



*Drishti IAS Presents...*



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## SCIENCE & TECHNOLOGY

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1. Ans: C

Exp:

- Artificial Neural Network is a vital subset of machine learning that **helps computer scientists in their work on complex tasks, such as, strategizing, making predictions, and recognizing trends.**
  - ◆ Hence, **statement 1 is correct.**
- It is a computational model that mimics the way nerve cells work in the human brain.
  - ◆ It is **designed to simulate the way the human brain analyzes and processes information.**
  - ◆ Hence, **statement 2 is correct.**

2. Ans: B

Exp:

- Corbevax is India's first indigenously developed Receptor Binding Domain (RBD) protein sub-unit vaccine against Covid, with two doses scheduled 28 days apart. **Hence, statement 1 is correct.**
- It can be **stored at 2-8 degrees Celsius**, which is best suited for India's requirements. **Hence, statement 2 is not correct.**
- Corbevax is a "recombinant protein sub-unit" vaccine, which means it is made up of a specific part of SARS-CoV-2: the spike protein on the virus's surface. Hence, **statement 3 is correct.**

3. Ans: C

Exp:

- The red-and-green glowing snailfish was identified during dives among iceberg habitats off the coast of eastern Greenland.
- Snailfish that live in an iceberg habitat in Greenland can survive in icy Arctic waters due to the presence of antifreeze proteins in their bloodstream. **Hence, statement 1 is correct.**
- Animals that dwell in tropical environments often exhibit **biofluorescence**. The capacity to absorb solar energy and remit it in a different color more frequently in arctic water than other species.
- **Solar energy** is a necessary ingredient for **biofluorescence**. Snailfish get their shine by converting **blue wavelengths into green, red or yellow light.** Hence, **statement 2 is correct.**

4. Ans: B

Exp:

- Satellites in **geostationary orbit** are approximately **35,786 kilometers** above the Earth's surface. This distance is roughly **42,164 kilometers** from the **core of the Earth**. This distance places it in the category of **high Earth orbit.** Hence **statement 1 is not correct.**

- The **geostationary orbit** is a special case of **geosynchronous orbit** in which a satellite moves in a **circular geosynchronous orbit** in the **equatorial plane** in the direction of the **earth's rotation**.
- The satellite in this orbit has the **same orbital period as the rotation of the earth around its axis**, making it appear stationary relative to a fixed spot on the earth. This allows them to provide constant coverage of an area. **Hence, statement 2 is correct.**

5. Ans: A

Exp:

- A hydrogen fuel cell is an electrochemical device that **converts hydrogen into electrical energy.** Hence, **statement 1 is not correct.**
- They produce no tailpipe emissions (emission of gaseous and particulate pollutants) and only emit water vapour and warm air. **Hence, Statement 2 is correct.**
- They are more efficient than internal combustion engine vehicles.
  - ◆ Hydrogen FCEVs have an advantage over battery powered EVs in terms of refuelling time; **hydrogen can be refilled in a fuel cell vehicle in a matter of minutes, nearly as fast as an internal combustion engine can be refilled with fossil fuels.** Hence, **statement 3 is not correct.**

6. Ans: C

Exp:

- **Indian Energy Exchange:**
  - ◆ It is the first and largest energy exchange in India providing a nationwide, automated trading platform for physical delivery of electricity, Renewable Energy Certificates and Energy Saving Certificates.
  - ◆ The exchange platform enables efficient price discovery and increases the accessibility and transparency of the power market in India while also enhancing the speed and efficiency of trade execution.
  - ◆ It is a **publicly listed company with National Stock Exchange (NSE) and Bombay Stock Exchange (BSE).** Hence, **statement 1 is correct.**
  - ◆ It is **approved and regulated by Central Electricity Regulatory Commission (CERC)** and has been operating since 2008. **Hence, statement 2 is correct.**
- **Mission:**
  - ◆ To leverage technology and innovation to establish transparent and efficient energy marketplaces for delivering affordable, reliable energy to consumers.

7. Ans: D

Exp:

- The infection has been named 'tomato flu' because of the red, painful blisters that appear on a patient's body and gradually enlarge to the size of a tomato.
- This flu is a **self-limiting one and there is no specific drug for this.**
  - ◆ Hence, statement 1 is correct.
- The infectious disease is **caused by intestinal viruses and is rare in adults** as they usually have immune systems strong enough to defend them from the virus.
  - ◆ Hence, statement 2 is correct.
- The treatment for tomato flu is **similar to the treatment of chikungunya, dengue and hand, foot, and mouth disease.**
  - ◆ Patients are advised to **isolate, rest, plenty of fluids, and hot water sponge for the relief of irritation and rashes.**
  - ◆ Hence, statement 3 is correct.
- Hence, option D is correct.

8. Ans: D

Exp:

- A nova is an astronomical event in **which a strong explosion occurs temporarily on the stellar (Pertaining to Stars) surface, increasing the brightness by hundreds to millions of times, then slowly darkening over weeks or months. Hence, statement 1 and statement 2 are correct.**
- It occurs in a **binary system consisting of a white dwarf and a main sequence star. Hence, statement 3 is correct.**
  - ◆ A binary star system occurs when two stars both orbit around a common center of mass.
    - The brighter star is officially classified as the primary star, while the dimmer of the two is the secondary.
  - ◆ White dwarfs are stars that have burned up all of the hydrogen they once used as nuclear fuel.
    - Such stars have very high density. A typical white dwarf is half the size of our Sun and has a surface gravity 1,00,000 times that of Earth.

9. Ans: C

Exp:

- **OTT or over-the-top platforms** are audio and video hosting and streaming services which started out as content hosting platforms.
- The Government has notified the **Information Technology (Intermediary Guidelines and Digital Media**

**Ethics Code) Rules 2021** to regulate **OTT platforms. Hence, statement 1 is correct.**

- These platforms offer a range of content and use **artificial intelligence** to suggest to users the content they are likely to view based on their past viewership on the platform.
- The rules establish a **soft-touch self-regulatory architecture** with a **Code of Ethics** and **three-tier grievance redressal mechanism** for **OTT platforms. Hence, statement 2 is correct.**
- A few examples are Netflix, Disney+, Amazon Prime Video etc.

10. Ans: D

Exp:

- A cyber-attack is a **malicious act that seeks to damage data, steal data, or disrupt digital life in general. It includes computer viruses, data breaches, Denial of Service (DoS) attacks, and other attack vectors. Hence, statement 1 is correct.**
- **There are different types of cyber-attacks like,**
  - ◆ **Malware:** Malware short for malicious software refers to any kind of software that is designed to cause damage to a single computer, server, or computer network. Ransomware, Spy ware, Worms, viruses, and Trojans are all varieties of malware.
  - ◆ **Phishing:** It is a method of trying to gather personal information using deceptive e-mails and websites.
  - ◆ **Trojan:** Trojans are dangerous malware that can steal money from mobile users' bank accounts by disguising the malicious application as a legitimate app to lure unsuspecting people into installing the malware. **Hence, statement 2 is correct.**
- A study by cyber security firm Kaspersky warns of an **increase in cyberattacks on Android and iOS devices in the Asia Pacific (APAC) as more people switch to mobile banking in the region. Hence, statement 3 is correct.**

11. Ans: D

Exp:

- **India's first commercial Space Situational Awareness (SSA) Observatory** will be set up in the **Garhwal region of Uttarakhand. Hence, statement 1 is correct.**
  - ◆ The observatory will be set up by Digantara, a Bengaluru-based space sector start-up.
- The observatory will be the first-of-its-kind in the region, set up to augment the start-up's SSA capabilities.
- It will be strategically positioned to serve global space traffic management operations.



- It will assist in tracking any activity in space including that of space debris and military satellites hovering over the region.
  - ◆ At present, the US is a dominant player in monitoring space debris.
- The observatory will bring value to the nation by serving as an essential data source for advancing knowledge of the realm of space.
- It will be able to supplement its space-based sensors in their mission to **monitor satellites and debris in orbits ranging from Low Earth Orbit (LEO) to Geosynchronous Earth Orbit (GEO)**. Hence, statement 2 is correct.

12. Ans: B

Exp:

- **Facial recognition is an algorithm-based technology.** It creates a digital map of the face by identifying and mapping an individual's facial features, which it then matches against the database to which it has access.
  - ◆ Hence, statement 1 is correct.
- In the **Automated Facial Recognition System (AFRS)**, the **large database** (containing photos and videos of peoples' faces) **is used to match and identify the person**.
  - ◆ Image of an unidentified person, taken from CCTV footage, is compared to the existing database using Artificial Intelligence technology, for pattern-finding and matching.
  - ◆ Hence, statement 2 is correct.
- The facial recognition system works primarily by **capturing the face & its features through the camera** and then using various kinds of software to reconstruct those features.
  - ◆ The captured face along with its features is **stored into a database, which can be integrated with any kind of software** that may be used for security purposes, banking services, etc.
  - ◆ Hence, statement 3 is not correct.

13. Ans: C

Exp:

- CSIR has a pan-India presence and has a dynamic network of 37 national laboratories, 39 outreach centres, 3 Innovation Complexes and 5 units.
  - ◆ It is the largest research and development (R&D) organisation in India.
  - ◆ Hence, statement 1 is correct.
- It is ranked 37<sup>th</sup> among 1587 government institutions worldwide and is the only Indian organization among the top 100 global government institutions, according to the Scimago Institutions Ranking World Report 2021.

- The Prime Minister is the President (Ex-officio) and the Union Minister of Science and Technology is the Vice President (Ex-officio).

◆ Hence, statement 2 is correct.

- Hence, option C is correct.

14. Ans: D

Exp:

- Liquid Nano Urea is in the form of a nanoparticle. It is a nutrient (liquid) to provide nitrogen to plants as an alternative to the conventional urea.
- It is **Indigenous Urea, introduced firstly by the Indian Farmers Fertiliser Cooperative Limited (IFFCO)** for farmers across the world.
  - ◆ Hence, statement 1 is correct.
- It is developed to **replace conventional urea and it can curtail the requirement of the same by at least 50%**.
  - ◆ Hence, statement 2 is not correct.
- Hence, option D is correct.

15. Ans: B

Exp:

- A blockchain is a form of **Decentralised distributed database or ledger that is shared among the nodes of a computer network**.
  - ◆ The innovation of a blockchain is that it **guarantees the fidelity and security of a record of data and generates trust without the need for a trusted third party**. Hence, statement 1 is not correct.
- **Estonia, the world's blockchain capital, is using blockchain infrastructure** to verify and process all e-governance services offered to the general public. Hence, statement 2 is correct.
- Blockchains are best known for their crucial **role in cryptocurrency systems, such as Bitcoin, for maintaining a secure and decentralized record of transactions**. Hence, statement 3 is correct.

16. Ans: C

Exp:

- It was launched in 2018 by the **Ministry of Science and Technology** with an outlay of **Rs. 3,660.00 crore for a period of five years** to encourage innovation in new age technologies.
- It covers the entire India which includes Central Ministries, State Governments, Industry and Academia. Hence, statement 1 is not correct.
- The NM-ICPS is a **comprehensive Mission which would address technology development, application development, human resource development & skill enhancement, entrepreneurship and start-up**



development in Cyber Physical System (CPS) and associated technologies.

- ◆ The Mission aims **at the establishment of 15 Technology Innovation Hubs (TIH)**, six Application Innovation Hubs (AIH) and four Technology Translation Research Parks (TTRP).
- ◆ These Hubs & TTRPs will connect to **Academics, Industry, Central Ministries and State Government in developing solutions** at reputed academic, R&D and other organizations across the country in a hub and spoke model.
- ◆ The Hubs & TTRPs have **four focused areas along which the Mission implementation** would proceed, namely:
  - Technology Development,
  - HRD & Skill Development,
  - Innovation, Entrepreneurship & Start-ups Ecosystem Development, and
  - International Collaborations. Hence, **statement 2 is correct.**
- ◆ **Its application includes:**
  - **Driverless cars** that communicate securely with each other on smart roads,
  - **Sensors in the home to detect changing health conditions**
  - Improving agricultural practices and **enabling scientists to address issues arising out of climate change**, etc, Hence, **statement 3 is correct.**
- Therefore, **option C is correct.**

17. Ans: D

Exp:

- Electromagnetic fields are a **combination of invisible electric and magnetic fields of force**. Hence, **statement 1 is correct.**
  - ◆ Electric fields are **created by differences in voltage**: the higher the voltage, the stronger will be the resultant field.
- As the natural source of EMF, they are **present everywhere in our environment but are invisible to the human eye.**
  - ◆ **Electric fields** are produced by **the local build-up of electric charges in the atmosphere associated with thunderstorms**. Hence, **statement 2 is correct.**
- As per the Government, **EMF emissions** from Mobile towers are non-ionizing Radio frequencies having very minuscule power and are **incapable of causing any adverse environmental impact**. Hence, **statement 3 is correct.**

18. Ans: B

Exp:

- Amid the Covid-19 and Monkeypox cases around, the new zoonotic Langya Henipavirus has raised concerns. The first case of the Langya virus was reported in 2019.
- The Langya virus is a **zoonotic virus which means it can be transmitted from animals to humans.**
- Hence, **statement 1 is not correct.**
- **Langya is part of the genus Henipavirus, which has a single-stranded RNA genome with a negative orientation.**
  - ◆ Unique features of henipaviruses Paramyxovirinae are their larger genomes, longer untranslated regions that are over 100 amino acids longer than any other known phosphoprotein in the family.
  - ◆ It is an emerging cause of zoonosis in the Asia-Pacific region.
  - ◆ Hence, **statement 2 is correct.**
- Hence, **option B is correct.**

19. Ans: D

Exp:

**Chronic Fatigue Syndrome:**

- It is a **serious and debilitating disease** that affects the **nervous system**, the **immune system** and the **body's production of energy**. Hence **statement 1 is correct.**
- It is also known as "**Myalgic Encephalomyelitis**". Hence **statement 2 is correct.**
- Its potential results are **viral or bacterial infection, hormonal imbalances and genetic predispositions.**
- It can **affect anyone**, from children to adults of all ages. Hence **statement 3 is not correct.**
- **Symptoms:**
  - ◆ Significantly **lowered ability to do activities** that were performed before the illness.
  - ◆ **At least 6 months (or longer) of debilitating fatigue** that is more severe than everyday feelings of tiredness.
  - ◆ Most recognizable symptom is **Post-Exertional Malaise (PEM)**.
  - ◆ A "**crash**" in physical/mental energy following even minor activities like grocery shopping or brushing teeth.
- **Treatment:**
  - ◆ There is **no specific test for the disease**, and doctors have to rely on medical examinations, blood and urine tests.



- ◆ Doctors have recommended ways to deal with the symptoms of the disease like “Pacing” in which patients learn to balance rest and activity to prevent crashes caused by exertion.

20. Ans: C

Exp:

- Small Satellite Launch Vehicle (SSLV) is a three stage Launch Vehicle configured with **three Solid Propulsion Stages and a liquid propulsion-based Velocity Trimming Module (VTM) as a terminal stage. Hence, statement 1 is not correct.**
  - ◆ SSLV is 2m in diameter and 34m in length with a lift-off weight of around 120 tonnes.
  - ◆ It is capable of launching 500kg satellites in 500km planar orbit from Satish Dhawan Space Centre (SDSC).
  - ◆ It can accommodate multiple satellites. Hence, statement 2 is not correct.
  - ◆ It can be assembled both vertically and horizontally. Hence, statement 3 is correct.
- **Key Features:**
  - ◆ Low cost,
  - ◆ Low turn-around time,
  - ◆ Flexibility in accommodating multiple satellites,
  - ◆ Launch demand feasibility,

21. Ans: B

Exp:

- **Trametesmaxima IIPLC-32 is a white-rot fungus which has the potential to cause microbial degradation of pyrene. Hence, statement 1 is not correct.**
- It grows on dead plants; this fungus causes pyrene degradation using special enzymes.
- The pyrene concentration decreased by 79.8%, 65.37% and 56.37% within 16 days from the initial levels of 10 mg per liter, 25 mg per liter and 50 mg per liter, respectively.
- Pyrene, possessing four benzene rings, belongs to the highly toxic class of **Polycyclic Aromatic Hydrocarbons (PAHs)** with carcinogenic and mutagenic properties. Hence, statement 2 is correct.
- **PAHs** are a class of chemicals that occur naturally in coal, crude oil, and gasoline. These are ubiquitous environmental pollutants originating from multiple sources, including combustion of petrogenic fossil fuels, and incomplete incineration of municipal wastes and biomass.

22. Ans: B

Exp:

- Recently, African Swine Fever has been confirmed for the first time, at a private pig farm in Kerala, after more than 15 pigs on the farm had died due to the disease in the last ten days.
  - ◆ It is a highly contagious and fatal animal disease that infects and leads to an acute form of hemorrhagic fever in domestic and wild pigs.
- It was **first detected in Africa in the 1920s.**
  - ◆ Hence, statement 1 is correct.
- ASF **spread from animal to animal only, it is not a threat to human beings.**
  - ◆ Hence, statement 2 is not correct.
- The mortality rate is close to 95% - 100% and **since the fever has no cure, the only way to stop its spread is by slaughtering the animals.**
  - ◆ Hence, statement 3 is correct.

23. Ans: A

Exp:

- AlphaFold is an **Artificial Intelligence-based protein structure prediction tool.** It is based on a computer system called **Deep Neural Network. Hence statement 1 is correct.**
- Neural networks use a large amount of input data and provide the desired output exactly like how a human brain would.
- AlphaFold is not the only AI-based protein structure prediction tool. **RoseTTaFold, developed by University of Washington in Seattle, U.S., is another tool which can predict the structure of protein complexes. Although less accurate than AlphaFold. Hence, statement 2 is not correct.**

24. Ans: A

Exp:

- India's Salt Industry is facing crises as farmers are facing low prices due to the non-availability of minimum support prices and are also in distress due to lack of proper arrangements for wages and social security.
- Vacuum Evaporation Method:
  - ◆ It involves evaporation of salt brine by steam heat in large commercial evaporators, called vacuum pans.
  - ◆ This method yields a very high purity salt, fine in texture, and principally used in those applications requiring the highest quality salt.
  - ◆ Hence, statement 1 is correct.

- India is the third largest Salt producing Country in the World after China and USA with Global annual production being about 230 million tones. **Hence, statement 2 is not correct.**

**25. Ans: C**

**Exp:**

- Rabies is a disease of dogs, foxes, wolves, hyaenas and in some places, it is a disease of bats which feed on blood.
- The disease is passed to other animals or to people if they are bitten by an animal with rabies.
  - ◆ The germs which cause rabies live in the **saliva of the sick (rabid) animal.**
  - ◆ **Hence, statement 1 is correct.**
- Rabies is a vaccine-preventable, zoonotic, viral disease. Once clinical symptoms appear, rabies is virtually 100% fatal. **In up to 99% of cases, domestic dogs are responsible** for rabies virus transmission to humans. Yet, rabies can affect both domestic and wild animals.
  - ◆ **Hence, statement 2 is correct.**

**26. Ans: C**

**Exp:**

- Indian Space Research Organisation (ISRO) will conduct two unmanned 'Abort Mission' in 2022 to ensure crew safety during the Gaganyaan mission.
- Gaganyaan is a mission by the Indian Space Research Organisation (ISRO).
- Under the Gaganyaan schedule (to be launched in 2023):
  - ◆ Three flights will be sent into orbit.
  - ◆ There will be two unmanned flights and one human spaceflight.
- The Gaganyaan system module, called the Orbital Module will have three Indian astronauts, including a woman. **Hence, statement 1 is correct.**
- GSLV Mk III, also called the LVM-3 (Launch Vehicle Mark-3,) the three-stage heavy lift launch vehicle, will be used to launch Gaganyaan as it has the necessary payload capability. **Hence, statement 2 is correct.**
- It will circle Earth at a low-earth-orbit at an altitude of 300-400 km from earth for 5-7 days. **Hence, statement 3 is not correct.**

**27. Ans: D**

**Exp:**

- The West Nile Virus is a flavivirus related to the viruses that are also responsible for causing St. Louis encephalitis, Japanese encephalitis, and yellow fever.
  - ◆ It is a mosquito-borne, **single-stranded RNA virus (not DNA virus).** **Hence, statement 1 is not correct.**

- In 80% of the infected people, the disease is asymptomatic. In the rest of the 20% cases, West Nile fever or severe WNV is observed with symptoms such as fever, headache, fatigue, body aches, nausea, rash, and swollen glands.
- Severe infection may even cause neurological diseases like West Nile encephalitis or meningitis or West Nile poliomyelitis or acute flaccid paralysis.
  - ◆ As of now, **no treatment/vaccine for WNV is available.** **Hence, statement 2 is not correct.**

**28. Ans: A**

**Exp:**

- Nano Urea is **Indigenous Urea**, introduced firstly by the Indian Farmers Fertiliser Cooperative Limited (IFFCO) for farmers across the world. **Hence, statement 1 is correct.**
  - ◆ It has been **indigenously developed at Nano Biotechnology Research Centre**, Kalol, Gujrat in line with Atmanirbhar Bharat and Atmanirbhar Krishi.
- It is urea in the form of a nanoparticle. It is a nutrient (liquid) to provide nitrogen to plants as an alternative to the conventional urea.
  - ◆ Urea is a chemical nitrogen fertiliser, white in colour, which artificially provides nitrogen, a major nutrient required by plants.
- It contains 40,000 mg/L of nitrogen in a 500 ml bottle which is equivalent to the impact of nitrogen nutrient provided by one bag of conventional urea.
- While **conventional urea** has an efficiency of about **25 %**, the efficiency of **liquid nano urea** can be as high as **85-90 %**. Therefore, Liquid Nano Urea has more efficiency than conventional Urea. **Hence, statement 2 is not correct.**
- The Prime Minister inaugurated the first Indian Liquid Nano Urea (LNU) plant at **Kalol, Gujarat not at Vijaypur (a fertilizer plant at Madhya Pradesh).** **Hence, statement 3 is not correct.**

**29. Ans: A**

**Exp:**

- Recently, Devasthal Observatory campus owned by Aryabhata Research Institute of Observational Sciences (ARIES), Nainital in Uttarakhand has set-up the International Liquid-Mirror Telescope (ILMT).
- It has become the **world's first Liquid-Mirror Telescope (LMT)** to be **commissioned for astronomy** and also one of its kind to be operational anywhere in the world. **Hence, statement 1 is correct.**



- A LMT is a **stationary** telescope whereas a conventional telescope moves along the direction of the object of interest in the sky. **Hence, statement 2 is not correct.**
- A LMT **will survey** and capture any and all possible celestial objects such as stars, galaxies, supernovae explosions, asteroids and even space debris. However, a **conventional capture** just a piece of sky at a given point of time.

30. Ans: A

Exp:

- The **United States Geological Survey (USGS)** in partnership with **National Aeronautics and Space Administration (NASA)** and the **Lunar Planetary Institute** has released a new comprehensive map of the Moon, called the '**Unified Geologic Map of the Moon**'. **Hence, statement 1 is not correct.**
- The map has been created with the help of the information gathered from six **Apollo-era regional maps**.
- This new map will be the precise roadmap of the Moon's surface geology **for future human expeditions**. **Hence, statement 2 is correct.**
- The map will also assist researchers in learning about the history of the structures found on the Moon's surface.

31. Ans: D

Exp:

**NewSpace India Limited (NSIL):**

- It's located in **Bengaluru** not in Hyderabad. **Hence, statement 1 is not correct.**
- It's under the administrative control of the **Department of Space** and is not under PMO (Prime Minister Office). **Hence, statement 2 is not correct.**

- The mission of NSIL is as follows:

- ◆ **Owning satellites for Earth Observation and Communication applications** and providing space-based services,
- ◆ **Building satellites and launching them** as per demand,
- ◆ **Providing Launch Services** for satellite belonging to customer,
- ◆ **Building launch vehicles through Indian Industry** and launch as per satellite customer requirement. **Hence, statement 3 is not correct.**

32. Ans: B

Exp:

- World Wide Web (WWW), which is also known as a Web (1.0), is a collection of websites or web pages stored in web servers and connected to local computers through the internet.
  - ◆ it was invented by Tim Berners-Lee, a British scientist, in **1989, while working at CERN (Switzerland)**. **Hence, statement 1 is not correct.**
- Web 2.0 is the second stage of evolution of the Web where users could now communicate with servers and other users leading to the creation of the social web.
  - ◆ This is the world wide web that we use today. **It is also known as "Read & Write" Internet**. **Hence, statement 3 is not correct.**
- Web 3.0, is an evolving term that is used to refer to the next generation of the Internet – a "read-write-execute" web – with decentralization as its bedrock.
  - ◆ It speaks about a digital world, built by leveraging blockchain technology, **where people are able to interact with each other without the need for an intermediary**. **Hence, statement 2 is correct.**