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Day 1

1. Consider the following statements

1. Cloud computing is used to process time-sensitive data, while edge computing is used to process data that is not time-driven.
2. Cloud computing is preferred over edge computing in remote locations.

Select the correct answer code:

- A. 1 only
- B. 2 only
- C. Both 1 and 2
- D. None of the above

Answer: D

Explanation

- Edge Computing Vs. Cloud Computing - Which One's Better?
- First, it's important to understand that cloud and edge computing are different, non- interchangeable technologies that cannot replace one another. Edge computing is used to process time-sensitive data, while cloud computing is used to process data that is not time-driven.
- Besides latency, edge computing is preferred over cloud computing in remote locations, where there is limited or no connectivity to a centralized location. These locations require local storage, similar to a mini data center, with edge computing providing the perfect solution for it.
- Edge computing is also beneficial to specialize and intelligent devices. While these devices are akin to PCs, they are not regular computing devices designed to perform multiple functions. These specialized computing devices are intelligent and respond to particular machines in a specific way. However, this specialization becomes a drawback for edge computing in certain industries that require immediate responses.

2. Which among the following is/are correct in context to characteristics of Big data :

1. Large volume of data
2. Homogeneous data
3. Consistent data
4. High speed data generation

Select the correct answer code:

- A. 1, 3 and 4 only
- B. 1,2 and 4 only
- C. 1 and 4 only

D. All of the above

Answer: C

3. Consider the following matches :

1. 1G. TDMA
2. 2G. CDMA
3. 3G WCDMA
4. 4G FDMA

Select the correct answer code:

- A. 1, 3 and 4 only
- B. 2 and 3 only
- C. 3 only
- D. 1 and 3 only

Answer: C

4. SQL injection, recently seen in news, is related to

- A. COVID-19
- B. Cyber crime
- C. Criticality of uranium
- D. Gene editing technology

Answer: B

5. Which among the following is/are part of D 10 Club :

1. India
2. China
3. Australia
4. South Korea

Select the correct answer code:

- A. 1, 3 and 4 only
- B. 2 and 3 only
- C. 2, 3 and 4 only
- D. All of the above

Answer: A

Day 2

1. Consider the following matches :

- | | |
|----------------|-----------|
| 1. BT Cotton | Cry 1 Ab |
| 2. BT Brinjal | Cp4-Epsps |
| 3. HTBT Cotton | Cry1Ac |

Select the correct answer code:

- A. 1 and 2 only
- B. 1 only
- C. 2 and 3 only
- D. All of the above

Answer: B

2. Barstar and Barnase gene, recently seen in news, is related to

- A. BT Cotton
- B. GM Canola oil
- C. GM Mustard
- D. GM Soyabean

Answer: C

3. Consider the following statements

- 1. In India it is mandatory for importers of major crops to declare that the products are not genetically-modified .
- 2. As per FSSAI there must be zero presence of GMO in imported food.

Select the correct answer code:

- A. 1 only
- B. 2 only
- C. Both 1 and 2
- D. None of the above

Answer: A

4. Micropropagation, recently seen in news, is more specifically related to

- A. Tissue culture

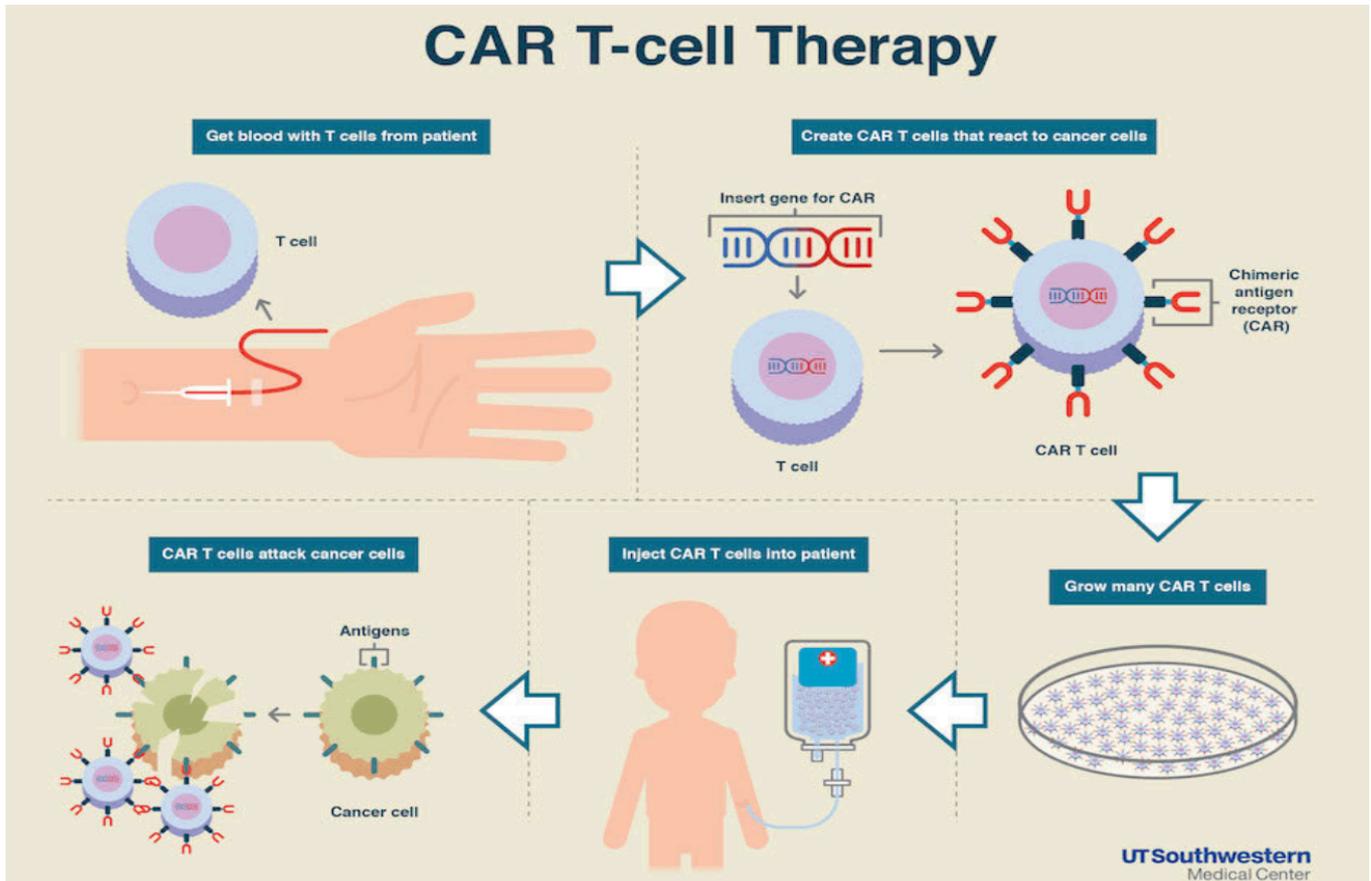
- B. Three parent baby
- C. Gene editing
- D. Animal Clonning

Answer: A

5. CAR-T cell therapy, recently seen in news, is related to

- A. HIV transmission
- B. Cancer treatment
- C. Stem cells
- D. GM Crops

Answer: B



Day 3

1. Consider the following statements

1. High frequencies can travel at faster speeds but can go only short distances.
2. Recently china launched low frequency 6G satellite.

Select the correct answer code:

- A. 1 only
- B. 2 only
- C. Both 1 and 2
- D. None of the above

Answer: A

Explanation

- 6G satellite

✓ It involves use of high-frequency terahertz waves to achieve data-transmission speeds many times faster than 5G is likely to be capable of.

World's First 6G Satellite

China on 6 November 2020 successfully launched "the world's first 6G test satellite" from the Taiyuan Satellite Launch Center in the Shanxi Province to test the technology of Terahertz waves. The satellite was launched into the orbit along with twelve other satellites carrying technologies for monitoring crop disaster and prevention of forest fires.

2. Consider the following statements

1. Plants take carbon dioxide as well as oxygen for their growth.
2. Single celled animal can live without oxygen whereas multicellular can not.

Select the correct answer code:

- A. 1 only
- B. 2 only
- C. Both 1 and 2
- D. None of the above

Answer: A

Explanation

***Henneguya Salminicola* — Unique Non-oxygen Breathing Animal**

Researchers at Tel Aviv University (TAU) have discovered a new non-oxygen breathing animal called *Henneguya salminicola*, a parasite, a member of the jellyfish family. *Henneguya salminicola* is tiny, less than a 10-celled parasite. The discovery (<https://doi.org/10.1073/pnas.1909907117>) published in *Proceedings of the National Academy of Sciences* says that “the discovery confirms that adaptation to an anaerobic environment is not unique to single-celled eukaryotes, but has also evolved in a multicellular, parasitic animal. Hence, *H. salminicola* provides an opportunity for understanding the evolutionary transition from an aerobic to an exclusive anaerobic metabolism”.

3. Which among the following is/are gene editing technologies:

1. CRISPR Cas 9
2. TALEN
3. Meganucleases
4. SHANEL

Select the correct answer code:

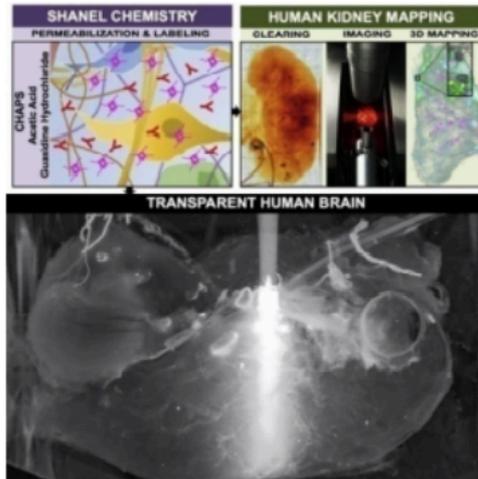
- A. 1 and 2 only
- B. 1,2 and 3 only
- C. 1, 3 and 4 only
- D. All of the above

Answer: B

Explanation

disease, and promoting exciting new possibilities for human gene therapy. Here we review three foundational technologies—clustered regularly interspaced short palindromic repeats (CRISPR)-CRISPR-associated protein 9 (Cas9), transcription activator-like effector nucleases (TALENs), and zinc-finger nucleases (ZFNs). We discuss the engineering advances that facilitated their development and highlight

SHANEL Technology makes Human Organs Transparent



Graphical abstract adapted from Cellular and Molecular Probing of Intact Human Organs published in Cell

For the first time, scientists at Helmholtz Zentrum München – German Research Center for Environmental Health – have come up with a technology called SHANEL (Small-micelle-mediated Human Organ Efficient clearing and Labeling) that makes human organs transparent helping in organ mapping

and serve as templates for 3D bioprinting technologies. The technology can be used for developing artificial organs. According to the researchers, “SHANEL can develop into a key technology for mapping intact human organs in the near future. This would dramatically accelerate our understanding of organs such as the brain, their development and function in health and disease”. The study (DOI:https://doi.org/10.1016/j.cell.2020.01.020) was published in Cell.

4. Which among the following is/are true in context to achievements in latest technologies:

1. Living robots from frog cells
2. Reconstruction of broken optic nerve
3. Yarn from human skin cell

Select the correct answer code:

- A. 1 and 2 only
- B. 1 and 3 only
- C. 2 and 3 only
- D. All of the above

Answer: B

Explanation

Yarn from Human Skin Cells

A team of scientists has developed a “human textile” which they say is a yarn grown from human skin cells and can stitch up surgical patients and repair organs. The study published in the journal *Acta Biomaterialia* says that, “CAM (Cell-assembled extracellular Matrix) yarns can be generated with a range of physical and mechanical properties. We show that this material can be used as a simple suture to close a wound or can be assembled into fully biological, human, Tissue-engineered Vascular Grafts (TEVGs) that have high mechanical strength and are implantable. By combining this truly ‘bio’ material with a textile-based assembly, this original tissue engineering approach is highly versatile and can produce a variety of strong human textiles that can be readily integrated in the body.”

Living Robots from Frog Cells

Scientists from the University of Vermont have repurposed living frog cells and assembled them into a living robot called “Xenobot” – it is tiny, about a millimetre wide. The tiny Xenobot can approach a target with a payload like medicine which needs to be taken to a particular target inside a patient. In a release by the University Joshua Bongard, a computer scientist and robotics expert at the University of Vermont who co-led the new research says that “these are novel living machines. They're neither a traditional robot nor a known species of animal. It's a new class of artefact: a living, programmable organism”. The research was published in the *Proceedings of the National Academy of Sciences* journal.

5. Consider the following matches :

1. Hope Mission Mars
2. Bepi colombo Mercury
3. Hayabusa Asteroid

Select the correct answer code:

- A. 1 and 2 only
- B. 1 only
- C. 2 and 3 only
- D. All of the above

Answer: D

Explanation

Day 4

1. Consider the following statements:

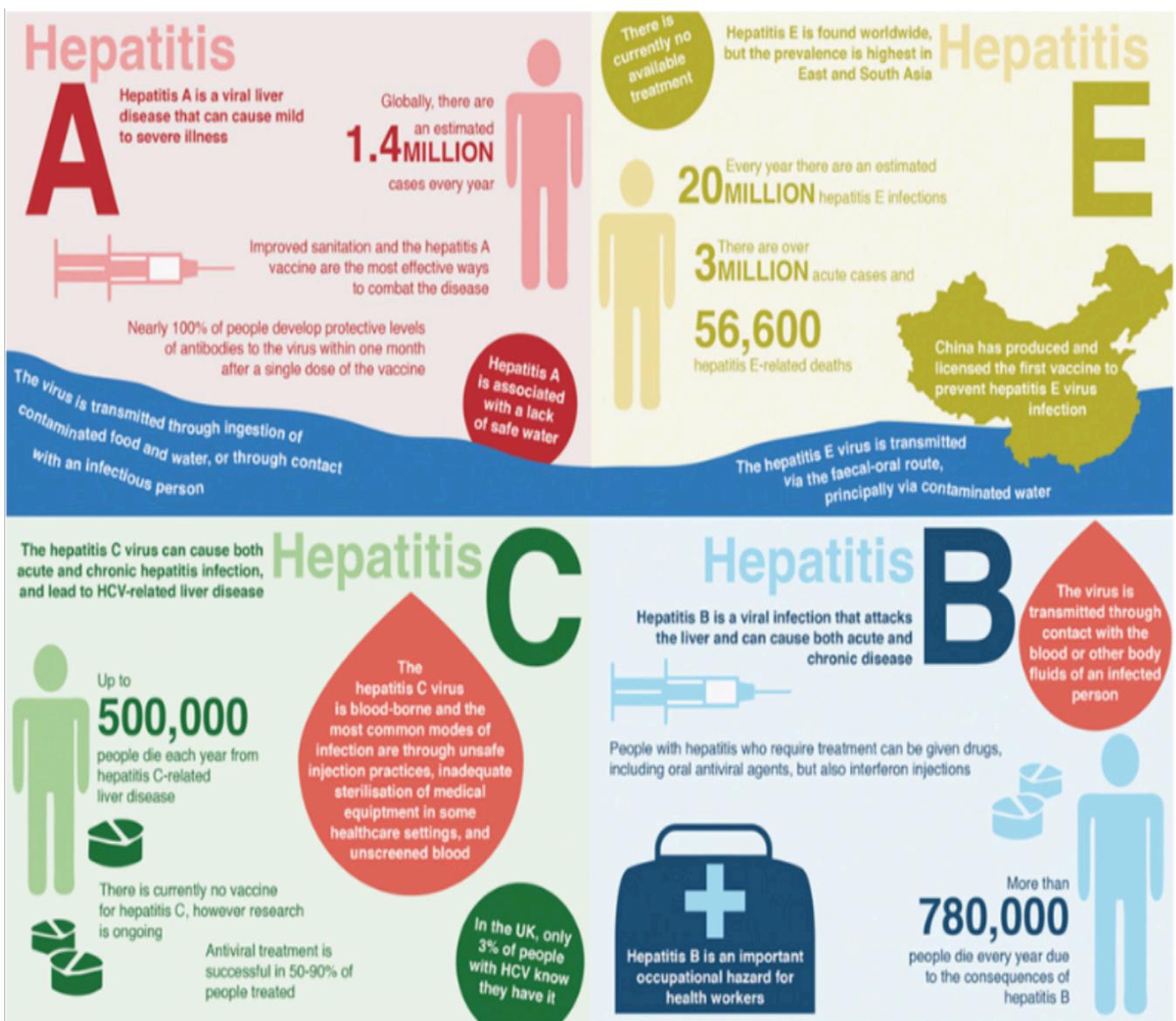
1. Currently there is no vaccine available for hepatitis C
2. Hepatitis C is mainly a blood borne illness whereas hepatitis A transmitted through food & water

Select the correct answer code:

- A. 1 only
- B. 2 only
- C. Both 1 and 2
- D. None of the above

Answer: C

Explanation



2. Consider the following statements in context to Graphene:

1. It is one of the world's thinnest material and toughest material.
2. Till date there is no evidence of Graphene presence in extraterrestrial materials
3. It has higher thermal conductivity than carbon nanotubes.

Select the correct answer code:

- A. 1 and 2 only
- B. 1 and 3 only
- C. 1 only
- D. 2 and 3 only

Answer: B

Explanation

Discovery: Study involving Indian origin scientist finds graphene in two meteorites

The peer-reviewed study came out of research supported by the John Templeton Foundation and published in the Planetary and Space Science Journal on May 27.

Written by [Anuradha Mascarenhas](#) | Pune |
June 1, 2021 7:06:45 pm



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3. Consider the following matches :

1. Aware tool Antibiotics
2. REPLACE AIDS awareness
3. Nikshay portal Tuberculosis

Select the correct answer code:

- A. 1 and 3 only
- B. 2 only
- C. 2 and 3 only
- D. All of the above

Answer: A

4. Consider the following matches in context to Disposal of biomedical waste :

1. Yellow Contaminated plastic bags
2. Blue Anatomical waste

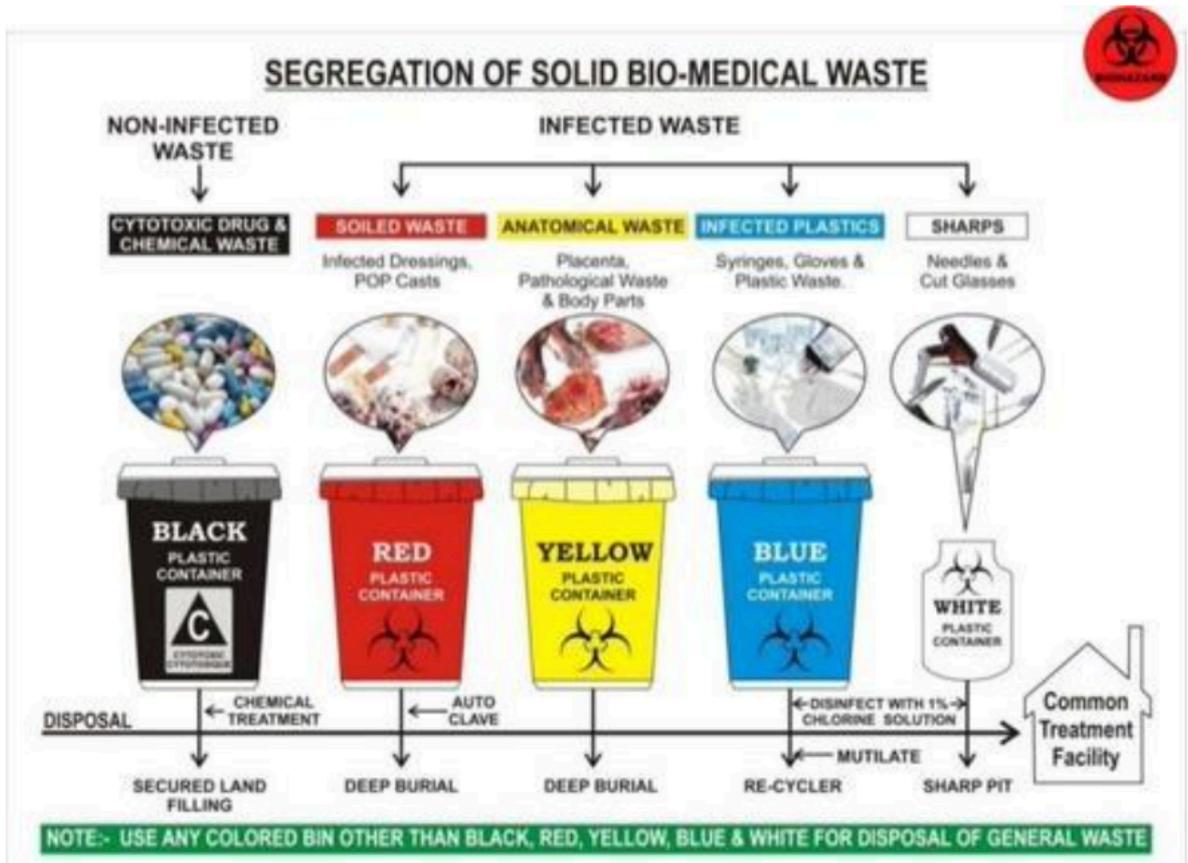
3. Orange Broken glassware

Select the correct answer code:

- A. 1 and 3 only
- B. 2 only
- C. 2 and 3 only
- D. None of the above

Answer: D

Explanation



5. Consider the following statements in context to TRIPS Agreement:

1. It covers Patents, copyright, trademarks and geographical indications.
2. It is binding on all members of WTO
3. It determine whether a new formulation deserve a patent or not.

Select the correct answer code:

- A. 1 and 2 only
- B. 1 and 3 only

- C. 1 only
- D. 2 and 3 only

Answer: A

Explanation

TRIPS Agreement

- The Agreement on Trade-Related Aspects of Intellectual Property Rights (or TRIPS Agreement) set the **standards for intellectual property protection in the world today.**
- It came into **force on 1 January 1995 and is binding on all members of the World Trade Organization (WTO).**
- The TRIPS Agreement sets **minimum standards in the international rules governing patents, including on medicines.**
- Countries that are members of the WTO (today, more than 150 countries) agree to certain common standards in the way they enact and implement their patent laws.
- These standards include, amongst others, that **patents be given for a minimum of 20 years; that patents may be given both for products and processes; and that pharmaceutical test data be protected against 'unfair commercial use'.**
- In addition, the TRIPS Agreement **also introduced detailed obligations for the enforcement of intellectual property rights.**

Day 5

1. Which among the following best describe iPS stem cells

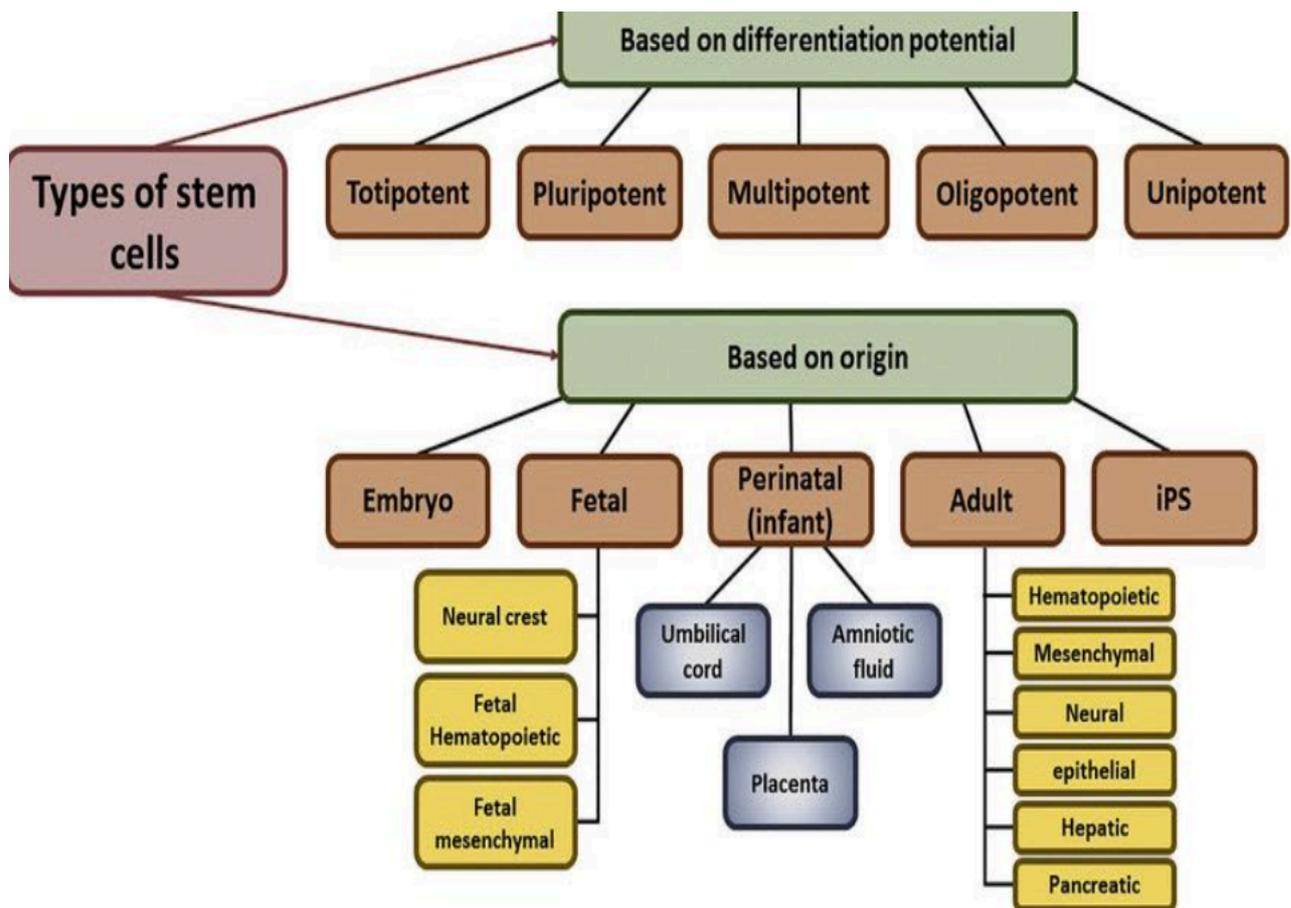
- A. Stem cells derived from embryonic stage
- B. Stem cells created through the introduction of embryonic genes
- C. Stem cells specifically used to treat neurological diseases
- D. Unipotent stem cell for arthritis treatment

Answer: B

Explanation

Induced Pluripotent Stem Cells (iPSCs)

- Induced pluripotent stem cells are stem cells that are created in the laboratory, a happy medium between adult stem cells and embryonic stem cells. iPSCs are created through the introduction of embryonic genes into a somatic cell (a skin cell for example) that cause it to revert back to a “stem cell like” state.



2. Consider the following statements

- 1. In cloudy weather RADAR operate better than LIDAR.
- 2. RADAR provide better and precise image of an object as compare to LIDAR.

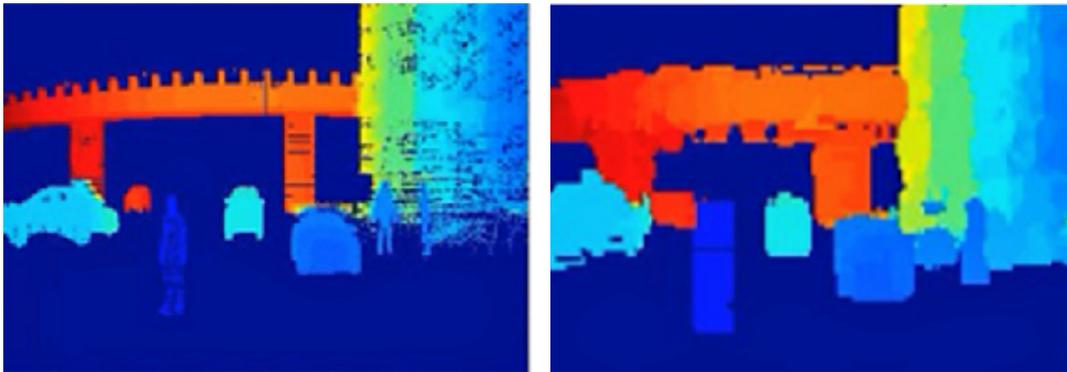
Select the correct answer code:

- A. 1 only
- B. 2 only
- C. Both 1 and 2
- D. None of the above

Answer: A

Explanation

Lidar VS Radar



3. Consider the following matches:

- 1. Param Shivay IIT-BHU
- 2. Paramshakti IIT Kharagpur
- 3. Param Brahma IIT Delhi

Select the correct answer code:

- A. 1 and 2 only
- B. 2 and 3 only
- C. 1 only
- D. All of the above

Answer: A

Explanation

- Param Shivay has been installed in IIT-BHU, Varanasi, in 2019. It has 837 TeraFlop High-Performance Computing (HPC) capacity
- The Paramshakti with a capacity of 1.66 PetaFlop has been installed at IIT- Kharagpur.
- The third system, Param Brahma, has been installed at IISER(Indian Institutes of Science Education and Research)-Pune, which has a capacity of 797 TeraFlop.

4. Which among the following consume least time to perform calculations

- A. Fugaku
- B. Summit
- C. Sycamore
- D. PARAM Siddhi

Answer: D

5. 'Opposition event' often seen in news, more specifically related to:

- A. Quantum uncertainty
- B. Alignment of celestial bodies
- C. Entanglement and superposition
- D. Lagrange points

Answer: B

Explanation

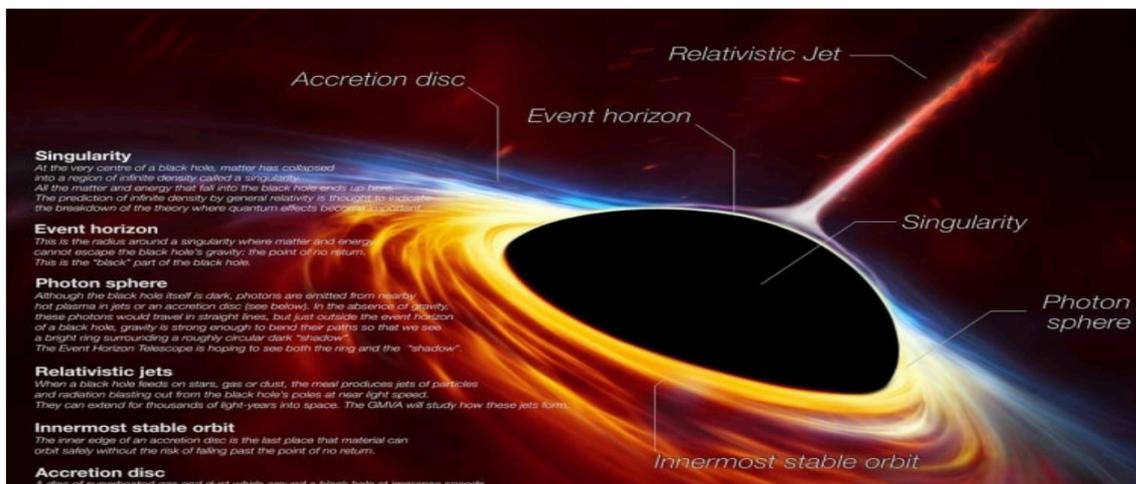
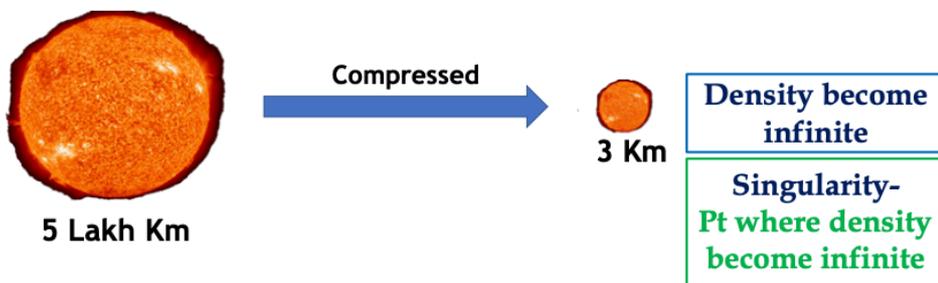
Day 6

1. 'Singularity' often seen in news, is a:
 - A. Point where density become infinite
 - B. Point where escape velocity equal to speed of light
 - C. Accretion disc of black hole
 - D. Point where density become almost zero

Answer: A

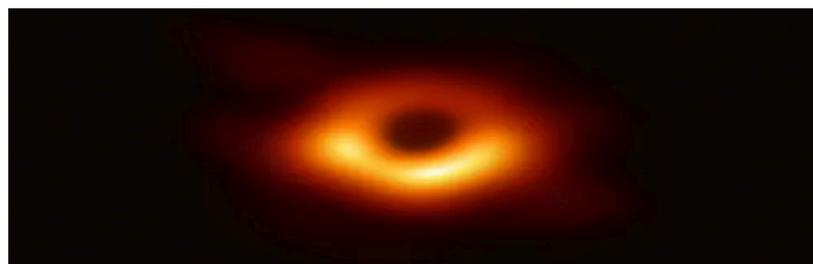
Explanation

SINGULARITY & EVENT HORIZON



Surface hiding pt of singularity called Event Horizon

i.e Any event happened beneath this horizon can't be seen bcz nothing can escape



2. Consider the following statements in context to Quasars

1. As per recent information they only found in galaxies that have supermassive blackholes
2. They are very luminous objects that emit jets at radio frequencies.
3. Milky way hosts biggest Quasar

Select the correct answer code:

- A. 1 and 2 only
- B. 2 and 3 only
- C. 1 only
- D. All of the above

Answer: A

Explanation

Most distant source of radio emission discovered, holds clues about ancient universe (10 March)

About

- An international team of astronomers have discovered the most distant 'radio-loud' quasar with the help of European Southern Observatory's Very Large Telescope (ESO's VLT). It took 13 billion years for the quasar's light to reach earth
- Named P172+18, the quasar emitted wavelengths which had a redshift of 6.8. Only three other 'radio-loud' sources with redshift greater than six have been discovered so far and the most distant one had a redshift of 6.18. The higher the redshift of the radio wavelength, the farther away is the source.

Quasars

- are very luminous objects in faraway galaxies that emit jets at radio frequencies.
- They are only found in galaxies that have supermassive blackholes which power these bright discs.
- However, 90 per cent of them do not emit strong radio waves, making this newly-discovered one special

Significance

- This particular quasar appears to the scientists as it was when the universe was just around 780 million years old. The glowing disc around a blackhole 300 million times more massive than our Sun, thus, holds clues about the ancient star systems and astronomical bodies.
- It is also one of the fastest accreting quasars, which means it is accumulating objects from the galaxy at an enormous speed. This has led team that discovered it to infer that the blackhole at its centre is consuming from its galaxy at a stunning rate
- The scientists think that the powerful radio jets shooting out of the quasar fuelled the appetite of the blackhole. The jets are thought to be capable of disturbing the gas around the black hole, increasing the rate at which gas falls in

- A detailed study of these 'radio-loud' superbright objects can lead astronomers to understanding how the supermassive blackholes in their core grew to be as big so rapidly since the Big Bang.

Is there a quasar behind every black hole, and a black hole behind every quasar?

- There is a black hole behind every quasar, but not every black hole is a quasar. So yes, in a way, a quasar is simply one face a black hole may show. If you are looking at a quasar, you are absolutely looking at a black hole.

To become a quasar, a black hole must meet a few criteria.

- It must be supermassive: millions or billions of times the mass of our Sun.
- Such black holes are found in the centers of most large galaxies, but even then, not every galaxy hosts a quasar. Specifically, a quasar is a supermassive black hole that is actively feeding on material.
- The infalling matter has swirled into a disk that has heated up, and it shines so brightly that its light drowns out the rest of the galaxy around the black hole.

What about supermassive black holes that aren't feeding so voraciously?

- These are not quasars. Some are relatively dormant, like our own Milky Way's central black hole.
- Others are active, but not active enough to outshine their host galaxies.
- Astronomers call them active galactic nuclei, and they come in a variety of flavors. Quasars simply top the list for the brightest active galactic nuclei.
- What's more, a quasar seems to be a relatively short-lived phase of a black hole's life. So, a black hole that is quiet today may have once been a quasar, and the quasars we see in the distant past will eventually "turn off" after they've eaten everything around them.

3. Consider the following statements in context to Sun's Corona

- 1. The corona cannot be seen with the naked eye except during a total solar eclipse, or with the use of a coronagraph etc**
- 2. Corona is the brightest and hottest layer of the sun**

Select the correct answer code:

- A. 1 only
- B. 2 only
- C. Both 1 and 2
- D. None of the above

Answer: A

Explanation

Sun

Corona

- The corona is the outermost layer of the Sun.
- The temperature in the corona is 500,000 K or more.
- The corona cannot be seen with the naked eye except during a total solar eclipse, or with the use of a coronagraph.
- The corona does not have an upper limit.



Why is the corona so dim?

- The corona reaches extremely high temperatures. However, the corona is very dim.
- The corona is about 10 million times less dense than the Sun's surface.
- This low density makes the corona much less bright than the surface of the Sun.

Why is the corona so hot?

- The corona's high temperatures are a bit of a mystery.
- A NASA mission called IRIS may have provided one possible answer.
- The mission discovered packets of very hot material called "heat bombs" that travel from the Sun into the corona.
- In the corona, the heat bombs explode and release their energy as heat. But astronomers think that this is only one of many ways in which the corona is heated.

4. Which among the following Criteria on the basis of which IAU classify Planets and dwarf planets

1. Orbit around any fully-fledged star
2. Needs to have enough gravity to pull itself into a spherical shape
3. Cleared the neighborhood around its orbit

Select the correct answer code:

- A. 1 and 2 only
- B. 2 and 3 only
- C. 3 only
- D. All of the above

Answer: C

Explanation

Planet

Definition of a Planet

- International Astronomical Union (IAU), a group of experts, is the authorized body to define the criteria for any object to be designated as a planet.

- In 2006, IAU defines three criteria to classify any object as a planet.
- It needs to be in orbit around any fully-fledged star.
- It needs to have enough gravity to pull itself into a spherical shape.
- It has cleared the neighborhood around its orbit

Why IAU decided to demote Pluto as a dwarf planet.

- Pluto not satisfied third criteria (It has cleared the neighborhood around its orbit)
- This last criterion is the point at which planets and dwarf planets differ.
- IAU recognizes five named dwarf planets -Ceres, Pluto, Eris, Haumea, and Makemake.
- Except Ceres, other dwarf planets are also known as Plutoids.

What is a Dwarf Planet?

- is a celestial body in direct orbit of the Sun that is massive enough that its shape is controlled by gravitational forces but has not cleared its neighboring region of other objects.

5. 'Cold & hot Classical objects' often seen in news, are:

- A. Asteroid belt object
- B. Kuiper belt objects
- C. Oort cloud part
- D. Part of Moon's orbit

Answer: B

Explanation

Kuiper Belt

Cold & hot Classical objects

- There are two main groups of objects in the classical Kuiper Belt, referred to as "cold" and "hot." These terms don't refer to temperature -- instead, they describe the orbits of the objects, along with the amount of influence Neptune's gravity has had on them.

Cold Classical KBO

- The cold classical KBOs have orbits that never come very close to Neptune, and thus they remain "cool" and unperturbed by the giant planet's gravity.

Hot classical KBOs

- Have had interactions with Neptune in the past.
- These interactions pumped energy into their orbits, which stretched them into an elliptical shape, and tilted them slightly out of the plane of the planets.

Day 7

1. Consider the following statements in context to WHO funding

1. As of March 2020, Assessed contribution of US was largest among member countries
2. In recent years, Assessed contributions have accounted far more than voluntary contribution
3. Each Member State must contribute to WHO funding.

Select the correct answer code:

- A. 1 and 2 only
- B. 1 and 3 only
- C. 2 and 3 only
- D. All of the above

Answer: B

Explanation

WHO Funding

- WHO gets its funding from two main sources: Member States paying their assessed contributions (countries' membership dues), and voluntary contributions from Member States and other partners.

Assessed contributions (AC)

- are a percentage of a country's Gross Domestic Product (the percentage is agreed by the United Nations General Assembly).
- Member States approve them every two years at the World Health Assembly. They cover less than 20% of the total budget.
- Assessed contributions are the dues countries pay in order to be a member of the Organization.
- The amount each Member State must pay is calculated relative to the country's wealth and population.



Voluntary funding

- The remainder of WHO's financing is in the form of voluntary contributions (VC), largely from Member States as well as from other United Nations organizations, intergovernmental organizations, philanthropic foundations, the private sector, and other sources.
- Voluntary contributions come from Member States (in addition to their assessed contribution) or from other partners.
- In recent years, voluntary contributions have accounted for more than three quarters of the Organization's financing.

2. AEFI deaths seen in news, include

1. Anxiety about immunization
2. Vaccine quality defect
3. Coincidental events (not due to the vaccine)

Select the correct answer code:

- A. 1 and 2 only
- B. 1 and 3 only
- C. 2 and 3 only
- D. All of the above

Answer: D

Explanation

AEFI deaths

Adverse events following immunisation (AEFI).

- Any untoward medical occurrence which follows immunization and which does not necessarily have a causal relationship with the usage of the vaccine.
- If not rapidly and effectively dealt with, can undermine confidence in a vaccine and ultimately have dramatic consequences for immunization coverage and disease incidence.
- Reported adverse events can either be true adverse events, i.e. actually a result of the vaccine or immunization process, or coincidental events that are not due to the vaccine or immunization process, but are temporally associated with immunization.

What are the categories of AEFIs?

- Vaccine product-related reaction: inherent property of the vaccine formulation
- Vaccine quality defect-related reaction: deficient quality of the vaccine, diluent and/or delivery equipment from the manufacturer's side

- Immunization error-related reaction: due to inappropriate handling or administration of the vaccine, thus preventable
- Immunization anxiety-related reaction: arising from anxiety about immunization
- Coincidental event: is caused by something other than the vaccine product, immunization error or immunization anxiety

3. Consider the following statements in context to African swine fever

1. As per current information it only affects members of the pig family
2. It is caused by a large DNA virus
3. It cannot be transmitted to humans through contact with pigs or pork.

Select the correct answer code:

- A. 1 and 2 only
- B. 1 and 3 only
- C. 2 and 3 only
- D. All of the above

Answer: D

Explanation

- African swine fever is a viral disease of pigs and wild boar that is usually deadly. There are neither vaccines nor cures. For this reason, it has serious socio-economic consequences in affected countries.
- It is caused by a large DNA virus of the Asfarviridae family
- Healthy pigs and boar usually become infected by:
 - ✓ Contact with infected animals, including contact between free-ranging pigs and wild boar.
 - ✓ Ingestion of meat or meat products from infected animals – kitchen waste, swill feed, infected wild boar (including offal).
 - ✓ Contact with anything contaminated by the virus such as clothing, vehicles and other equipment.
 - ✓ Bites by infectious ticks.

Sign and symptoms

- The typical signs of African swine fever are similar to classical swine fever, and the two diseases normally have to be distinguished by laboratory diagnosis.
- Symptoms include fever, loss of appetite, lack of energy, abortions, internal bleeding, with haemorrhages visible on the ears and flanks. Sudden death may occur.

Prevention and control

- Currently there is no approved vaccine for ASF.

- Prevention This includes ensuring proper disposal of waste food from aircraft, ships or vehicles coming from affected countries and policing illegal imports of live pigs and pork products from affected countries.
- Classic sanitary measures may be employed including early detection and humane killing of animals (with proper disposal of car cases and waste); thorough cleansing and disinfection; zoning/ compartmentalisation and movement controls etc

Is it a public health threat?

- ASF cannot be transmitted to humans through contact with pigs or pork.
- ASF only affects members of the pig family.



4. Consider the following matches:

1. MANAV First 3D printed robot
2. Daksh Bomb Disposal
3. Bandicoot Manual Scavenging

Select the correct answer code:

- A. 1 and 2 only
- B. 2 and 3 only
- C. 3 only
- D. All of the above

Answer: D

5. Consider the following matches in context to Drones categories:

1. Nano Less than 250 grams
2. Small 250 grams to 2 Kg
3. Medium 2 Kg to 25 Kg

Select the correct answer code:

- A. 1 only
- B. 2 and 3 only
- C. 1 and 3 only
- D. None of the above

Answer: A

Explanation

Day 8

1. Consider the following statements

1. Ballistic Missile are similar to rocket engine whereas Cruise missiles similar to jet engine
2. Generally accuracy of cruise missile is low as compare to Ballistic missile
3. Generally Ballistic missiles are long range whereas Cruise missiles are short range missiles .

Select the correct answer code:

- A. 1 and 2 only
- B. 1 and 3 only
- C. 2 and 3 only
- D. All of the above

Answer: B

Explanation

Ballistic Missile	Cruise Missile
propelled only for a brief duration after the launch.	Self-propelled till the end of its flight.
Similar to a rocket engine.	Similar to a jet engine.
Long-range missiles leave the earth's atmosphere and reenter it.	The flight path is within the earth's atmosphere.
Low precision as it is unguided for most of its path and its trajectory depends on gravity, air resistance and Coriolis Force.	Hits targets with high precision as it is constantly propelled.
Can have a very long range (300 km to 12,000 km) as there is no fuel requirement after its initial trajectory.	he range is small (below 500 km) as it needs to be constantly propelled to hit the target with high precision.
Prithvi , Agni	Brahmos missile

2. Consider the following matches :

1. Project Netra Missile tracker
2. Tri Netra Detect debris
3. Sindhu Netra Satellite

Select the correct answer code:

- A. 1 and 3 only
- B. 2 and 3 only
- C. 3 only

D. All of the above

Answer: C

Explanation

Warning System

NETRA

- First indigenously built Airborne Early Warning and Control System (AEW&CS) developed by DRDO.
- This radar system is also mounted on Embraer aircraft(Brazil) which gives 240-degree coverage of airspace.
- Helps to detect and track aircraft, missiles, ships and vehicles.
- The other countries which have developed AEW&C are United States, Russia and Israel.
- Other with similar name

Project Netra

- ISRO
- To detect debris and other hazards to Indian satellites.

Tri Netra

- Indian Railways
- Reduce train accidents by keeping a record of the track maintenance and will also provide better visibility during foggy days.

Sindhu Netra satellite (2021)

- Developed by the Defence Research and Development Organisation (DRDO)
- To monitor activities of both military warships and merchant shipping in the Indian Ocean Region (IOR).
- Also help in carrying out surveillance in specific areas such as the South China Sea or near the Gulf of Aden and the African coast including the Ladakh region and the border areas with Pakistan.
- In the first dedicated mission of its commercial arm NSIL (NewSpace India Limited), the ISRO successfully launched Brazil's earth observation satellite Amazonia-1
- Sindhu Netra' was part of the satellites launched.

3. Consider the following statements in context to Air Independent Propulsion system

- 1. It specifically allows nuclear submarine to operate without the need to access atmospheric oxygen**
- 2. It generates power through the electrolysis of oxygen and hydrogen.**
- 3. Recently DRDO installed indigenous AIP in six submarines under project 75I.**

Select the correct answer code:

- A. 1 and 3 only
- B. 2 and 3 only
- C. 3 only
- D. None of the above

Answer: D

Explanation

Submarines

Air Independent Propulsion (AIP)

Fuel cell AIP

- An electrolytic fuel cell releases energy by combining hydrogen and oxygen, with only water as the waste product.
- The cells are highly efficient, and do not have moving parts, thus ensuring that the submarine has a low acoustic signature

DRDO's AIP

- Innovative Phosphoric Acid Fuel Cell technology
 - ✓ This process is more tolerant of fuel impurities, offers longer life and efficiency, and is much safer, since it does not require hazardous Hydrogen to be stored on board.
- The DRDO's AIP system, once ready, will from 2024-25 onward, be "retrofitted" into six Scorpene submarines that are being built in India under Project 75
- As per various reports the six Project-75I submarines will be powered by AIP systems that the foreign vendor

4. Consider the following statements

1. INS Arihant and INS Chakra both are nuclear submarines
2. INS Arihant is indigenous whereas INS Chakra taken from Russia.
3. Currently INS Chakra carries only conventional weapons .

Select the correct answer code:

- A. 1 and 3 only
- B. 2 and 3 only
- C. 1 and 2 only
- D. All of the above

Answer: D

Explanation

Submarine

INS Arihant

- Nuclear submarines are those that are powered by onboard nuclear reactors whereas conventional submarines generate energy by burning diesel, which requires air indigenously-built nuclear-propelled submarine.
- Capable of carrying submarine-launched ballistic missiles having a range of over 700 km.
- having a range of over 700 km.
- It is its most dependable platform for a second-strike as the other options i.e land-based and air-launched, are easier to detect.
- Marked the completion of India's

Nuclear triad

- Refers to the nuclear weapons delivery via **land, air and sea** i.e. land-based intercontinental ballistic missiles (ICBMs), strategic bombers, and submarine-launched ballistic missiles (SLBMs).
- It belongs to Akula-class nuclear powered Submarine.
- It was **taken from Russia** on a 10 year lease period.
- It carries only conventional weapons and not nuclear tipped missiles.
- It is the second nuclear submarine after the indigenously built INS Arihant.
- INS Chakra 1 was inducted into Indian Navy in the year 1998. □INS Chakra 2 was inducted into Indian Navy in the year 2012.

5. 'Stardust 1.0' often seen in news, is:

- A. Debris tracker
- B. Biofuel based rocket
- C. Fastest internet facility
- D. Track life of a star

Answer: B

Day 9

1. Consider the following statements in context to GAGANYAAN

1. It is India's first permanent Human Space Flight Programme set for 2022
2. The spacecraft will be placed in a low earth orbit of 300-400km
3. CARE experiment is a part of GAGANYAAN programme

Select the correct answer code:

- A. 1 and 3 only
- B. 2 and 3 only
- C. 3 only
- D. None of the above

Answer: B

Explanation

Gaganyaan (GSLV MK III)

India's first Human Space Flight Programme set for 2022.

- The programme will make India the fourth nation in the world to launch a Human Spaceflight Mission, only after the USA, Russia and China
- It aims to send a three-member crew to space for a period of five to seven days.
- The spacecraft will be placed in a low earth orbit of 300-400km.
- The crew will be selected by Indian Air Force (IAF) and ISRO jointly after which they will undergo training for two-three years.

Re-entry & Recovery tech (Tested)

- Came back to Earth after being taken to an altitude of 126 km into space. This is known as Crew module Atmospheric Re-entry Experiment (CARE).

Crew Escape System

- Emergency escape measure to quickly pull the astronaut crew out to a safe distance from launch vehicle.

Environmental Control & Life Support System (ECLSS)

- For humans inside to live comfortably
- Maintains a steady cabin pressure and air composition
- Removes carbon dioxide and other harmful gases
- Controls temperature and humidity

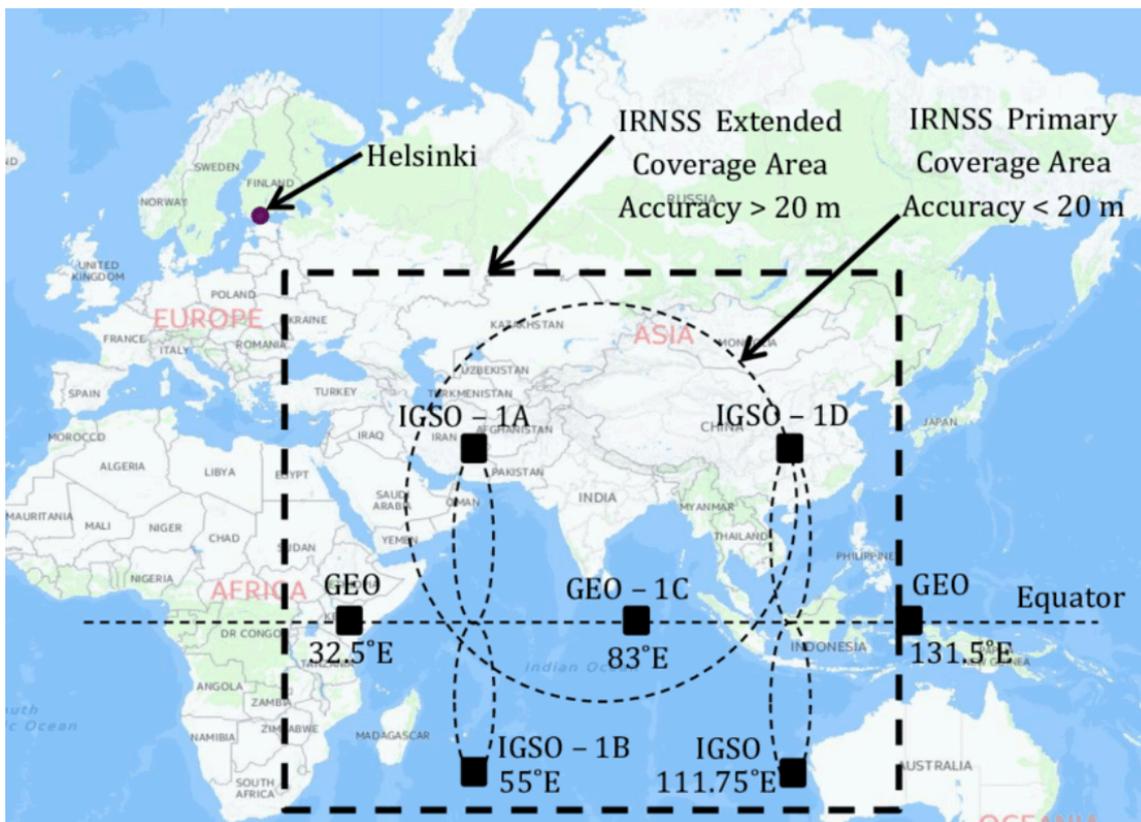
2. India has become the fourth country in the world to have its independent regional navigation satellite system recognised by the International Maritime Organisation (IMO) as a part of the World Wide Radio Navigation System (WWRNS), it means:

- A. All merchant vessels are authorised to use it anywhere in indo-pacific ocean
- B. All merchant vessels and small fishing vessel also authorised to use it
- C. Only merchant vessels are authorized to use it
- D. Only military vessel can use it

Answer: B

Explanation

- The IMO has now accepted IRNSS as an alternative navigation module.
- It was in use only on a pilot basis earlier but now all merchant vessels are authorised to use it, even small fishing vessels.
- ✓ There are at least 2,500 merchant vessels in Indian waters that will now be able to use the system.
- ✓ The IRNSS will be used to assist in the navigation of ships in ocean waters within the area of approximately 1,500 km from the Indian boundary,



3. Consider the following statements

- 1. Solid fuel motor when ignited it burns until it runs out of propellant**
- 2. Liquid fuel engine can be stopped or restarted**
- 3. Hypergolic propellants represent an intermediate group between solid and liquid propellant engines.**

Select the correct answer code:

- A. 1 and 2 only**
- B. 2 and 3 only**
- C. 3 only**
- D. All of the above**

Answer: A

4. Consider the following statements in context to Sun- synchronous orbit (SSO)

- 1. In this orbit satellite always visits the same spot at the same local time**
- 2. The satellite always be in the same 'fixed' position relative to the Sun.**

Select the correct answer code:

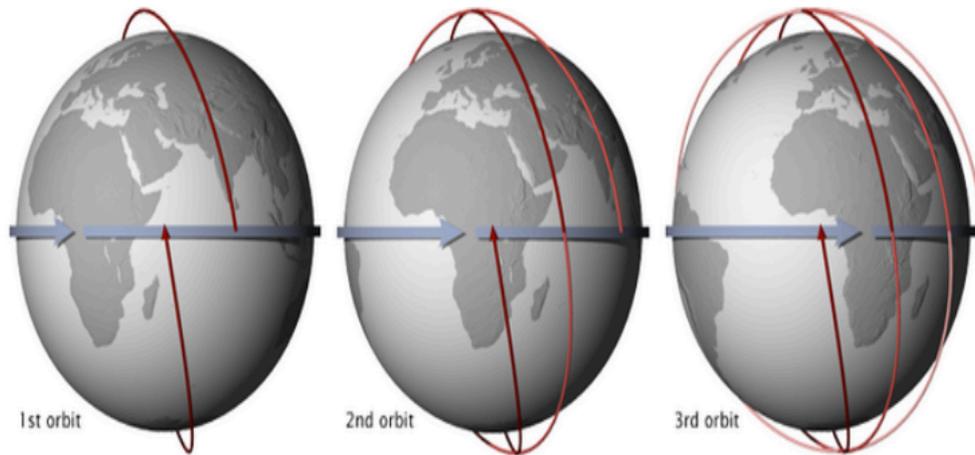
- A. 1 only**
- B. 2 only**
- C. Both 1 and 2**
- D. None of the above**

Answer: C

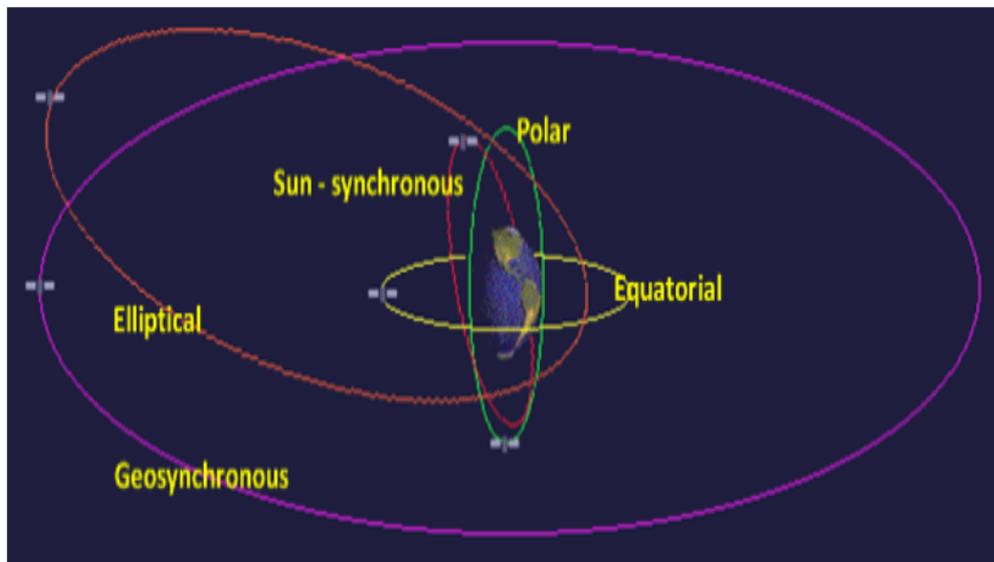
Explanation

Sun-synchronous orbit (SSO)

- Sun-synchronous orbit (SSO) is a particular kind of polar orbit. Satellites in SSO, travelling over the polar regions, are synchronous with the Sun.
- Synchronised to always be in the same 'fixed' position relative to the Sun.
- This means that the satellite always visits the same spot at the same local time – for example, passing the city of Paris every day at noon exactly.
- A satellite in a Sun-synchronous orbit would usually be at an altitude of between 600 to 800 km. At 800 km, it will be travelling at a speed of approximately 7.5 km per second.
- Since there are 365 days in a year and 360 degrees in a circle, it means that the satellite has to shift its orbit by approximately one degree per day.



A Sun-synchronous orbit crosses over the equator at approximately the same local time each day (and night). This orbit allows consistent scientific observations with the angle between the Sun and the



5. Digiboxx an alternative to google drive ,provides 20 GB of free cloud storage launched by:

- A. Facebook
- B. NITI Aayog
- C. C-DAC
- D. Amazon

Answer: B

Explanation

About Digi Boxx

- It provides 20 GB of free cloud storage and 100 GB free space per month.



- It charges only 30 rupees per month for such large storages. DigiBoxx is first in its kind under “Make in India, Store in India” policy of India. It is a Software as a Service product that is in line with the National security and data localisation priorities.
- It has a feature called “InstaShare”. The feature allows users to share high resolution images, videos, large-size documents, PDFs.
- When the user deletes a data from the storage space, he can retrieve it for another sixty days.
- After sixty days, the data gets deleted permanently.
- Currently DigiBoxx is available only to Android users.
- DigiBoxx is highly inexpensive as compared to other cloud storages, especially Google. Google currently offers 15 GB of free storage space. This includes mail, drive, photos and other services. For 100 GB subscription, one has to pay Rs 130 per month.
- DigiBoxx offers special plans of Rs 999 providing up to 50 TB of storage data. This is exclusively for small and medium businesses.

Day 10

1. Consider the following matches :

1. Project 15B Shivalik Class
2. Project 17 Delhi Class
3. Project 17A Nilgiri Class

Select the correct answer code:

- A. 1 and 3 only
- B. 2 and 3 only
- C. 3 only
- D. All of the above

Answer: C

Explanation

Project	Class	Series
Project 15	<input type="checkbox"/> Delhi-class destroyers <input type="checkbox"/> Third-largest warships to be fully designed and built in India, after the Kolkata-class destroyers and the Shivalik-class frigates	<input type="checkbox"/> INS Delhi <input type="checkbox"/> INS Mysore <input type="checkbox"/> INS Mumbai
Project 15 A	<input type="checkbox"/> Kolkata class <input type="checkbox"/> Follow-on of the Project 15 Delhi-class destroyers, but are considerably more capable than them	<input type="checkbox"/> INSKolkata <input type="checkbox"/> INS Kochi <input type="checkbox"/> INS Chennai
Project 15 B	<input type="checkbox"/> Visakhapatnam class <input type="checkbox"/> Improved version of Kolkata <input type="checkbox"/> Can carry 8 Brahmos missile	<input type="checkbox"/> INS Visakhapatnam <input type="checkbox"/> INS Mormugao <input type="checkbox"/> INS Murmugao <input type="checkbox"/> INS Imphal <input type="checkbox"/> INS Porbandar
Project 17	<input type="checkbox"/> Shivalik class <input type="checkbox"/> Multi-role stealth frigates in service	<input type="checkbox"/> INS Shivalik <input type="checkbox"/> INS Satpura <input type="checkbox"/> INS Sahydri
Project 17A	<input type="checkbox"/> Nilgiri-class <input type="checkbox"/> This class will improve upon the earlier class(Project 17) in terms of stealth <input type="checkbox"/> Armed with Barak 8 & Brahmos	7 ships Launched <input type="checkbox"/> INS Nilgiri <input type="checkbox"/> INS Himgiri Other- Under construction

2. Consider the following statements in context to Akash Missile

1. Akash is India's first indigenously produced medium range Air to Air missile that can engage multiple targets from multiple directions
2. It has been designed and developed as part of IGMDP

Select the correct answer code:

- A. 1 only
- B. 2 only
- C. Both 1 and 2
- D. None of the above

Answer: B

Explanation

Akash Missile

- Akash Missile has the capability to engage aerial threats up to the **maximum range of 25 km** and up to an altitude of 20 km, operating at a speed range of 1.8 to 2.5 Mach
- Medium range
- Akash is India's **first indigenously(96%) produced medium range Surface-to-Air missile** that can engage multiple targets from multiple directions
- The missile is supported by the indigenously developed **radar called Rajendra**
- Akash uses ramjet propulsion system which can intercept the target at supersonic speed without deceleration
- Manufactured by Bharat Dynamics Ltd (BDL)
- India is ready to export (April 2021)
- Rajendra is a **multi-function** electronically scanned phased array radar.
- It is the primary sensor at Troop level for **Akash weapon** system.
- It has the capability to perform extensive search in 90, track multiple targets and missiles and also provide command guidance to the missile simultaneously.
- It has an engagement capability of 4 targets with 8 missiles simultaneously.
- It provides a full load tracking capacity of **64 targets** simultaneously.

3. Consider the following statements

- 1. Rajendra radar is a 3D radar capable to track up to 64 targets**
- 2. INDRA is a is a mobile surveillance 2 D radar system**

Select the correct answer code:

- A. 1 only
- B. 2 only
- C. Both 1 and 2
- D. None of the above

Answer: B

Explanation

INDRA Radar

- The Indian Doppler Radar (INDRA) series of 2D radars were developed by India's DRDO for the Army and Air Force.
- The INDRA-I is a mobile surveillance radar for low level target detection while the INDRA-II is for ground controlled interception of targets.
INDRA-I is a 2D mobile surveillance radar for low level target detection.
- The radar is housed in two wheeled vehicles.
- Some of the main features are automated Track While Scan (TWS), integrated IFF and high scan rate for high speed target detection.

4. Consider the following statements

- 1. Helina is a helicopter version of Nag missile**
- 2. Shaurya variant of the K-15 Sagarika.**
- 3. Dhanush is a naval variant of Agni**

Select the correct answer code:

- A. 1 and 2 only
- B. 2 and 3 only
- C. 1 and 3 only
- D. All of the above

Answer: A

5. Consider the following statements in context to Nirbhay

- 1. It is a Long range subsonic ballistic missile**
- 2. It is an Indian version of American Tomahawk**

Select the correct answer code:

- A. 1 only
- B. 2 only
- C. Both 1 and 2
- D. None of the above

Answer: B

Explanation

- Integrated Guided Missile Development Programme (IGMDP)-DRDO
- IGMDP was started in 1983 (Dr APJ Abdul Kalam)
- To attain self-sufficiency in the field of missile technology.

Missiles

- Prithvi Missile
- Akash
- Trishul
- Nag
- Agni (Later separated)

Missile	Type	Range	
Agni I	MRBM	700-1000 Km	Single stage
Agni II	IRBM	2000-2500	Two stage solid fuel Nuclear warhead
Agni III	IRBM	>2500	Two solid stage
Agni IV	IRBM	>3500	Two solid stage
Agni V	ICBM	>5000	Three stage

AGNI-V MISSILE

OPERATIONAL RANGE
5,500-8,000* km

WEIGHT 50,000 kg	SPEED 24 MACH
LENGTH 17.5 m	ENGINE 3 STAGE SOLID
DIAMETER 2 m	NUCLEAR WARHEAD 1,500 kg

TESTS CONDUCTED	AGNI-I	AGNI-II	AGNI-III	AGNI-IV
RANGE	APR 19, 2012 700 km	SEP 15, 2013 2,000 km	JAN 31, 2015 3,500 km	NOV 9, 2015 4,000 km

*5,550 km with full payload of 1.5-tonne warhead, 8,000 km with a lighter warhead
ICBM ZONE Agni-V is classified as an inter-continental ballistic missile (ICBM), having a range of 5,500 km or more. The US, Russia, China, France and Israel already possess such missiles

Missile	Type	Range	
Prithvi I	SRBM	150 Km	Single stage Liquid Replaced with Prahaar
Prithvi II	SRBM	250-350 Km	Single stage liquid
Prithvi III	SRBM	350-600 Km	First-solid Second-Liquid

- Akash Missile has the capability to engage aerial threats up to the maximum range of 25 km and up to an altitude of 20 km, operating at a speed range of 1.8 to 2.5 Mach
- Medium range
- Akash is India's first indigenously(96%) produced medium range Surface-to-Air missile that can engage multiple targets from multiple directions
- The missile is supported by the indigenously developed radar called Rajendra
- Akash uses ramjet propulsion system which can intercept the target at supersonic speed without deceleration

TRISHUL

- It is a short-range (500m to 9 km) quick reaction all-weather surface-to-air missile designed to counter a low-level attack developed by India.
- It was developed by DRDO as a part of
- the Integrated Guided Missile Development Program.
- It can also be used as an anti-sea skimmer from a ship against low flying attacking missiles and also against moving targets



BARAK-8

- The missile has maximum speed of Mach 2 with a maximum operational range of 70 km, which was later increased to 100 km
- It includes Long Range Surface-to-Air Missile (LR-SAM) and Medium Range Surface-to-Air Missile (MRSAM)
- 360 degree coverage
- Two stage
- Jointly developed by DRDO India and M/s Israel Aerospace Industry (IAI).

- Capability to penetrate in deep water/land to intercept all types of aerial targets (like Subsonic & Supersonic Missiles, Fighter Aircraft, Maritime Patrolling Aircraft (MPA), Helicopter and Sea Skimming Missiles).

Anti Tank Missiles

- Nag
 - ✓ This is guided, anti-tank, fire, and forget type of missile.
 - ✓ This missile is low-weighted as its body is made of fiber.
 - ✓ The most striking feature is that its smoke is invisible – hence it can not be understood from where the missile is coming or targetted.
 - ✓ Range of 4-8km
- HELINA (HELicopter launched NAg)
 - ✓ It is an anti-tank guided missile integrated into Dhruv Helicopters.
 - ✓ It has a range of 7-8km.
- Amogha 1
 - ✓ Anti-tank guided missile of the range 2.8km.

Submarine-launched ballistic missiles (SLBM)

- K series
 - ✓ It consists of K4 and Sagarika (K15). K4 is still being developed.
 - ✓ It is named to honor Dr. A.P.J Abdul Kalam. It is a nuclear missile.
 - ✓ K4 is a nuclear-capable intermediate-range ballistic missile that was developed and tested by DRDO in January 2020.
 - ✓ Once inducted, these missiles will be included in INS Arihant which belongs to the class of indigenous ballistic missile nuclear submarines
- Sagarika
 - ✓ Being integrated with India's nuclear powered Arihant-class submarine.
 - ✓ Range - 700 km (Short to Medium)
- Shaurya
 - ✓ A variant of the K-15 Sagarika.
 - ✓ Submarine- nuclear-capable missile.
 - ✓ Aims to enhance India's second-strike capability
- Dhanush
 - ✓ It is the naval variant of Prithvi – called Dhanush.
 - ✓ Short range ballistic missile

- ✓ Single solid stage
- ✓ Carry Nuclear Warheads

Air to air

- Astra
 - ✓ Beyond-visual-range (>37 Km) air-to-air missile using a solid- propellant.
 - ✓ In terms of size and weight, one of the smallest weapon developed by the DRDO.
 - ✓ Active radar seeker to find targets.
- Designed to intercept and destroy enemy aircraft at supersonic speeds at a range of 80 km.
- Novator K-100 (Russia)
 - ✓ Medium Range air-to-air missile
 - ✓ Range – 300–400 km
 - ✓ Speed- Mach 3.3
- MICA
 - ✓ It is a Beyond Visual Range, air-to-air missile (upto 80km)
 - ✓ India purchased 450 MICAs from European missile major MBDA as part of the Mirage 2000 upgrade deal from France in 2012 for \$1.23 billion
 - ✓ The MICA will be mounted on the 36 Rafale combat jets that India is purchasing from France

Cruise missile

- Brahmos missile (India & Russia)-2.8 Mach
 - ✓ The name Brahmos has been taken as a combination of the two rivers Brahmaputra and Moskva
 - ✓ It is a medium-range supersonic cruise missile that can be launched from submarine, ships, aircraft, or land.
 - ✓ It is the fastest supersonic cruise missile in the world.
 - ✓ Its range was initially capped at 290 km as per obligations of the Missile Technology Control Regime (MTCR). Since India's entry into MTCR, the range has been extended to 450 km and the plan is to increase it to 600km.
 - ✓ It also provides a much-desired capability to strike from large stand-off ranges with pinpoint accuracy by day or night and in all weather conditions.
- Brahmos missile (India & Russia)
 - ✓ Two stage (Solid & Liquid Ramjet).
- Brahmos II
 - ✓ Hypersonic (7 Mach)
- Nirbhay



- ✓ Long range (1000 Km) subsonic (0.6-0.7 Mach) cruise missile
- ✓ Launch- Multiple platform
- ✓ Conventional & Nuclear warhead
- ✓ Two solid stage
- ✓ Indian version of American Tomahawk