The Martian atmosphere is an extremely thin sheet of gas, principally carbon dioxide, that extends from the surface of Mars to the edge of space. Earth's atmosphere is over 100 denser than Mars's. Whereas Mars's atmosphere is less dense and has a much thinner atmospheric volume compared to Earth, but there are many similarities. Gravity holds the atmosphere to the Martian surface and within the atmosphere, very complex chemical, thermodynamic, and fluid dynamics effects occur.

**Statement 4 is incorrect:** Mercury and Venus are the only planets in our solar system without moons i.e. they do not have any natural satellite. Mars has two moons, Phobos and Deimos. Both are thought to be captured asteroids, or debris from early in the formation of our solar system. Phobos is the larger of Mars' two moons.



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55. Consider the following statements about Open Network for Digital Commerce (ONDC)

1. ONDC promotes open networks for all aspects of exchange of goods and services over digital networks
2. ONDC is not platform-centric, it aims to democratisation of e-commerce sector in India
3. ONDC is a regulating body of the e-commerce ecosystem in India

Which of the statements given above are correct?

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

Ans: a (1 and 2 only)

**Statement 1 is correct:** Open Network for Digital Commerce (ONDC) is a freely accessible government-backed platform that aims to democratise e-commerce by moving it from a platform-centric model to an open network for buying and selling of goods and services. Open Network for Digital Commerce (ONDC) is an initiative to promote open networks for all aspects of exchanging goods and services over digital or electronic networks.

**Statement 2 is correct:** ONDC, a UPI of e-commerce, seeks to democratise digital or electronic commerce, moving it from a platform-centric model to an open network. ONDC plans to enable sellers and buyers to be digitally visible and transact through an open network. The new framework aims at promoting open networks developed on open-sourced methodology, using open specifications and open network protocols independent of any specific platform.

**Statement 3 is incorrect:** As far as a regulatory framework for governing e-commerce activities is concerned, there are no dedicated e-commerce laws and a regulating body in India. Various ministries and the Department of the government of India deal with e-commerce. For instance, the Ministry of Electronics and Information Technology looks after the technical aspects of e-commerce through the information technology Act, data privacy issues, etc.

56. Consider the following statements about Sound

1. Speed of the sound in air increases with increase in temperature.
2. When a sound waves travels from one medium to another medium, the frequency remains constant.
3. Sound travels faster in hydrogen medium compared to air medium
4. The speed of the sound is higher in space than any other medium

Which of the statements given above are correct?

- (a) Only one
- (b) Only two
- (c) Only three
- (d) All four

Ans: c (Only three)

**Statement 1 is correct:** Sound is the form of energy which gives the sensation of hearing. The speed of sound depends upon medium and temperature. Temperature is also a form of energy. When the temperature increases the sound waves get extra energy and vibrate more. Thus the speed of the sound will increase with temperature increase

**Statement 2 is correct:** The number of vibrations made by a particle in one second is called the frequency of a sound wave. It depends upon the source of the sound. Thus the frequency will not change when a sound wave travel from one medium to another

**Statement 3 is correct:** The speed of the sound will decrease with the increasing density. The density of Hydrogen is lesser than the density of air. Thus the sound travels faster in Hydrogen medium compared to air medium.

**Statement 4 is incorrect:** Sound does not travel at all in space. The vacuum of outer space has essentially zero air. Because sound is just vibrating air, space has no air to vibrate and therefore no sound. If you are sitting in a space ship and another space ship explodes, you would hear nothing.

57. Consider the following fundamental forces of nature

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



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Arrange them in decreasing order of their strength?

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

Ans: b (1-3-2-4)

#### Explanation:

**Strong Nuclear Force:** The strong interaction is very strong but very short-ranged. It is responsible for holding the nuclei of atoms together. It is basically attractive but can be effectively repulsive in some circumstances. The strong force is 'carried' by particles called gluons; that is, when two particles interact through the strong force, they do so by exchanging gluons. Thus, the quarks inside of the protons and neutrons are bound together by the exchange of the strong nuclear force. This the strongest among all fundamental forces of nature

**Electromagnetic Force:** The electromagnetic force causes electric and magnetic effects such as the repulsion between electrical charges or the interaction of bar magnets. It is long-ranged but much weaker than the strong force. It can be attractive or repulsive and acts only between pieces of matter carrying an electrical charge. Electricity, magnetism, and light are all produced by this force.

**Weak Nuclear Force:** The weak force is responsible for radioactive decay and neutrino interactions. It has a very short range and. As its name indicates, it is very weak. The weak force causes Beta-decay ie. the conversion of a neutron into a proton, an electron, and an antineutrino. Its strength is lesser compared in Electromagnetic force

**Gravitational Force:** The gravitational force is weak but very long-ranged. Furthermore, it is always attractive. It acts between any two pieces of matter in the Universe since mass is its source. This is the weakest of all fundamental forces of nature

Hence the decreasing order of fundamental forces as per their strength is: Strong Nuclear Force->Electromagnetic Force->Weak Nuclear Force->Gravitational Force

58. 42. Consider the following statements about scramjet engine technology

1. A scramjet engine efficiently operates at hypersonic speeds and allows supersonic combustion
2. BrahMos is a ramjet supersonic cruise missile which is capable of being launched from land, sea and air.

Which of the statements given above are correct?

- (a) Only one
- (b) Only two
- (c) Only three
- (d) All four

Ans: c (Both 1 and 2)

**Statement 1 is correct:** Scramjet engine is an improvement over the ramjet engine as it efficiently operates at hypersonic speeds and allows supersonic combustion. In an air-breathing scramjet engine, air from the atmosphere is rammed into the engine's combustion chamber at a supersonic speed of more than Mach two. In the chamber, the air mixes with the fuel to ignite supersonic combustion but the cruiser's flight will be at a hypersonic speed of Mach six to seven. So it is called supersonic combustion ramjet or Scramjet

**Statement 2 is correct:** BrahMos is a two-stage missile with a solid propellant booster engine as its first stage, which brings it to supersonic speed and then gets separated. The liquid ramjet or the second stage then takes a missile closer to 3 Mach speed in the cruise phase. It is capable of being launched from land, sea and air. Stealth technology and a guidance system with advanced embedded software provide the missile with special features.

59. Consider the following statements about Dark Matter and Dark Energy

1. Dark matter attracts and holds the galaxies together but the dark energy repels and causes expansion of the universe.
2. Around 95 percent of the universe is made up of "unknown dark matter and dark energy"

Which of the statements given above are correct?

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

Ans: c (Both 1 and 2)



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**Statement 1 is correct:** Although the names seem to imply that they are similar, dark energy and dark matter are not directly related. Dark Energy is a form of mysterious energy in space that exerts a negative, repulsive force, behaving like the opposite of gravity and causing the universe to expand rapidly. Whereas Dark matter acts as an attractive force of gravity that holds the universe together by acting as an adhesive agent.

**Statement 2 is correct:** Dark energy makes up approximately 68% of the universe and appears to be associated with the vacuum in space. Whereas Dark matter makes up only about 27% of the universe. But, the remaining 5 % is the normal matter that makes up all stars and galaxies of the universe. Hence, around 95 percent of the universe is made up of "unknown dark matter and dark energy".

60. Consider the following statements about Bisphenol A (BPA)

1. It is a colourless crystalline solid insoluble in organic solvents
2. It is used to manufacture polycarbonate plastics and resins
3. It is mainly used in making bulletproof glasses and windows
4. Use of BPA was banned in baby products in India

How many statements given above are correct?

- (a) Only one
- (b) Only two
- (c) Only three
- (d) All four

Ans: c (Only three)

**Statement 1 is incorrect:** Bisphenol A (BPA) is a chemical compound primarily used to manufacture various plastics. It is a colorless solid soluble in most common organic solvents but has very poor solubility in water.

**Statement 2 is correct:** It is primarily used in large quantities in the production of polycarbonate plastics. It is found in various products, including shatterproof windows, eyewear, water bottles, and epoxy resins that coat metal food cans, bottle tops, and water supply pipes.

**Statement 3 is correct:** Because of its high density, it has the capability to withstand high impact collisions. Thus they are very susceptible as a material for safety glasses, bulletproof windows and helmets.

**Statement 4 is correct:** According to Bureau of Indian Standard regulations 2015, the use of BPA is banned in infant feeding bottles, but the manufacturers do not adhere to the guidelines. It is banned in USA way back in 2012.

61. Consider the following statements about Singularity Theory of black holes

1. Einstein's General Theory of Relativity provided theoretical basis for existence of black holes
2. Inside a black hole, matter is compressed down to an infinitely tiny point.
3. All conceptions of time and space completely break down at the centre of the black hole.
4. Sun is a massive star and can turn into a black hole at end of the life cycle.

How many statements given above are correct?

- (a) Only one
- (b) Only two
- (c) Only three
- (d) All four

Ans: c (Only three)

**Statement 1 is correct:** Singularities were first predicated as a result of Einstein's Theory of General Relativity, which resulted in the theoretical existence of black holes

**Statements 2 & 3 are correct:** A black hole is a place in space where gravity pulls so much that even light cannot get out. Gravity is so strong because matter has been squeezed into a tiny space. This can happen when a star is dying. According to the Singularity theory, at the centre of a black hole is the ultimate no man's land, which is a place where matter is compressed down to an infinitely tiny point, and all conceptions of time and space completely break down

**Statement 4 is incorrect:** Our Sun is an average-sized star. The sun is much smaller in size to become a black hole at the end of the life cycle. The Sun would need to be about 20 times more massive to end its life as a black hole. Stars that are born this size or





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larger can explode into a supernova at the end of their lifetimes before collapsing back into a black hole, an object with a gravitational pull so strong that nothing, not even light, can escape. The life cycle of Sun will end up as a white dwarf not as Black hole

62. Consider the following pairs about vitamin deficiency diseases

Vitamin	Deficiency disease
Vitamin A	Xerophthalmia
Vitamin B6	Convulsion
Vitamin D	Rickets
Vitamin K	Increased blood clotting time

How many pairs given above are correctly matched?

- (a) Only one
- (b) Only two
- (c) Only three
- (d) All four

Ans: d (All four)

**Explanation:**

#### VITAMIN DEFICIENCY DISEASES

Name of vitamins	Source	Deficiency diseases
Vitamin A	Fish liver oil, carrots, butter and milk	Xerophthalmia (hardening of the cornea of the eye), Night blindness
Vitamin B1 (Thiamine)	Yeast, milk, green vegetables and cereals	BeriBeri (loss of appetite, retarded growth)
Vitamin B2 (Riboflavin)	Milk, egg white, liver, kidney	Cheilosis (fissuring at corners of mouth and lips), digestive disorders and burning sensation of the skin.
Vitamin B6 (Pyridoxine)	Yeast, milk, egg yolk, cereals and grams	<b>Convulsions</b>
Vitamin B12	Meat, fish, egg and curd	Pernicious anemia (RBC deficient in haemoglobin)
Vitamin C (Ascorbic acid)	Citrus fruits, amla and green leafy vegetables	Scurvy (bleeding gums)
Vitamin D	Exposure to sunlight, fish and egg yolk	Rickets (bone deformities in children) and osteomalacia (soft bones and joint pain in adults)
Vitamin E	Vegetable oils like wheat germ oil, sunflower oil, etc.	Increased fragility of RBCs and muscular weakness
Vitamin K	Green leafy vegetables	Increased blood clotting time

63. Consider the following statements about defense mechanisms in Human body

1. Individual acquired passive immunity when he expose to infection
2. Metabolic defence to metabolize and detoxify foreign chemicals
3. Resistance to stress mainly through release of the hormone
4. Individuals can acquire immunity through blood transmission

How many statements given above are correct?

- (a) Only one
- (b) Only two
- (c) Only three
- (d) All four

Ans: b (Only two)

**Statement 1 is incorrect:** By transfer from an actively immunized individual through blood, serum components, etc. This is called passively acquired immunity

**Statements 2 & 3 are correct:** The generalized primary forms of host defense are termed "innate," "inborn," or "nonspecific" immunity. These initial defensive mechanisms guard the body by contributing protective responses that are effective against a diverse variety of threats. Generally, the defence mechanisms in our body are as follows,

- Immunity to defend the body from infections
- Metabolic defence to metabolize and detoxify foreign chemicals
- Stoppage of bleeding (Hemostasis) to prevent blood loss
- Resistance to stress mainly through release of the hormone

**Statement 4 is incorrect:** By infection, antibodies are produced against the infective agent and by deliberate artificial immunization. This is termed as actively acquired immunity

64. Consider the following statements regarding Antimicrobial resistance

1. Antibiotic resistance does not occur naturally, but misuse of antibiotics in humans and animal feed is the main cause.
2. Antibiotic Resistance in Bacteria occurs when the changes in bacteria cause the drugs used to treat the infection to become less effective.
3. The usage of Colistin in poultries is banned in India.

How many statements given above are correct?

- (a) Only one
- (b) Only two
- (c) Only three
- (d) All four

Ans: b (Only two)

**Statement 1 is incorrect:** Antibiotic / Antimicrobial resistance happens when germs like bacteria and



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fungi develop the ability to defeat the drugs designed to kill them. That means the germs are not killed and continue to grow. Resistant infections can be difficult, and sometimes impossible, to treat. But this resistance is natural, whereas misuse of antibiotics in humans and animals only accelerates the process but it is not the main reason.

**Statement 2 is correct:** Drugs/ Medicines are designed to kill the bacteria which infect human beings. Antibiotic resistance (ABR) is developed in bacteria when they develop the ability to survive exposure to antibiotics designed to kill them.

**Statement 3 is correct:** Colistin is an antibiotic for therapeutic purposes in veterinary. But the drug is highly misused in the poultry industry as a growth promoter for prophylactic purposes. One of the reasons for antibiotic resistance in India is the unwanted use of Colistin in the poultry industry. In 2019, the Health Ministry of India banned the manufacture, sale, and distribution of the antibiotic, Colistin and its formulations for food-producing animals, poultry, aqua farming, and animal feed supplements in a bid to preserve the drug's efficacy in humans under provisions of the Drugs and Cosmetics Act, 1940.

65. Green plants evolve oxygen during the day rather than carbon dioxide. This is because

- (a) Green plants do not respire
- (b) Green plants respire only at night
- (c) The rate of photosynthesis is much higher than the rate of respiration
- (d) The rate of respiration is much higher than the rate of photosynthesis

Answer: c

Explanation:

Green plants evolve oxygen during the day rather than carbon dioxide because they perform **photosynthesis** in the presence of sunlight. Photosynthesis is a process by which green plants convert light energy into chemical energy, using water and carbon dioxide as raw materials. The products of photosynthesis are glucose and oxygen. During the day, the rate of photosynthesis is higher than the rate of respiration, which is a process by which plants break down glucose to release energy,

carbon dioxide, and water. Therefore, during the day, plants release more oxygen than carbon dioxide, as photosynthesis dominates over respiration. However, at night, when there is no sunlight, photosynthesis stops, but respiration continues. Therefore, plants release more carbon dioxide than oxygen at night, as respiration dominates over photosynthesis.

66. Ports of Odesa, Chornomorsk and Pivdennyi are in news, these ports are located in

- (a) Baltic Sea
- (b) Black Sea
- (c) Caspian Sea
- (d) Adriatic Sea

Explanation:

Answer: (b) Black Sea

Explanation:

-The Joint Coordination Centre (JCC) facilitated the implementation of the Black Sea Grain Initiative to allow ships to safely export grain, other foodstuffs and fertilizers, including ammonia, from Ukraine via a maritime humanitarian corridor.

-The JCC comprised representatives of Ukraine, the Russian Federation, Türkiye and the United Nations.

-The JCC was born out of the recognition of the critical importance of global food security, and its significant dependence on the supply of grain and other foodstuffs produced in the region.

-The Initiative was focused on exporting grain, other foodstuffs and fertilizers, including ammonia, from Ukraine.

-The Initiative saw significant volumes of commercial grain exports move from three key Ukrainian ports in the Black Sea – Odesa, Chornomorsk, Yuzhny/Pivdennyi – to world markets.

67. Consider the following statements

1. Criticality of a nuclear reactor is said to be achieved when the number of neutrons produced in Nuclear fission reaction equals the number of neutrons lost through absorption, leakage, and other processes.
2. Criticality is the state allows for a sustained and controlled chain reaction.

Which of the following statements are incorrect?

- (a) 1 only



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

Answer : (d) Neither 1 nor 2

Explanation:

India's second indigenous 700 MW Nuclear power reactor at Kakrapar Atomic Power Project (KAPP) in Gujarat has achieved its first criticality.

Statement 1 is correct: A Nuclear reactor is said to be critical when the number of neutrons produced in Nuclear fission reactions equals the number of neutrons lost through absorption, leakage, and other processes.

Statement 2 is correct: In the operation of a nuclear reactor, criticality is the state in which a nuclear chain reaction is self-sustaining—that is, when reactivity is zero. This equilibrium state allows for a sustained and controlled chain reaction.

68. Which of the following statements are correct?

1. Technical textiles are primarily composed of synthetic fibers that are engineered to improve performance.
2. National Technical Textiles Mission aims to position India as a global leader in Technical Textiles.

Select the correct answer:

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

Answer : (c) Both 1 and 2

Explanation:

Technical textiles are functional fabrics that have applications across various industries including automobiles, civil engineering and construction, agriculture, healthcare, industrial safety, personal protection etc.

Statement 1 is correct: Technical textiles are engineered products with a definite functionality.

They are manufactured using natural as well as man-made fibers such as Nomex, Kevlar, Spandex, Twaron that exhibit enhanced functional properties such as higher tenacity, excellent insulation, improved thermal resistance etc.

Statement 2 is correct: The aim of the mission is to position India as a global leader in Technical Textiles by taking the domestic market size from USD 40 billion to USD 50 billion by 2024.

-It also supports the 'Make in India' Initiative promoting domestic manufacturing of related machinery and equipment.

69. The concept of 'fall-back liability' sometimes seen in news is related to

- (a) Taxation clause.
- (b) E-commerce rules.
- (c) Non-performing assets.
- (d) Stock exchanges.

Answer : (b) E-commerce rules.

Explanation:

The rapid growth of e-commerce has revolutionized how businesses operate and consumers shop. However, it has also brought in concerns regarding consumer protection, especially in cases related to product defects, counterfeit goods or inadequate services. To prioritize and safeguard consumers' interests, in July 2020, the Ministry of Consumer Affairs notified the Consumer Protection (E-Commerce) Rules, 2020 under the Consumer Protection Act, 2019.

Given this context, a "fallback liability" which makes online marketplaces responsible for losses incurred by an end-user, on account of a seller's negligence in product delivery or sale, would be akin to holding a shopping mall responsible for sales made by retailers that operate in the mall.

The introduction of a "fall-back liability" can have a domino effect – exclude MSME and small-scale sellers from these benefits as well as the larger digital economy. Given the scale at which online marketplaces operate, with millions of products, and small and medium sellers listed on their platforms – it is simply not feasible for these marketplaces to ensure that every product sold on their platform is defect-free and that every seller is financially responsible – despite extensive due diligence.

70. Consider the following statements

1. The United States is the largest producer of gold.



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- The largest resources of gold ore in India are located in Karnataka.
- Gold supply in India is primarily met through imports.

Which of the following statements are correct?

- 1 and 2 only
- 2 and 3 only
- 3 only
- All are correct

Answer: (c) 3 only

Explanation:

Statement 1 is incorrect: In 2023, China's mines produced an estimated 370 metric tons of gold. China is the largest gold producer in the world, followed by Australia and Russia. The United States stands fourth in Gold Production.

Statement 2 is incorrect: The Bihar government has decided to accord permission for exploration of the "country's largest" gold reserve in Jamui district

-As per a Geological Survey of India (GSI) survey, around 88 million tonnes of gold reserve, including 37.6 tonnes of mineral-rich ore, are present in Jamui district.

-GSI findings indicated the presence of gold in areas such as Karmatia, Jhajha and Sono in Jamui district of Bihar.

Statement 3 is correct: Gold supply in India is primarily met through imports.

It is importing gold from more than 30 countries across the world. Switzerland, UAE, Ghana, South Africa and USA are the five largest gold import partners of India.

71. Consider the following statements

- Bituminous variety of coal has the lowest percentage of Carbon in it.
- Anthracite coal is only found in Jammu and Kashmir in India.

Which of the following statements are correct?

- 1 only
- 2 only
- Both 1 and 2
- Neither 1 nor 2

Answer: (b) 2 only

Explanation:

Statement 1 is incorrect: Bituminous coal is the second highest quality of coal, with a carbon content that ranges from 76-86%. It is the most abundant type, and one of the longest buried fossil fuels, holds a middle rank of coal between sub bituminous and anthracite. Bituminous coal usually has a high heating (Btu) value and is used in electricity generation and steel making

-Lignite: Lignite: Lignite coal, aka brown coal, is the lowest grade of coal with the least concentration of carbon. Lignite has a low heating value and a high moisture content and is mainly used in electricity generation. It contains the greatest amount of compounds other than carbon—such as sulfur and mercury.

-The precursor to coal is peat. Peat is a soft, organic material consisting of partly decayed plant and mineral matter. When peat is placed under high pressure and heat, it undergoes physical and chemical changes (coalification) to become coal.

Statement 2 is correct: Anthracite is the best quality of coal which carries 80 to 95 percent carbon content. It ignites slowly with a blue flame. It has the highest calorific value. It is found in small quantities in Jammu and Kashmir.

72. Consider the following statements.

A. Octane Number	1- It is the lowest temperature at which a substance produces enough vapor to ignite momentarily
B. Cetane Number	2- It measures the fuel's resistance to engine knocking.
C. Flash Point	3- Indicates the ignition quality of diesel fuel.

Match the following pairs correctly.

- A-3, B-1, C-2
- A-3, B-2, C-1
- A-2, B-3, C-1
- A-1, B-2, C-3

Answer: (c) A-2, B-3, C-1

Explanation:

**A-Octane Number:** It measures the fuel's resistance to engine knocking. Higher octane numbers signify better resistance to premature combustion in gasoline. Octane number, also called Antiknock Rating, measures the ability of a fuel to resist knocking when



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ignited in a mixture with air in the cylinder of an ICE. The octane number is determined by comparing the knock intensity of the fuel with that of blends of two reference fuels: iso-octane, which resists knocking, and heptane, which knocks readily. The octane number is the percentage by volume of iso-octane in the iso-octane–heptane mixture.

**B-Cetane Number:** Indicates the ignition quality of diesel fuel. A higher cetane number signifies easier ignition. Cetane number is a measure of the tendency of a diesel fuel to knock in a diesel engine. The scale is based upon the ignition characteristics of two hydrocarbons n-hexadecane (cetane) and 2,3,4,5,6,7,8-heptamethylnonane. Cetane has a short delay period during ignition and is assigned a cetane number of 100; heptamethylnonane has a long delay period and has been assigned a cetane number of 15. Just as the octane number is meaningful for automobile fuels, the cetane number is a means of determining the ignition quality of diesel fuels and is equivalent to the percentage by volume of cetane in the blend with heptamethylnonane, which matches the ignition quality.

**C-Flash Point:** It is the lowest temperature at which a substance produces enough vapor to ignite momentarily. At that temperature, the vapor pressure of the liquid provides a vapor concentration that is equal to the lower flammability limit. If ignition is attempted when the liquid reaches its flash point, a flash flame will occur but the flame will not sustain. The cloud will burn and the fire will self-extinguish because the energy released by the combustion and transferred to the remaining fuel is not sufficient to produce enough vapors to sustain the flame.

The flash point is an important concept in fire investigation and fire protection because it is the lowest temperature at which a risk of fire exists with a given liquid. It is crucial in many circumstances to establish the presence of some liquids

73. Select the correct statements with reference to “Kra Isthmus Project”:

1. The Kra Isthmus Project will connect the South China Sea and Gulf of Thailand.

2. The project could change global shipping routes, reducing reliance on the Malacca Strait.

Select the correct code

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

Answer: (b) 2 only

Explanation:

An isthmus is a narrow strip of land that connects two larger land masses and is bordered by water on two sides.

**Statement 1 is incorrect:**

Situated in Thailand, the Kra Isthmus represents the narrowest segment of the Malay Peninsula, bordered by the Andaman Sea to the west and the Gulf of Thailand to the east.



**Statement 2 is correct:**

-Reducing Shipping Distance: The Thai Prime Minister plans a 90-kilometer land bridge with road and rail networks connecting deep-sea ports on both coasts.

-Alternative to the Strait of Malacca: This project might provide a shorter, safer, and more cost-effective alternative, saving around 1,200 km and 2 to 3 days of travel time compared to the congested Strait of Malacca.

-Economic Benefits: It intends to generate economic growth, create jobs, and shorten travel time, all of which will improve Thailand’s economy and its position in Southeast Asia.

74. Consider the following statements:

1. Monoclonal antibodies are natural proteins that mimic the behavior of antibodies produced by the immune system.



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2. Monoclonal antibodies are designed to target certain antigens.

Select the correct statements.

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

Answer: (b) 2 only

Explanation:

India has reached out to Australia seeking to restock monoclonal antibody doses to combat the Nipah virus.

**Statement 1 is incorrect:** Monoclonal antibodies are proteins made in laboratories that act like antibodies in our bodies. Laboratory-made monoclonal antibodies help stimulate the immune system.

The word “monoclonal” refers to the fact that the antibodies created in the laboratory are clones.

Monoclonal antibodies are used for diagnosis, disease treatment and research.

**Statement 2 is correct:** Antibodies are parts of your immune system. They seek out the antigens (foreign materials) and stick to them in order to destroy them. Currently, these are the uses of monoclonal antibodies. Healthcare professionals use them in the treatment of the following: Cancer, Rheumatoid arthritis, Multiple sclerosis, Cardiovascular disease, Crohn’s disease, Ulcerative colitis and Psoriasis

75. Choose correct one regarding “Purple Sector in the Economy”

- 1. It is used to describe the business of sustainable resource management and environmental protection.
- 2. Digital Public Infrastructure (DPI) can provide significant benefits to the Purple Sector.

Select the correct answer:

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

Answer : (b) 2 only

Explanation:

Statement 1 is incorrect: The purple economy is an economic order that focuses on the sustainability of

caring labor. It refers to the economic activities related to providing care and support services, often in healthcare, childcare, elderly care, and other areas aimed at improving people’s well-being. It encompasses both paid and unpaid care work and is a critical aspect of social and economic development. Statement 2 is correct: Significance of DPI in the purple sector include

- 1. Enhanced employment opportunities to disabled.
- 2. Increase in government revenues.
- 3. Increased expenditure in the economy.
- 4. Social benefits like Health care and Education.

76. The provision of ‘Reservation to Backward class of citizens which are not adequately represented in the state’ is related to

- (a) Article 12
- (b) Article 14
- (c) Article 16
- (d) Article 18

Answer: (c) Article 16

Explanation:

Explanation:

**Option a is incorrect:** Under Article 12, the control of the Government does not necessarily mean that the body must be under the absolute direction of the government. It merely means that the government must have some form of control over the functioning of the body. Just because a body is a statutory body, does not mean that it is ‘State’.

**Option b is incorrect:** Article 14 of the Constitution of India reads as under: “The State shall not deny to any person equality before the law or the equal protection of the laws within the territory of India.

**Option c is correct:** Article 16(4), which allows the State to reserve posts in appointments and promotions to public services “for the benefit of backward classes of citizens, who, in the State’s opinion, are inadequately represented in the services”.

**Option d is incorrect:** Article 18 talks about the abolition of titles. It says: No title, not being a military or academic distinction, shall be conferred by the State. No citizen of India shall accept any title from any foreign State.



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77. Consider the following statements regarding Payments Bank:

1. A payments bank is like any other bank but operates on a smaller scale without involving any credit risk.
2. It was set up based on the recommendations of the Nachiket Mor Committee.
3. It can take demand deposits of Rupees one lakh.

How many of the above statements is/are correct?

- (a) Only one
- (b) Only two
- (c) All three
- (d) None

Answer: (c) 3 only

Explanation

The Reserve Bank of India (RBI) recently imposed restrictions on Paytm Payments Bank Ltd (PPBL), following a system audit report and subsequent compliance validation report of external auditors.

**Statement 1 is correct:** A payments bank is like any other bank but operates on a smaller scale without involving any credit risk.

**Statement 2 is Correct:** Payments bank was set up based on the recommendations of the Nachiket Mor Committee. It is registered as a public limited company under the Companies Act 2013 and licensed under Section 22 of the Banking Regulation Act 1949.

**Statement 3 is Correct:** Payment Bank can take deposits up to Rs. 2,00,000. It can accept demand deposits in the form of savings and current accounts. It cannot issue loans and credit cards. It cannot accept time deposits or NRI deposits. It cannot set up subsidiaries to undertake non-banking financial activities.

78. Consider the following statements with respect to 'Green Ammonia'

Statement 1 - Green ammonia production is where the process of making ammonia is 100% renewable and carbon-free

Statement 2 - It is produced by using hydrogen from water electrolysis and oxygen separated from the air.

Select the correct answer:

- (a) Statement 1 is true, Statement-2 is false

(b) Statement 1 is true, Statement-2 is true: Statement-2 is a correct explanation for Statement-1

(c) Statement 1 is true, Statement-2 is true; Statement-2 is not a correct explanation for Statement-1

(d) Statement 1 is false, Statement-2 is true

Answer : (a) Statement 1 is true, Statement-2 is false

Explanation:

**Statement 1 is true:** Ammonia is a chemical which is used mainly in the manufacture of nitrogenous fertilizers, like urea and ammonium nitrate, but can be put to other uses too, such as to run engines.

-Green ammonia production is where the process of making ammonia is 100% renewable and carbon-free

**Statement 2 is false:** It is produced by using hydrogen from water electrolysis and nitrogen separated from the air. These are then fed into the Haber process (Also known as Haber-Bosch), all powered by sustainable electricity.

-Green ammonia production makes use of renewable energy sources such as hydro-electric, solar power or wind turbines.

- In the Haber process, hydrogen and nitrogen are reacted together at high temperatures and pressures to produce ammonia, NH<sub>3</sub>.

79. Consider the following statements with respect to 'Financial Stability Board'

1. It brings together national authorities responsible for financial stability, international organizations and standard-setting bodies

2. FSB was established by IMF in the wake of financial crisis

3. It assess the vulnerabilities affecting the global financial system.

How many of the above statements is/are not correct?

- (a) Only one
- (b) Only two
- (c) All three
- (d) None

Answer : (d) None

Explanation:

**Statement 1 and 3 are correct:** The FSB promotes international financial stability; it does so by



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coordinating national financial authorities and international standard-setting bodies as they work toward developing strong regulatory, supervisory and other financial sector policies. It fosters a level playing field by encouraging coherent implementation of these policies across sectors and jurisdictions.

-More specifically, the FSB was established to:

-Assess vulnerabilities affecting the global financial system as well as to identify and review, on a timely and ongoing basis within a macroprudential perspective, the regulatory, supervisory and related actions needed to address these vulnerabilities and their outcomes.

-Promote coordination and information exchange among authorities responsible for financial stability.

-Monitor and advise on market developments and their implications for regulatory policy.

**Statement 2 is incorrect:** It was established in the 2009 G20 Pittsburgh Summit as a successor to the Financial Stability Forum. The Board includes all G20 major economies, FSF members, and the European Commission

80. Ketamine, sometimes seen in the news, is related to which of the following?

- (a) Medication specifically used to treat multidrug-resistant tuberculosis.
- (b) A drug, medically used for induction and maintenance of anesthesia.
- (c) A medication used to prevent cervical, vulvar and vaginal cancer in women.
- (d) None of the above.

Answer : (b) a drug, medically used for induction and maintenance of anesthesia

Explanation:

Ketamine is a dissociative anesthetic used medically for induction and maintenance of anesthesia. It is also used as a treatment for depression and pain management. Some studies indicate ketamine can quickly relieve depression in people who do not respond well to other treatments and several other trials indicate ketamine may have significant anti anxiety effects.

81.Consider the following statements

1. National Mission on Edible Oil-Oil Palm is a Centrally Sponsored Scheme to promote palm cultivation.

2. India is the world’s largest palm oil exporter.

Select the correct answer:

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

Answer : (a) 1 only

Explanation:

**Statement 1 is correct:** The scheme, called National Edible Oil Mission-Oil Palm (NMEO-OP), for self-reliance in edible oil involves investment of over Rs. 11,000 crore (over a five year period).

- The special emphasis of the scheme will be in India’s north-eastern states and the Andaman and Nicobar Islands due to the conducive weather conditions in the regions.

- India is the largest consumer of vegetable oil in the world. Of this, palm oil imports are almost 55% of its total vegetable oil imports.

**Statement 2 is incorrect:** Indonesia exported \$27.3B in Palm Oil, making it the 1st largest exporter of Palm Oil in the world.

India, the leading importer of palm oil worldwide, imports most of its palm oil from Indonesia.

82.Consider the following statements

- 1. Tantalum is a very hard, ductile, lustrous, blue-gray transition critical metal that is highly corrosion-resistant.
- 2. Tantalum reserves has been found in the Sutlej River sand in Punjab.

Which of the following statements are correct.

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

Answer: (c) Both 1 and 2

Explanation:

**Statement 1 is correct:** Tantalum is a rare metal with the atomic number 73. It was first discovered in 1802 by Swedish chemist Anders Gustaf Ekenberg.

-It is grey, heavy, and highly corrosion-resistant, forming an oxide layer when exposed to air.





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-Pure tantalum is ductile, allowing it to be stretched into thin wires without breaking.

-Extremely resistant to chemical attack at temperatures below 150°C, it is affected only by hydrofluoric acid, acidic solutions with fluoride ions, and free sulfur trioxide.

-Tantalum also has an extremely high melting point.

Note: In chemistry, a **transition metal (or transition element)** is a chemical element in the d-block of the periodic table. Since they are metals, they are lustrous and have good electrical and thermal conductivity. Most (with the exception of group 11 and group 12) are hard and strong, and have high melting and boiling temperatures.

**Statement 2 is correct:** The discovery of tantalum in the Sulej River sand indicates that there may be a potential source of tantalum in India, which could reduce the dependence on imports and increase the domestic supply.

-India imports most of its Tantalum metal from the United States, United Kingdom and Germany.

-The discovery of tantalum can help in enhancing India's electronics and semiconductor Industry.

-Tantalum does not react with bodily fluids and is used to make surgical equipment and implants, like artificial joints, according to the US Department of Energy.

-Composite with tantalum carbide (TaC) and graphite is one of the hardest materials, used in high-speed machine tool cutting edges.

83. Consider the following statements with respect to 'Ramlila'

1. It is an annual dance-drama event that involves the traditional performance of the Ramayana epic.
2. It is performed in northern India during the festival of Dussehra that includes song, narration, recital and dialogue.

Which of the above given statements is/are incorrect?

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

Answer: (d) Neither 1 nor 2

Explanation:

**Statement 1 is correct:** Ramlila, literally "Rama's play", is a performance of the then Ramayana epic in a series of scenes that include song, narration, recital and dialogue. This staging of the Ramayana is based on the Ramacharitmanas, one of the most popular storytelling forms in the north of the country.

This sacred text devoted to the glory of Rama, the hero of the Ramayana, was composed by Tulsidas in the sixteenth century in a form of Hindi in order to make the Sanskrit epic available to all.

**Statement 2 is correct:** It is performed across northern India during the festival of Dussehra, held each year according to the ritual calendar in autumn. The majority of the Ramlilas recount episodes from the Ramacharitmanas through a series of performances lasting ten to twelve days, but some, such as Ramnagar's, may last an entire month.

It was included in the UNESCO'S List of Intangible Cultural Heritage in 2008.

84. As a result of climate change, which one of the following lakes of West Africa has become dry and turned into a desert recently?

- (a) Lake Oguta.
- (b) Lake Faguibine.
- (c) Lake Malawi.
- (d) Lake Tanganyika.

Answer: (b) Lake Faguibine.

Explanation:

Option b is correct: Lake Faguibine in northern Mali (in Africa) started to disappear after catastrophic droughts in the 1970s. Over several years, droughts in the 1970s dried up the lake.

-The lake was once one of the largest in West Africa used to be fed by annual flooding from the Niger River.

-The Lake Faguibine System, four interlinked lakes west of Timbuktu in Mali, was historically one of Mali's most fertile areas.

85. Consider the following statements.

1. The term 'Puisne Judges' is used to refer to judges of the higher judiciary to denote seniority of rank.



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2. In India, the term is used for reference during seniority-based appointments and has no impact on the judicial power of a judge.

Select the incorrect statement

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

Answer: (d) Neither 1 nor 2

Explanation:

While recommending names for appointment as judges of the Supreme Court, the Collegium headed by the Chief Justice of India mentioned that it had taken into consideration the seniority of Chief Justices and senior Puisne Judges.

Statement 1 is correct: Puisne is almost always used in the context of judges, and essentially denotes seniority of rank.

The term Puisne judge is used in 'common law countries' to refer to judges who are ranked lower in seniority, i., any judge other than the Chief Justice of that court.

Statement 2 is correct: In India, there is a reference to a Puisne judge only while considering the order of seniority for appointments, elevations to High Courts, etc. Still, it does not have a bearing on the exercise of a judge's judicial power.

#### DIRECTIONS (86-90)

- A) Both the statement and argument are true.
- B) The statement is true, but the argument is false.
- C) The statement is false, but the argument is true.
- D) Both the statement and argument are false.

86) **Statement:** "Regular exercise is essential for maintaining good health."

**Argument:** Exercise helps improve cardiovascular health, strengthens muscles, and boosts immunity.

ANS: A

87) **Statement:** "Government subsidies for farmers are necessary to ensure food security."

**Argument:** Without subsidies, small-scale farmers would struggle to compete with larger agribusinesses, leading to a decline in food production.

ANS: A

88) **Statement:** "Mandatory vaccination programs are necessary to prevent the spread of infectious diseases."

**Argument:** Compulsory vaccinations ensure herd immunity, protecting vulnerable populations, such as the elderly and immunocompromised individuals, from outbreaks.

ANS: D

89) **Statement:** "Providing tax breaks to corporations stimulates economic growth."

**Argument:** Tax breaks for corporations incentivize investment and job creation, leading to overall economic expansion.

ANS: B

90) **Statement:** "Investing in renewable energy sources is crucial for mitigating climate change."

**Argument:** Renewable energy technologies are still in their developmental stages and cannot meet the current energy demands effectively.

ANS: C

91) **Statement:** "Implementing a flexible work-from-home policy will increase employee satisfaction."

**Assumption:** Employees prefer remote work over traditional office settings.

- (a) True
- (b) False
- (c) Cannot be determined.
- (d) Irrelevant

Ans: b) False.

Explanation: While implementing a flexible work-from-home policy might increase employee satisfaction for some, assuming that all employees prefer remote work over traditional office settings is an overgeneralization. Employee preferences vary based on factors like job role, personal circumstances, and work environment preferences.

92) **Statement:** "Providing free public transportation will reduce traffic congestion in urban areas."

**Assumption:** The availability of free public transportation will encourage more people to use it instead of driving personal vehicles.

- (a) True



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- (b) False
- (c) Cannot be determined.
- (d) Irrelevant

Ans: A) True.

Explanation: The assumption aligns with the principle of incentivizing behavior change. Offering free public transportation would likely attract more commuters to use it, thereby reducing the number of cars on the road and alleviating traffic congestion in urban areas.

93) **Statement:** "There has been a significant increase in air pollution levels in the city."

Course of Action:

1. The government should implement strict emission control measures for vehicles.
2. Citizens should be encouraged to use public transportation or carpooling.
3. Industries should be mandated to adopt cleaner production technologies.

Select the correct code

- (a) Only 1 and 2
- (b) Only 2 and 3
- (c) Only 1 and 3
- (d) All of the above

Answer is D) All of the above.

Explanation: All three courses of action address different aspects of air pollution control: controlling vehicle emissions, reducing individual vehicle usage, and regulating industrial pollution. Combining these measures can effectively tackle the issue of increasing air pollution levels in the city.

94) **Statement:** "Cases of cybercrime have been on the rise in recent months."

Course of Action:

1. The government should establish cybercrime investigation units equipped with modern technology.
2. Awareness campaigns should be conducted to educate people about online security measures.
3. Internet access should be restricted to curb cybercriminal activities.

Select the correct code

- (a) Only 1 and 2

- (b) Only 2 and 3
- (c) Only 1 and 3
- (d) All of the above

Answer: A) Only I and II.

Explanation: Course of action III is not appropriate because restricting internet access would hinder legitimate online activities and violate individual freedoms. Instead, focusing on strengthening cybercrime investigation units and raising public awareness about online security measures would be more effective in combating cybercrime.

95) **Statement:** "Unplanned urbanization is leading to overcrowding and inadequate infrastructure in cities."

Course of Action:

1. The government should implement urban planning policies to regulate construction activities.
2. Incentives should be provided for the development of satellite towns and decentralization of population.
3. Strict penalties should be imposed on illegal construction and encroachments.

Select the correct code

- (a) Only 1 and 2
- (b) Only 2 and 3
- (c) Only 1 and 3
- (d) All of the above

Answer :D) All of the above.

Explanation: Each course of action addresses a different aspect of the problem: regulating construction activities, decentralizing population through satellite towns, and enforcing penalties for illegal construction. Combining these measures can help mitigate the issues arising from unplanned urbanization.

96) **Statement:** "There has been a surge in counterfeit products in the market."

Course of Action:

1. Government agencies should conduct regular raids to seize counterfeit goods and apprehend offenders.



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- Public awareness campaigns should be launched to educate consumers about identifying counterfeit products.
- Stricter regulations should be imposed on manufacturers and retailers to ensure product authenticity.

Select the correct code

- Only 1 and 2
- Only 2 and 3
- Only 1 and 3
- All of the above

Answer: D) All of the above.

Explanation: Each course of action addresses a different aspect of tackling the surge in counterfeit products: enforcement through raids and penalties, raising public awareness, and implementing stricter regulations. Combining these actions can effectively combat the proliferation of counterfeit goods.

97) **Statement:** "Rising levels of unemployment are leading to social unrest in the country."

Course of Action:

- The government should focus on promoting entrepreneurship and providing incentives for small businesses.
- Job creation programs should be initiated to generate employment opportunities, particularly in sectors with high demand.
- Law enforcement agencies should be deployed to suppress any instances of social unrest.

Select the correct code

- Only 1 and 2
- Only 2 and 3
- Only 1 and 3
- All of the above

Answer A) Only I and II.

Explanation: Course of action III is not appropriate as it focuses on suppressing social unrest rather than addressing the root causes of unemployment. Instead, promoting entrepreneurship, providing incentives for small businesses, and creating job opportunities through targeted programs are proactive measures to alleviate unemployment and reduce social unrest.

98) **Statement:** "Lowering taxes will stimulate economic growth."

**Assumption:** Tax reductions will result in increased consumer spending and business investments.

- True
- False
- Cannot be determined.
- Irrelevant

Answer: True.

Explanation: The assumption aligns with the theory of supply-side economics, which suggests that reducing taxes leaves individuals and businesses with more disposable income, thus encouraging spending and investment, ultimately driving economic growth.

99) **Statement:** "Investing in renewable energy sources is crucial for mitigating climate change."

**Assumption:** Renewable energy technologies are more environmentally friendly than fossil fuels.

- True
- False
- Cannot be determined
- Irrelevant

Answer: True.

Explanation: The assumption is supported by scientific evidence demonstrating that renewable energy sources, such as solar, wind, and hydroelectric power, produce fewer greenhouse gas emissions compared to fossil fuels like coal, oil, and natural gas. Investing in renewable energy can help reduce carbon emissions and combat climate change.

100) **Statement:** "Providing free access to education will lead to a more educated population."

**Assumption:** Access to education is a primary barrier to attaining higher levels of academic achievement.

- True
- False
- Cannot be determined.
- Irrelevant

Answer: True.

Explanation: The assumption is grounded in the principle of equity in education, suggesting that removing financial barriers to education can increase enrollment rates and educational attainment levels, particularly among disadvantaged populations.



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## EXPLANATION

Access to education is often considered a crucial factor in improving societal literacy and fostering economic development.

