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DAY: 41

**QUESTIONS
with ANSWER HINTS**

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QUESTIONS

1. Consider the following statements about Anti-Satellite (ASAT) missile:

1. It is a part of Mission Shakti which is a joint program of the Defence Research and Development Organisation (DRDO) and the Indian Space Research Organisation (ISRO).
2. For a country to have such a capability, it must be a member of Non-Proliferation Treaty.

Which of the above statements is/are correct?

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

2. IndSpaceEx, seen in news recently refers to:

- (a) India's first space warfare exercise.
- (b) Exercise to intercept a satellite in outer space based on indigenous technology.
- (c) DRDO's exercise to clean space debris created by Anti-Satellite Missile Test.
- (d) First UN-crewed experimental flight for Indian Human Spaceflight Programme.

3. Chandrayaan-2 is India's mission to explore the lunar surface. In this context, consider the following statements:

1. It is a completely indigenous mission.
2. It will be the first mission to the far side of the moon.
3. If successful, India will become the second country to soft-land on moon.

Which of the above statements is/are correct?

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

4. Consider the following statements about the term "Eugenics" :

1. It is the science of improving the human species.
2. It encourages healthy, superior people to reproduce and discouraged the reproduction of the mentally challenged or anyone who fell outside the social norm.

Which of the above statements is/are correct?

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

5. What is TEMPLATES recently seen in news?

- (a) A programme to investigate how new stars are born.
- (b) NASA's mission to study the Trojan asteroids of Jupiter
- (c) A study to observe and understand the Universe.
- (d) A programme to study the effect of solar flares on the communication system

6. Vikram and Pragyan, seen in the news recently are:

- (a) Long Range Inter-Continental Ballistic Missiles (ICBMs) developed by DRDO.
- (b) Lander and Rover of ISRO's Chandrayaan-2 mission.
- (c) Indigenously built Light Combat Aircrafts by HAL.
- (d) Altitude long-endurance Unmanned Aerial Vehicles (UAVs) by DRDO.

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

1. It is an algorithm that performs an unconventional function.
2. It has developed by scientists from Israel Institution of Technology.

Select the correct answer using the code given below:

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

8. Consider the following statements regarding Hydrothermal Carbonisation Technology:

- 1. It can convert wet municipal solid waste to biofuel, soil amendment, and absorbents.
- 2. This technology can be used to generate energy from solid waste with low moisture content.

Which of the above statement is/are correct?

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

9. Consider the following statements about food fortification in India:

- 1. It is the addition of key vitamins and minerals to staple foods such as rice, milk and salt.

- 2. The manufacturers of the fortified food are required to provide a quality assurance undertaking.
- 3. Packaging and labelling of the fortified food must state the food fortificant added, logo and the tagline "Sampoorna Poshan Swasth Jeevan".

Which of the above statements are correct?

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

10. Which of the following statements is correct regarding Samudrayaan Project?

- (a) It is an ocean project of ISRO to carry various projects in deep ocean.
- (b) It is a pilot project of the Ministry of Earth Sciences' for deep ocean mining for rare minerals.
- (c) It is a Ministry of Home project to strengthen the maritime security.
- (d) It is a project under Ministry of defence to develop indigenous nuclear powered submarine.

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ANSWER HINTS

Answer Key

Q. 1 (a)	Q. 3 (c)	Q. 5 (a)	Q. 7 (c)	Q. 9 (d)
Q. 2 (a)	Q. 4 (c)	Q. 6 (b)	Q. 8 (a)	Q. 10 (b)

1. Correct Option: (a)

Explanation:

- **Statement 2 is incorrect:** For a country to have such a capability, membership of NPT is not mandatory.

Supplementary notes:

Mission Shakti

- Mission Shakti is a joint program of the Defence Research and Development Organisation (DRDO) and the Indian Space Research Organisation (ISRO).
- As part of the mission, an anti-satellite (A-SAT) weapon was launched and targeted an Indian satellite which had been decommissioned. Mission Shakti was carried out from DRDO's testing range in Odisha's Balasore.
- For a country to have such a capability, membership of NPT (Non-Proliferation Treaty) is not mandatory.

Significance:

- India is only the 4th country to acquire such a specialized and modern capability, and the entire effort is indigenous. Till now, only the US, Russia and China had the capability to hit a live target in space.
- Communication satellites, earth observation satellites, experimental satellites, navigation satellites, along with satellites meant for scientific research and exploration, academic studies and other small satellites. India's space program is a critical backbone of India's security, economic and social infrastructure.
- The test was done to verify that India has the capability to safeguard our space assets.
- It is the Government of India's responsibility to defend the country's interests in outer space.

2. Correct Option: (a)

Explanation:

- **Option (a) is correct:** IndSpaceEx refers to India's first space warfare exercise.

Supplementary notes:

IndSpaceEx

- The country's armed forces, along with Defense Research and Development Organization (DRDO) and other stakeholders conducted IndSpaceEx- India's 1st ever space warfare exercise on July .
- The tri-Service integrated defense staff under the Ministry of Defense will conduct IndSpaceEx in the backdrop of China's continuing efforts to enhance its space and counter-space capabilities.
- The exercise would access threats in space from a military perspective and India's current capability in space.
- IndSpaceEx will take stock of the military space assets of the United States, Russia and China, and deliberate over how to plug the gap.
- The exercise took place five months after the successful testing of an anti-satellite (A-Sat) interceptor missile that destroyed a low-earth orbit satellite.
- One of the motives of this space warfare exercise is to draft a joint space doctrine for future battles in outer space

3. Correct Option: (a)

Explanation:

- **Statement 2 is incorrect:** Chandrayaan-2 will be the first mission to explore the Moon's South Polar Region.

- **Statement 3 is incorrect:** If successful, India will become only the **fourth** country to make a soft landing on the lunar surface, after the former Soviet Union, the US and China.

Supplementary notes:

Chandrayaan-2

- **Chandrayaan-2 is a completely indigenous lunar mission to the Moon's South Polar Region.**
- It will be launched from the second launch pad at Satish Dhawan Space Centre, Sriharikota using GSLV Mk-III. **If successful, India will become only the fourth country to make a soft landing on the lunar surface, after the former Soviet Union, the US and China.**
- Chandrayaan 2 attempts to foster a new age of discovery, increase our understanding of space, stimulate the advantage of technology, promote global alliances and inspire a future generation of explorers and scientists.
- The mission will help us gain a better understanding of origin and evolution of the moon by conducting detailed topographic studies, comprehensive mineralogical analyses and a host of other experiments on the lunar surface.
- **The objectives of the mission are:**
 - Extensive mapping of the lunar surface to study variations in lunar surface composition which is essential to trace back the origin and evolution of earth
 - Further studies on the extent of water molecule distribution (discovered by Chandrayaan-1) on/below the surface and in the tenuous lunar exosphere to address the origin of water on the moon
 - Exploring the lunar South Pole because: (i) it remains in shadow and is much larger than the North Pole (ii) there is a possibility of the presence of water in the permanently shadowed areas around it (iii) it has craters that are cold traps and contain a fossil record of early solar system.
- The mission attempted to soft-land the lander - Vikram and rover – Pragyan in a high plain between two craters at an altitude of about 70°S
- Vikram Lander is named after Dr. Vikram Sarabhai and is designed to function for 1 lunar day (i.e. 14 earth days). It has the capability to communicate with Indian Deep Space Network (IDSN) near Bangalore as well as with the orbiter and rover.

- Pragyan ('wisdom' in Sanskrit) Rover is a 6-wheeled robotic vehicle that can communicate only with the lander and leverages solar energy for its functioning.

4. Correct Option: (c)

Explanation:

- **Both statements are correct**

Supplementary notes:

Eugenics

- **Eugenics is the science of improving the human species by selectively mating people with specific desirable hereditary traits.**
- It aims to reduce human suffering by "breeding out" disease, disabilities and so-called undesirable characteristics from the human population.
- **Eugenics encouraged people of so-called healthy, superior stock to reproduce and discouraged reproduction of the mentally challenged or anyone who fell outside the social norm.**
- Modern eugenics, more often called human genetic engineering, has come a long way scientifically and ethically and offers hope for treating many devastating genetic illnesses. Even so, it remains controversial.
- While eugenic principles have been practiced as early as ancient Greece, the contemporary history of eugenics began in the early 20th century, when a popular eugenics movement emerged in the United Kingdom,
- A major criticism of eugenics policies is that, regardless of whether negative or positive policies are used, they are susceptible to abuse because the genetic selection criteria are determined by whichever group has political power at the time.
- Negative eugenics in particular is criticized by many as a violation of basic human rights, which include the right to reproduce.
- Another criticism is that eugenics policies eventually lead to a loss of genetic diversity, thereby resulting in inbreeding depression due to a loss of genetic variation.

5. Correct Option: (a)

Explanation:

- **Option (a) is correct:** TEMPLATES is a NASA's programme to investigate how new stars are born.



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Supplementary notes:

Gravitational Lensing

- NASA is planning to investigate how new stars are born by using James Webb Space Telescope. For this, they will take the help of a natural phenomenon called "gravitational lensing".
- The programme is called **Targeting Extremely Magnified Panchromatic Lensed Arcs and Their Extended Star Formation, or TEMPLATES**.
- The phenomenon of Gravitational Lensing occurs when a huge amount of matter, such as a massive galaxy or cluster of galaxies, creates a gravitational field that distorts and magnifies the light from objects behind it, but in the same line of sight
- The large celestial objects will magnify the light from distant galaxies that are at or near the peak of star formation. These celestial object act as natural, cosmic telescopes; they are called gravitational lenses.

6. Correct Option: (b)

Explanation:

- **Option (b) is correct**

Supplementary notes:

Chandrayaan-2

- Chandrayaan-2 is a completely indigenous lunar mission that will boldly go where no country has ever gone- the Moon's South Polar Region.
- The mission will help us gain a better understanding of origin and evolution of moon by conducting detailed topographic studies, comprehensive mineralogical analyses and a host of other experiments on the lunar surface.
- **The aim of the mission is to attempt soft landing of the lander - Vikram and rover – Pragyan in a high plain between two craters at altitude of about 70°S**
- **Vikram Lander is named after Dr. Vikram Sarabhai and is designed to function for 1 lunar day (i.e. 14 earth days). It has the capability to communicate with Indian Deep Space Network (IDSN) near Bangalore as well as with the orbiter and rover.**
- **Pragyan ('wisdom' in Sanskrit) Rover is a 6-wheeled robotic vehicle can communicate only with the lander and leverages solar energy for its functioning.**

7. Correct Option: (c)

Explanation:

- **Both statements are correct**

Supplementary notes:

Ramanujan Machine

- **Scientists from Technion — Israel Institute of Technology have developed a concept and have named it Ramanujan Machine, after the Indian mathematician.**
- **It is not really a machine but an algorithm, and performs a very unconventional function.**
- With most computer programs, humans input a problem and expect the algorithm to work out a solution.
- With the Ramanujan Machine, it works the other way round. Feed in a constant, for example well-known pi, and the algorithm will come up with a equation involving an infinite series whose value, it will propose, is exactly pi.

Why named after Ramanujan?

- The algorithm reflects the way Srinivasa Ramanujan worked during his brief life (1887-1920). With very little formal training, he engaged with the most celebrated mathematicians of the time, particularly during his stay in England (1914-19), where he eventually became a Fellow of the Royal Society and earned a research degree from Cambridge.
- Throughout his life, Ramanujan came up with novel equations and identities —including equations leading to the value of pi — and it was usually left to formally trained mathematicians to prove these.
- In 1987, two Canadian brothers proved all 17 of Ramanujan's series for $1/\pi$; two years earlier, an American mathematician and programmer had used one of these formulas to calculate pi up to over 17 million digits, which was a world record at the time (Deka Baruah, Berndt & Chan).

8. Correct Option: (a)

Explanation:

- **Statement 2 is incorrect:** This technology can be used to generate energy from solid waste with high moisture content.

Supplementary notes:

Hydrothermal Carbonisation Technology

- A research team at IIT Kharagpur has developed a technology which can generate energy from solid waste with high moisture content.
- **The new technology - Hydro Thermal Carbonization (HTC) - can convert wet municipal solid waste to biofuel, soil amendment and absorbents.**
- The moisture in the waste is used to the advantage of the process which uses water for the reaction. The biofuel generated as the recovered output can help curb air pollution.
- The technology can be used by the civic bodies to effectively manage solid waste.
- Once the organic waste is entered into the process, the outputs generated are all usable.
- All outputs can be used for one purpose or the other, including the water which can be converted to biogas or methane.

9. Correct Option: (d)

Explanation:

- **All statements are correct**

Supplementary notes:

Food fortification in India

- Fortification is the **addition of key vitamins and minerals** such as iron, iodine, zinc, Vitamin A & D **to staple foods** such as rice, milk and salt to improve their nutritional content. These nutrients may or may not have been originally present in the food before processing.
- India's National Nutritional strategy, 2017, had listed food fortification as one of the interventions to address anaemia, vitamin A and iodine deficiencies apart from supplementation and dietary diversification.
- Malnutrition is a prominent issue in India — 38 per cent of children under five years are stunted i.e. too short for their age, 36 per cent are underweight and 21 per cent are wasted i.e. too thin for their height, which is a sign of acute under-nutrition.
- 59 per cent women and 53 per cent children are anaemic.
- The **Food Safety and Standards Authority of India (FSSAI)** made standards for fortification in the Food Safety and Standards (Fortification of Foods) Regulations, 2018, for five staples — **wheat, rice, milk, oil and salt.**
- The standards are given for **wheat and rice fortification with iron, folic acid, and vitamin B12**, the deficiency of which cause anaemia. Besides, **other B vitamins** are also added.

- Standards are provided for **oil and milk fortification with vitamin A and vitamin D**, the deficiency of which cause night blindness and rickets respectively; **and salt fortification** with iron along with iodine to prevent goitre.
- The food companies who wish to add micro-nutrients to these staples sold in the packages will also have to follow the standards set by FSSAI. If the product is fortified according to the standards, the package **will carry an F+ label.**
- The Union Ministries of Women and Child Development, Human Resource Development and Consumer Affairs, Food and Public Distribution have mandated the **distribution of fortified wheat flour, rice, oil and double fortified salt in their schemes** — Integrated Child Development Services (ICDS) and Mid-Day Meal (MDM) and Public Distribution System (PDS) respectively.

Some of the important features of **Food Safety and Standards (Fortification of Foods) Regulations, 2018** are as follows:

- It prescribes the standards of addition of micro-nutrients for the purpose of food fortification.
- The **manufacturers of the fortified food are required to provide a quality assurance undertaking.**
- Packaging and labelling of the fortified food **must state the food fortificant added, logo and the tagline "Sampoorna Poshan Swasth Jeevan".**
- It should be in compliance to the Food Safety and Standards (Packaging and Labelling) Regulations, 2011.

10. Correct Option: (b)

Explanation:


- **Option (b) is correct:** The 'Samudrayaan' is a pilot project of the Ministry of Earth Sciences' for deep ocean mining for rare minerals.

Supplementary notes:

Samudrayaan

- The 'Samudrayaan' is a pilot project of the Ministry of Earth Sciences for deep ocean mining for rare minerals.
- The project proposes to send a submersible vehicle with three persons to a depth of about 6000 metres to carry out deep underwater studies.
- The indigenously developed vehicle is capable of crawling on the sea bed at a depth of six kilometre for 72 hours.

- Similar to ISRO's plan to carry persons on a space mission, NIOT has undertaken Samudrayaan. The ¹ 200 crore project proposes to carry three persons in a submersible vehicle to a depth of 6000 metres under sea for various studies.
- The success of the "Samudrayaan" will help India join the league of developed nations in exploration of minerals from oceans.
- India has been allocated a site of 75,000 sq km in the Central Indian Ocean Basin by the International Sea Bed Authority for exploration of polymetallic nodules from seabed.
- The estimated resource of polymetallic nodules is about 380 million tonnes, containing 4.7 million tonnes of nickel, 4.29 million tonnes of copper and 0.55 million tonnes of cobalt and 92.59 million tonnes of manganese.



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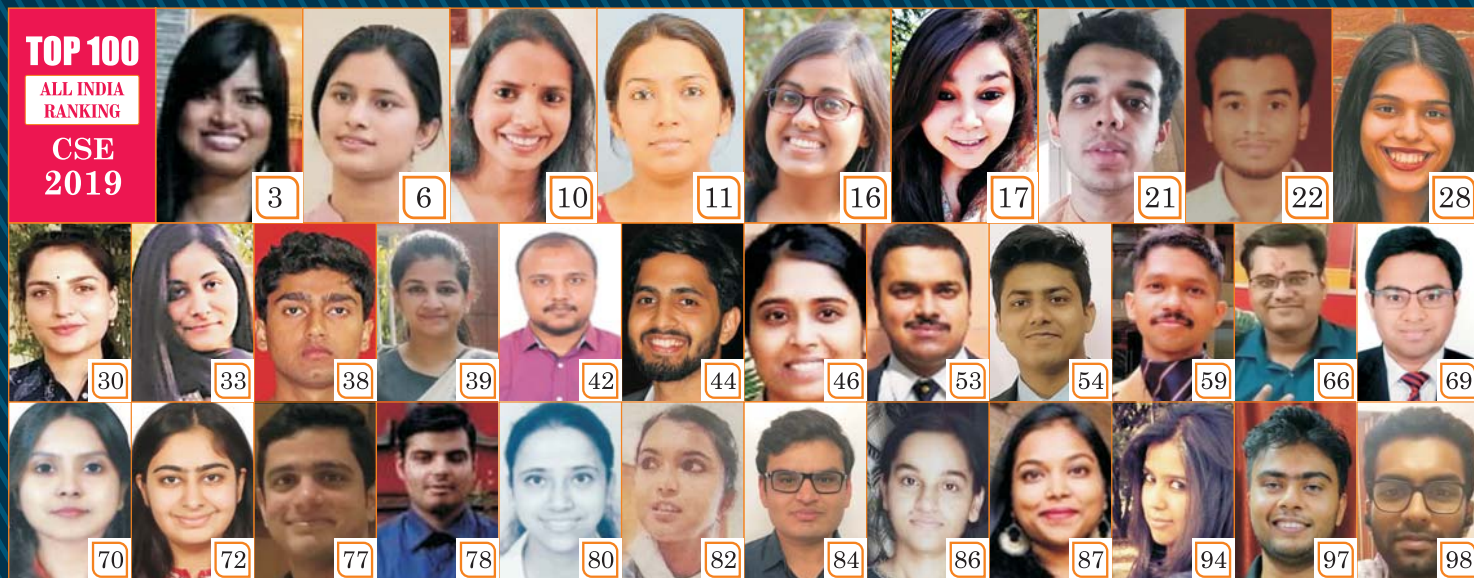
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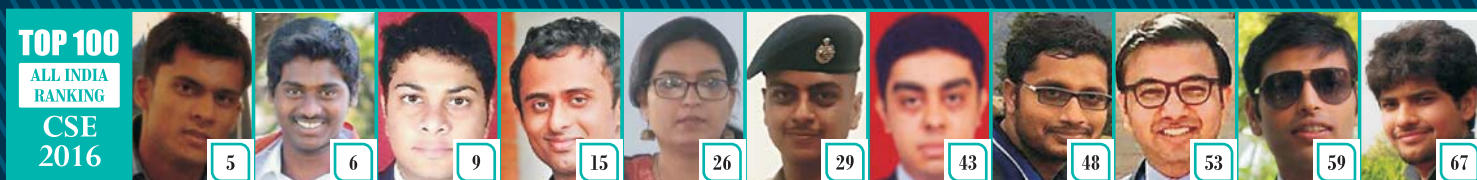
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