

Q. 1) Consider the following statements regarding the evolution of mobile networks over the various generations

1. 1G worked on analog radio signals and supported only voice calls.
2. 2G can transmit telephone signals including digitised voice, video calls, and conferencing.
3. 3G uses digital radio signals and supports voice and data transmission but not video calls.
4. 5G has lower latency when compared to 4G.

Which of the following statements is correct?

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

Q.1) Solution: (c)

Explanation:

The evolution of mobile networks over the various generations

- "G" stands for "GENERATION". While connected to the internet, the speed of the connection depends upon the signal strength that is shown in abbreviations like 2G, 3G, 4G, 5G, etc. on any mobile device.
- Each generation of wireless broadband is defined as a set of telephone network standards that describe the technical implementation of the system.
- 1G worked on analog radio signals and supported only voice calls. It was launched in the 1980s. It has a bandwidth of up to 2.4 kbps. **Hence statement 1 is correct.**
- 2G uses digital radio signals and supported both voice and data transmission but cannot do video calls. It was launched in the 1990s. It has a bandwidth of 64 Kbps. **Hence statement 2 is incorrect.**
- 3G can transmit telephone signals including digitised voice, video calls, and conferencing. It was launched in the 2000s with a speed of 1 Mbps to 2 Mbps. **Hence statement 3 is incorrect.**
- 4G was launched in 2009 with a peak speed of 100 Mbps to 1 Gbps and it also enables 3D virtual reality.
- 5G uses much higher radio frequencies of 28 GHz. 4G uses lower radio frequencies of 700 MHz to 2500 MHz.
- 5G transfers more data over the air at faster speeds than 4G.
- 5G uses a millimeter wave spectrum which enables more devices to be used within the same geographic area supporting around one million per square kilometer whereas 4G support a lesser number of devices about 4,000 devices per square kilometer.
- 5G has a wider area in the frequency spectrum and lower latency when compared to 4G. Latency refers to the delay before a transfer of data begins following an instruction. **Hence statement 4 is correct.**

Q. 2) Consider the following statements about DarkNet

1. It refers to unindexed sites which are unsearchable by search engines.
2. It constitutes around 4-6% of the World Wide Web (WWW).
3. It offers a level of identity security that the surface net does not.
4. It includes places such as academic databases as well as black markets.

Which of the following statements is correct?

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

Q.2) Solution: (b)

Explanation:

- DarkNet refers to encrypted networks on the Internet that are not indexed by search engines. DarkWeb refers to unindexed sites which are unsearchable by search engines because those sites are protected by passwords. The terms "dark net" and "dark web" are occasionally used interchangeably, but with subtle differences in meaning. The dark net is a network built over the Internet whereas the dark web refers to websites on a darknet. **Hence statement 1 is incorrect.**
- Darknet constitutes around 85-90% of the World Wide Web (WWW).
- The surface web is that portion of the World Wide Web that is readily available to the general public and searchable with standard web search engines. It is the opposite of the deep web. It only constitutes 4-6% of the whole web. **Hence statement 2 is incorrect.**
- It offers a level of **identity security** that the surface net does not. It protects their identities in order to evade detection and capture are drawn to this aspect of the dark net. **Hence statement 3 is correct.**
- DarkNet is a network that is only available to a select group of people and not to the general Internet public, and only accessible via authorization, specific software, and configurations.
- This includes harmless places such as academic databases and corporate sites, as well as those with shadier subjects such as black markets, fetish communities, and hacking and piracy. **Hence statement 4 is correct.**

Q. 3) Consider the following statements

1. LTE only supports data whereas VoLTE supports both calls and data.
2. LTE is not widely used like VoLTE.
3. LTE is the services offered on the network whereas VoLTE is a type of network.

Which of the following statements is correct?

- a) 1 and 2
- b) 2 and 3

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

Q.3) Solution: (a)

Explanation:

- **Long Term Evolution (LTE)** is a standard for high-speed cellular data communication systems. It provides a download speed of about 100 Mbps and an upload speed of about 50 Mbps. It does not provide good-quality voice calls while using the data services.
- **Voice over Long Term Evolution (VoLTE)** is a much-standardized system to make high-definition voice calls. It allows the users to make voice calls while using the data services without changing the quality of the voice.
- LTE only supports data whereas VoLTE supports both calls and data.
- LTE may or may not support data and voice call services at the same time.
- VoLTE always supports data and voice call services at the same time.
- In LTE if it supports data and voice calls together the quality of voice calling is not good.
- VoLTE supports HD-quality voice calling while using data services. **Hence statement 1 is correct.**
- VoLTE is more widely used than LTE. **Hence statement 2 is correct.**
- LTE turns off the data connection while making voice calls.
- VoLTE does not turn off the data connection while making voice calls.
- In LTE, external applications like Skype or WhatsApp are required to make video calls.
- In VoLTE no external applications are required to make video calls.
- LTE is a type of network whereas VoLTE is the services offered on the network. **Hence statement 3 is incorrect.**

Q. 4) Consider the following statements about the advantages of End-to-End Encryption

1. It ensures that user data is protected from unwarranted parties.
2. It can reveal the encrypted data if the endpoints are not defined properly.
3. It can help organizations protect that data by making it unreadable.

Which of the following statements is correct?

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

Q.4) Solution: (c)

Explanation:

- End-to-End Encryption is a communication process that encrypts data being shared between two devices.
- It prevents third parties like cloud service providers, internet service providers (ISPs), and cybercriminals from accessing data while it is being transferred.
- The cryptographic keys used to encrypt and decrypt the messages are stored on the endpoints.
- The process of end-to-end encryption uses an algorithm that transforms standard text into an unreadable format.
- This format can only be unscrambled and read by those with the decryption keys, which are only stored on endpoints and not with any third parties including companies providing the service.
- It is used when **transferring business documents**, financial details, legal proceedings, and personal conversations.
- It ensures that user **data is protected from unwarranted parties** including service providers, cloud storage providers, and companies that handle encrypted data. **Hence statement 1 is correct.**
- Some E2EE implementations allow the encrypted data to be encrypted and re-encrypted at certain points during transmission.
- Hence it makes it important to clearly define and distinguish the endpoints of the communication circuit.
- It reveals the encrypted data if the endpoints are not defined properly. This is one of the disadvantages of E2EE. **As the question asks for advantages, Hence statement 2 is incorrect.**
- Many industries are bound by regulatory compliance laws that require encryption-level data security.
- It can help **organizations protect that data** by making it unreadable. **Hence statement 3 is correct.**

Q. 5) Consider the following statements about the National Supercomputing Mission

1. It aims to indigenise the development and manufacturing of powerful computers.
2. It is implemented by the National Informatics Centre (NIC).
3. Under this mission, the supercomputer 'Param Pravega' has been installed.

Choose the correct code:

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

Q.5) Solution: (d)

Explanation:

- A supercomputer is a computer that performs at or near the currently highest operational rate for computers.

- Generally, PETAFL0P is a measure of a Supercomputer's processing speed and can be expressed as a thousand trillion floating point operations per second.
- FLOPS (floating point operations per second) are typically used to measure the performance of a computer's processor.
- They are primarily designed to be used in enterprises and organizations that require massive computing power.
- Examples: Weather forecasting, scientific research, intelligence gathering, and analysis.
- The National Supercomputing Mission aims to **indigenise the development and manufacturing of powerful computers**.
- It was launched in 2015 to enhance the research capacities and capabilities in the country by connecting them to form a Supercomputing grid, with National Knowledge Network (NKN) as the backbone.
- The NKN project is aimed at establishing a strong and robust Indian network that will be capable of providing secure and reliable connectivity. **Hence statement 1 is correct.**
- The Mission is being jointly steered by the Department of Science and Technology (DST) and the Ministry of Electronics and Information Technology (MeitY).
- It is implemented by the Centre for Development of Advanced Computing (C-DAC), Pune, and the IISc, Bengaluru. **Hence statement 2 is incorrect.**
- The Indian Institute of Science (IISc) Bengaluru installed the supercomputer 'Param Pravega' with a supercomputing capacity of 3.3 petaflops which has been installed under the government's National Supercomputing Mission. **Hence statement 3 is correct.**

Q. 6) Consider the following statements about the Internet of Things (IoT)

1. It is a system in which devices are connected to a network of information without any human intervention.
2. Accessibility to data and digitization plays an integral part in the working of IoT.
3. It may lead to an increase in the cyber fraud and cyber crimes.

Which of the following statements is correct?

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

Q.6) Solution: (d)

Explanation:

- The Internet of Things (IoT) is an integrated system in which devices are connected to a network of information in such a way that they can communicate with each other without any human intervention.

- It creates an intelligent system of systems that can manage multiple activities of human concern like traffic control, health management, optimal use of electricity and inventory management, etc.
- It is a computing concept that describes the idea of everyday physical objects being connected to the internet and being able to identify themselves to other devices.
- It is one of the fastest emerging technologies across the globe, providing enormous beneficial opportunities for society, industry, and consumers. **Hence statement 1 is correct.**
- Accessibility to data and digitization plays an integral part in the working of IoT.
- Digitization is a process that interconnects the world into an integrated network enabling sharing of data and information across systems. Thus, IoT connects devices but this connectivity is provided by the digitization of information. In brief, digitization is an enabler of IoT. **Hence statement 2 is correct.**
- It may lead to the tracking of large amounts of data for surveillance and also for intrusion into personal matters.
- It may lead to an increase in the digital divide, cyber fraud, and cyber crimes.
- Factors such as low literacy and income levels, geographical restrictions, lack of motivation to use technology, lack of physical access to technology, and digital illiteracy contribute to the digital divide.
- One of the biggest risks associated with IoT is insecure communications. Data transmissions between devices are susceptible to interception by third parties. This could allow threat actors to gain access to sensitive information, like user passwords or credit card numbers. **Hence statement 3 is correct.**

Q. 7) Consider the following statements about Big Data

1. It refers to a large amount of structured data only.
2. It is characterized by three V's which are Volume, Vagueness and Veracity

Choose the correct code:

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

Q.7) Solution: (d)

Explanation:

- Big data is a combination of structured, semistructured and unstructured data collected by organizations that can be mined for information and used in machine learning projects, predictive modeling and other advanced analytics applications. **Hence statement 1 is incorrect.**
- Big data is often characterized by the three V's:
 - ✓ the large volume of data in many environments;
 - ✓ the wide variety of data types frequently stored in big data systems; and

- ✓ the velocity at which much of the data is generated, collected and processed.

Hence statement 2 is incorrect .

- Applications of Big Data:
- In security agencies and police forces, big data is used to prevent cyber-attacks, enhance security systems and detect card-related fraud cases.
- In disaster management, big data helps in understanding and mitigating the risks of disasters.
- In Insurance Sector, big data is used to improve customer experience & ensure their right to claim
- In Banking Sector, big data is used in managing financial data
- Big Data is used in health care for predicting diseases, prescribing medicines, optimizing treatment, and using clinical data to improve patient care
- In agriculture and food, big data helps in seed selection, geo-tagging to keep track of records of agricultural assets in the country, weather forecasting, and irrigation & effective water management.
- In the telecom sector- connecting the hinterland areas and bringing them to the mainstream and on social media for targeting platform users.

Q. 8) Consider the following statements

1. An edge computing network reduces the amount of data that travels over the network.
2. In edge computing, remote servers hosted on the Internet store and process data.
3. In edge computing, the latency issues are virtually non-existent.

Which of the following statements is correct?

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

Q.8) Solution: (c)

Explanation:

- In Cloud computing, all data of the Internet of Things (IoT) system is computed in the cloud using data centres whereas in edge computing data generated by IoT devices are stored and processed locally.
- Data is not sent over a network as it is processed soon, therefore, an edge computing network reduces the amount of data that travels over the network. **Hence statement 1 is correct.**
- Cloud computing is a technology by which remote servers hosted on the Internet store and process data, rather than local servers or personal computers.
- Edge computing enables data to be analyzed, processed, and transferred at the edge of a network.
- The concept of edge computing is that instead of getting the data close to the data center, the data center is brought close to the data. The storage and computing resources from the data

center are deployed as close as possible (ideally in the same location) to where the data is generated. **Hence statement 2 is incorrect.**

- Latency refers to the time required to transfer data between two points on a network. Large physical distances between these two points coupled with network congestion can cause delays. As edge computing brings the points closer to each other, latency issues are virtually nonexistent. **Hence statement 3 is correct.**

Q. 9) Consider the following statements regarding blockchain

1. It is a public ledger that everyone can inspect, but no single user controls it.
2. In India, blockchain is regulated by the Department of Science .
3. Blockchain requires intermediaries to regulate unlike traditional transactions

Choose the correct code:

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

Q.9) Solution: (a)

Explanation:

- Blockchain is a public ledger that everyone can inspect, but no single user controls it.
- It is a distributed database or ledger that is shared among the nodes of a computer network.
- As a database, a blockchain stores information electronically in a digital format.
- 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 1 is correct.**
- In India, cryptocurrencies are currently unregulated. However, historically the Reserve Bank of India (the RBI) and the Government of India have banned dealing in cryptocurrency.
- In 2022, the Ministry of Finance released a report proposing the creation of a digital rupee, a state-backed cryptocurrency, as well as a framework for regulating private cryptocurrencies. The report also recommended the establishment of a Digital Currency Regulatory Authority (DCRA) to oversee the use of cryptocurrencies in India. It has not been established yet. Also department of space doesn't regulate it. **Hence statement 2 is incorrect.**
- In fact, one of the main advantages of blockchain technology is that it can eliminate the need for intermediaries in transactions.
- Traditional transactions often require intermediaries, such as banks, to verify and process transactions. These intermediaries can add costs, delays, and potential security vulnerabilities to the transaction process. Blockchain technology, on the other hand, allows for peer-to-peer transactions that can be verified and recorded on a decentralized, distributed ledger without the need for intermediaries. **Hence statement 3 is incorrect.**

Q. 10) Consider the following statements regarding the Global Cybersecurity Index (GCI)

1. It is published by the International Telecommunication Union (ITU).
2. India has been ranked 5th in the index.
3. The United States topped the index followed by the United Kingdom.

Choose the correct code:

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

Q.10) Solution: (c)

Explanation:

- The Global Cybersecurity Index (GCI) is published by the **International Telecommunication Union (ITU)**.
- **The GCI** is based on five parameters of cybersecurity, which are - legal measures, technical measures, organisational measures, capacity development, and cooperation. The performance is then aggregated into an overall score.
- **ITU** is the United Nations' specialized agency for information and communication technologies.
- It was founded in 1865 to facilitate international connectivity in communications networks. It is Headquartered in Geneva, Switzerland. **Hence statement 1 is correct.**
- **India has been ranked 10th in the index.** India scored a total of 97.5 points from a possible maximum of 100 points, to make it to the tenth position worldwide in the GCI 2020. India secured the fourth position in the Asia Pacific region. **Hence statement 2 is incorrect.**
- The **United States topped the index** followed by the United Kingdom.
- Even Saudi Arabia was placed in the second position together with the UK.
- Estonia was ranked 3rd in the index. **Hence statement 3 is correct.**

Q. 11) Consider the following statements

1. A QR code is a black-and-white square that is machine-readable.
2. Barcode is a square or rectangular shape that has parallel black lines and white spaces that are machine-readable.
3. QR codes include more information than barcodes.
4. Both QR codes and barcodes can be scanned only horizontally.

Choose the correct code:

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

Q.11) Solution: (d)

Explanation:

- A QR code is a black-and-white square that is machine-readable.
- It contains a lot of information about products or items. Digital devices can extract this information from the code. Nowadays, even smartphones can scan QR codes. **Hence statement 1 is correct.**
- Barcode is a square or rectangular shape that has parallel black lines and white spaces that are machine-readable.
- Machines can read this data representation. Barcodes are very helpful in shops for purchase processing. They help to identify products within seconds. They can also be used to track inventories in warehouses. Barcodes help with the accounting process in many shops and companies. There are various barcodes depending on their application for various purposes. **Hence statement 2 is correct.**
- QR codes include more information about products than barcodes. Barcodes may only include information like the type, size, and color of products, whereas QR codes may include additional information like the price, the condition of the product as well as the date of manufacturing. In addition, QR codes can also store multimedia data. **Hence statement 3 is correct.**
- Barcodes can be scanned vertically.
- There are two types –
- One-dimensional (1-D) barcodes: It contains information data in the horizontal direction and can hold up to 25 characters.
- Two-dimensional (2-D) matrix codes: It contains information both vertically and horizontally and can hold significantly more—up to 2,000 characters.
- QR codes are scanned both vertically and horizontally and do not require the orientation positioning required of linear barcodes. **Hence statement 4 is incorrect.**

Q. 12) Consider the following statements about quantum computing

1. Quantum computers carry out calculations using binary code
2. It can carry out exponentially larger calculations to **solve complex problems.**

Choose the correct code:

- a) 1 only
- b) 2 only
- c) Both 1 and 2
- d) Neither 1 or 2

Q.12) Solution: (b)

Explanation:

- Quantum computing is a rapidly-emerging technology that harnesses the laws of quantum mechanics to solve problems too complex for classical computers.
- Quantum mechanics is a subfield of physics that describes the behavior of particles — atoms, electrons, photons, and almost everything in the molecular and submolecular realm.
- While today's classical computers store information as binary 0 and 1 states, quantum computers draw on the fundamental laws of nature to carry out calculations using quantum bits. **Hence statement 1 is incorrect .**
- Unlike a bit that has to be a 0 or a 1, a qubit can be in a combination of states, which allows for exponentially larger calculations and gives them the potential to solve complex problems which even the most powerful classical supercomputers are not capable of. **Hence statement 2 is correct.**
- Qiskit is an open-source software development kit built by IBM for the quantum developer community. IBM regularly organizes India-focused programmes such as Qiskit India Week of Quantum, which celebrated women in quantum to kickstart their journeys in quantum and was attended by almost 300 students.

Q. 13) Consider the following statements about Web 3.0

1. It has recently got a universally accepted definition agreed by all the technology companies
2. It has been invented by Tim Berners-Lee

Choose the correct code:

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

Q.13) Solution: (d)

Explanation:

- World Wide Web, which is also known as the Web, is a collection of websites or web pages stored in web servers and connected to local computers through the internet.
- Web3 or Web3.0 refers to the next generation of the world wide web, which is supposed to take over from Web2.0.
- Web 3.0 is a **decentralized internet** where users control their own data.
- The spirit of Web 3.0 is Decentralized Autonomous Organization (DAO).
- DAO is all about the business rules and governing rules in any transaction are transparently available for anyone to see and software will be written conforming to these rules.
- There is no universally accepted definition of Web 3.0, and different companies and organizations may have different interpretations of what Web 3.0 entails. Generally, Web 3.0 is seen as an

evolution of the current web, which will involve the integration of technologies such as blockchain, artificial intelligence, and decentralized systems to create a more secure, decentralized, and user-centric web experience. **Hence statement 1 is incorrect**

- While Tim Berners-Lee is widely credited with inventing the World Wide Web, he did not invent Web 3.0. Web 3.0 is a term that has emerged in recent years to describe the next generation of the web, which is still being developed and defined by various technology companies and organizations. **Hence statement 2 incorrect**

Q. 14) Consider the following statements about Organic Light Emitting Diode (OLED) and Quantum Dots Light Emitting Diode (QLED)

1. Both OLED and QLED achieve deeper blacks without backlight behind an LCD panel.
2. OLED has a clear view from all angles without compromising the color contrast as compared to QLED.

Choose the correct code:

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

Q.14) Solution: (b)

Explanation:

- The OLEDs use organic glowing materials for their illumination, thus eliminating the need for an LED backlight as with LCDs.

The organic light-emitting diode in which the emissive electroluminescent layer is a film of an organic compound, which emits light in response to an electric current. As a result, they deliver superior, pristine, and vibrant picture quality and amazingly wide viewing angles for an exceptional viewing experience.

Quantum Dot LED, simply called a QLED, displays are based on quantum-dots light-emitting diodes. The technology is quite similar to OLED display technology, but with a quantum dot layer instead of the OLED emitting layer.

The ability to produce deeper blacks is one of the most important factors in achieving a near-perfect picture quality and which also allows for vibrant colors and higher contrast. As every pixel in an OLED display panel illuminates the light of its own, it achieves a near-perfect black level resulting in much brighter images without compromising dark areas surrounding them.

- QLED displays, on the other hand, suffer a little from light bleed, as it still relies on a backlight behind an LCD panel. OLED is the winner in terms of achieving deeper blacks as it achieves deeper black without backlight behind the LCD panel. **Hence statement 1 is incorrect.**

- While both OLED and QLED televisions deliver exceptional viewing experience when you're sitting in the center exactly in front of your television, QLED displays tend to lose significant color and luster, losing a significant amount of contrast when you're looking at the television from far off-center. OLED televisions offer an excellent viewing experience from all angles without compromising the color contrast and with no luminance degradation whatsoever. OLED has a clear advantage over QLED when it comes to drastic viewing angles. **Hence statement 2 is correct.**

Q. 15) Consider the following statements about Light Fidelity (LiFi) Technology

1. It is a unidirectional fully networked wireless communication technology.
2. It uses radio frequencies as a medium to carry data.
3. It can easily operate in harsh weather conditions.

Choose the incorrect code:

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

Q.15) Solution: (d)

Explanation:

Here the question asks to find an 'incorrect' code.

- Light Fidelity (LiFi) Technology is a **bidirectional fully networked wireless communication** technology.
- An improvised LED bulb functions as a router.
- It can offer greater security, data rates, and densities to support more robust and reliable wireless networks that complement and enhance existing cellular and Wi-Fi networks.
- It provides ultra-fast data connections and is especially useful in urban areas where radio spectra are congested and also very useful in rural areas wherein Fiber Optic Cables or networks are not reachable. **Hence statement 1 is incorrect.**
- An ordinary off-the-shelf LED bulb is connected to a device, which in turn is connected to the Internet.
- The Internet data flows in via the device into the bulb and is carried by light waves.
- At the other end, light waves carrying Internet data fall on a receiver or a dongle that is connected to the computer.
- It uses visible light instead radio frequencies as a medium to carry data. **Hence statement 2 is incorrect.**
- It requires specialized LEDs to work flawlessly and might not work during the night.
- It is difficult to operate in harsh weather conditions. **Hence statement 3 is incorrect.**

Q. 16) Consider the following

Malware types	Names
1. Ransomware	BadRabbit
2. Worm	Morris
3. Bots	ZEUS
4. Virus	Mirai

How many pairs are correctly matched?

- Only one pair is correctly matched
- Two pairs are correctly matched
- Three pairs are correctly matched
- Four pairs are correctly matched

Q.16) Solution: (b)

Explanation:

- Malware, short for malicious software, is used by threat actors to intentionally harm and infect devices and networks. The umbrella term encompasses many subcategories, including the following:
 - ✓ Viruses
 - ✓ Worms
 - ✓ Ransomware
 - ✓ Bots
 - ✓ Trojan Horses
 - ✓ Keyloggers
 - ✓ Rootkits
 - ✓ Spyware
 - ✓ Cryptomining Malware
 - ✓ Adware
- Ransomware encrypts files or devices and forces victims to pay a ransom in exchange for re-entry. While ransomware and malware are often used synonymously, ransomware is a specific form of malware. BadRabbit is a classic example of ransomware. **Hence pair 1 is correct.**
- A computer worm **self-replicates and infects other computers without human intervention.** Morris is a classic example of a worm. **Hence pair 2 is correct.**
- A computer virus infects devices and replicates itself across systems. **Viruses require human intervention to propagate.**
- The Zeus virus, **first detected in 2006**, is still used by threat actors today. **Hence pair 3 is incorrect.**

- A bot is a **self-replicating malware that spreads itself to other devices**, creating a network of bots, or a **BOTNET**. **Once infected, devices perform automated tasks commanded by the attacker**. Mirai is a classic example of a botnet. **Hence pair 4 is incorrect.**

Q. 17) Consider the following statements about Bluebugging

1. It is a hack where attackers access a device through its Bluetooth connection.
2. Once a device is blue-bugged, a hacker can listen to the calls and send messages.
3. The most secure smartphones like iPhones are not vulnerable to such attacks.
4. Turning off Bluetooth when not in use can prevent such attacks.

Choose the correct code:

- a) Only one statement is correct
- b) Two statements are correct
- c) Three statements are correct
- d) Four statements are correct

Q.17) Solution: (c)

Explanation:

- **Bluebugging** is a hack where attackers access a device through its Bluetooth connection.
- A hacker can gain unauthorized access to these apps and devices and control them as per their wish through blue bugging.
- Any Bluetooth-enabled device including True Wireless Stereo (TWS) devices or earbuds is susceptible to blue bugging. **Hence statement 1 is correct.**
- Once a device or phone is blue-bugged, a hacker can listen to the calls, read and send messages and steal and modify contacts. **Hence statement 2 is correct.**
- Even the most secure smartphones like iPhones are vulnerable to such attacks. **Hence statement 3 is incorrect.**
- Turning off Bluetooth and disconnecting paired Bluetooth devices when not in use, making Bluetooth devices undiscoverable from Bluetooth settings, updating the device's system software to the latest version, and limiting the use of public Wi-Fi can prevent such attacks. **Hence statement 4 is correct.**

Q. 18) Consider the following statements

1. A digital signature is a digital code that is created and validated by public key encryption.
2. A digital certificate is an electronic certificate that is issued to verify the authenticity of a user.
3. A digital signature helps in verifying the authenticity of a specific document.
4. A digital certificate helps in creating an identity for a website.

Choose the correct code:

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

Q.18) Solution: (d)

Explanation:

- A digital signature is a digital code that is created and validated by public key encryption.
- The digital signature creation process includes encryption and decryption using asymmetric keys.
Hence statement 1 is correct.
- A digital certificate is an electronic certificate that is issued to verify the authenticity of a user.
- A digital certificate can be issued by a trusted agency known as the CA. The CA follows specific steps such as key generation, registration, verification, and creation. **Hence statement 2 is correct.**
- A digital signature helps in verifying the authenticity of a specific document.
- It also helps in verifying the source of a specific document.
- It helps provide authentication, non-repudiation, and integrity. **Hence statement 3 is correct.**
- A digital certificate helps in creating an identity for a website. It also improves the trustworthy nature of the website. It helps provide authentication and security. **Hence statement 4 is correct.**

Q. 19) Consider the following statements

1. IPv4 has a 32-bit address length whereas IPv6 has a 128-bit address length.
2. In both IPv4 and IPv6 end-to-end, connection integrity is achievable.
3. The address representation of IPv4 can be decimal and IPv6 can be hexadecimal.

Choose the correct code:

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

Q.19) Solution: (c)

Explanation:

- IPv4 address consists of two things that are the network address and the host address. It stands for **Internet Protocol version four**. It was introduced in 1981 by DARPA and was the first deployed version in 1982 for production on SATNET and the ARPANET in January 1983.
- IPv6 is based on IPv4 and stands for Internet Protocol version 6. It was first introduced in December 1995 by Internet Engineering Task Force. IP version 6 is the new version of Internet Protocol, which is way better than IP version 4 in terms of complexity and efficiency.
- IPv4 has a 32-bit address length whereas IPv6 has a 128-bit address length.

- IPv4 can generate 4.29×10^9 address space.
- The address space of IPv6 is quite large it can produce 3.4×10^{38} address space. **Hence statement 1 is correct.**
- IPv4 supports manual and DHCP address configuration whereas IPv6 supports Auto and renumbering address configuration.
- Only in IPv6 end-to-end, connection integrity is achievable. **Hence statement 2 is incorrect.**
- The address representation of IPv4 is in decimal and IPv6 is in hexadecimal. **Hence statement 3 is correct.**

Q. 20) Consider the following statements about Optical Fibre

1. It provides lesser bandwidth compared to copper wires.
2. In this, data can move at higher speeds and greater distances.
3. It works on the principle of total internal reflection (TIR).

Choose the correct code:

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

Q.20) Solution: (b)

Explanation:

- Optical fibre is the backbone of the digital infrastructure — the data is transmitted by light pulses travelling through long strands of thin fibre.
- **Optical** fiber provides more bandwidth and has standardized performance up to 10 Gbps and beyond, something that is impossible to achieve when using copper.
- More bandwidth means that fiber can carry more information with far greater efficiency than copper wire. **Hence statement 1 is incorrect.**
- Since data travels in the form of light in fiber-optic cables, very little signal loss occurs during transmission, and data can move at higher speeds and greater distances. **Hence statement 2 is correct.**
- The optical fibre works on the principle of total internal reflection (TIR).
- Total internal reflection is the complete reflection of a ray of light within a medium such as water or glass from the surrounding surfaces back into the medium. **Hence statement 3 is correct.**

Q.21) Consider the following statements with respect to 'Dynamic Ground Water Resource Assessment 2022'

1. The Assessment is carried out at periodical intervals jointly by The Energy and Resources Institute and States/UTs.
2. Total annual groundwater recharge has increased and rainfall is the major contributor as per the findings of the report

Select the correct statement(s)

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

Q.21) Solution (b)

Explanation:

- The Assessment is carried out at **periodical intervals jointly by Central Ground Water Board and States/UTs.**
- **Total annual GW recharge has increased (437.6 bcm) and rainfall contributes to nearly 61 % in this.** The total annual ground water recharge is 437.60 Billion Cubic Meters (BCM) and the annual ground water extraction is 239.16 BCM. Assessment indicates an increase in ground water recharge.

Source: [CLICK HERE](#)

Q.22) Consider the following statements with respect to 'E-waste (management) rules 2022'

1. These rules apply to every manufacturer, producer refurbisher, user, dismantler and recycler of e-waste
2. Producers of electronic goods have to ensure at least 60% of their electronic waste is collected and recycled by 2023
3. It mandates that every producer of electronic components shall ensure that their products do not contain lead, mercury and other hazardous substances

Choose the correct answer using the code given below

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

Q.22) Solution (b)

Explanation:

- These rules apply to **every manufacturer, producer refurbisher, dismantler and recycler involved in manufacture, sale, transfer, purchase, refurbishing, dismantling, recycling and processing of e-waste** or electrical and electronic equipment listed in Schedule I, including their components, consumables, parts and spares which make the product operational.
- **Producers of electronic goods have to ensure at least 60% of their electronic waste is collected and recycled by 2023** with targets to increase them to 70% and 80% in 2024 and 2025, respectively.
- It mandates that every producer of EEE and their components shall ensure that their **products do not contain lead, mercury and other hazardous substances beyond the maximum prescribed concentration**

Source: [CLICK HERE](#)

Q.23) With reference to 'Forest and Climate Leaders' Partnership (FCLP)', consider the following statements

1. It aims to unite action by governments, businesses and community leaders from across the globe to scale up action to halt forest loss and land degradation by 2030.
2. It was launched at the recently held COP 27 in Glasgow with India being one of the founding members

Select the INCORRECT statement(s)

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

Q.23) Solution (b)

Explanation:

- **FCLP aims to unite action by governments, businesses and community leaders** from across the globe to scale up action to implement a commitment made at COP26 to **halt forest loss and land degradation by 2030.**
- FCLP is a voluntary partnership of 26 countries. It was launched by world leaders including the EU Commission President, UK Prime Minister and the leaders of France, Ghana, Congo, Colombia, and Germany at **COP 27. India is not a part of FCLP**

Source: [CLICK HERE](#)

Q.24) In which one of the following groups are all the four countries members of East Asia Summit?

- a) Brunei, Malaysia, Thailand and Canada
- b) Australia, Singapore, Mongolia and India
- c) Indonesia, New Zealand, Vietnam and Russia
- d) Philippines, South Korea, Sri Lanka and United States

Q.24) Solution (c)

The members of EAS are Australia, Brunei, Cambodia, China, India, Indonesia, Japan, Laos, Malaysia, Myanmar, New Zealand, Philippines, Russia, Singapore, South Korea, Thailand, United States, Vietnam.

Source: [CLICK HERE](#)

Q.25) Consider the following statements with respect to the Carbon Border Adjustment Tax

1. A carbon border tax is an import duty based on the amount of carbon emissions produced by the goods
2. It is proposed by the World Trade Organisation (WTO) and aims to tax products that are extremely carbon intensive
3. India does not levy an explicit carbon price.

Choose the correct answer using the code given below

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

Q.25) Solution (c)

Explanation:

- A carbon border tax is an **import duty based on the amount of carbon emissions** produced by the goods in question. It discourages emissions as a carbon price, and it has an impact on production and exports as a trade-related measure.
- The **European Union** has proposed a policy, called the Carbon Border Adjustment Mechanism. It aims to tax products such as cement and steel **that are extremely carbon intensive, with effect from 2026.**
- **India does not levy an explicit carbon price.**

Source: [CLICK HERE](#)

Q.26) A and B playing a game with rolling a fare dice, one after the other replacing it every time till one of them gets a six. If A begins the game, then the probability that A wins the game is

- a) $1/6$
- b) $2/6$
- c) $2/3$
- d) $1/3$

Q.26) Solution (c)

Explanation:

P (A wins in his first roll)

$$= 1/6$$

P (A does not win in his first roll

AND B does not win in his first roll

AND A wins in his second roll

$$= (5/6)*(5/6)*(1/6)$$

P (A does not win in his first roll

AND B does not win in his first roll

AND A does not win in his second roll

AND B does not win in his second roll

AND A wins in his third roll

$$= (5/6)*(5/6)*(5/6)*(5/6)*(1/6)$$

So, on

Required probability

$$(1/6 + 5/6 * 5/6 * 1/6 + 5/6 * 5/6 * 5/6 * 5/6 * 1/6 + \dots)$$

$$(1/6) / 1 - ((5/6) * (5/6))$$

$$= 2/3$$

Q.27) Two numbers x and y are chosen at random from the set of first 30 natural numbers. The probability that $x^2 - y^2$ is divisible by 3 is

- a) 43/89
- b) 57/87
- c) 47/87
- d) 41/83

Q.27) Solution (c)

Explanation:

Out of 30 numbers 2 numbers can be chosen in ${}^{30}C_2$ ways.

So, exhaustive number of cases = ${}^{30}C_2 = 435$

Since $x^2 - y^2$ is divisible by 3 if either x and y are divisible by 3 or non of x and y is divisible by 3.

Thus, the favourable numbers, of cases = ${}^{10}C_2 + {}^{20}C_2 = 235$

\therefore required probability $235/435 = 47/87$

Q.28) A die is thrown twice. What is the probability that

1. 5 will not come up either time?
2. 5 will come up at least once?

Choose the correct answers

- a) $11/36, 25/36$
- b) $25/36, 11/36$
- c) $14/36, 21/36$
- d) $21/36, 14/36$

Q.28) Solution (b)

Explanation:

Total number of outcomes when die is thrown twice = $6 \times 6 = 36$.

(i) Number of possible outcomes when 5 will come up either time = (5, 1), (5, 2), (5, 3), (5, 4), (5, 5), (5, 6), (1, 5), (2, 5), (3, 5), (4, 5), (6, 5) = 11

Probability that 5 will come up either time = Number of possible outcomes/Total number of favourable outcomes = $11/36$

The probability that 5 will not come up either time = $1 - 11/36 = 25/36$

(ii) Number of possible outcomes when 5 will come up at least once = 11

The probability that 5 comes up at least once = Number of possible outcomes/Total number of favourable outcomes = $11/36$

The probability that 5 will not come up either time is $25/36$ and the probability that 5 will come up is $11/36$.

Q.29) A child has a die whose six faces show the letters as given below:

A	B	C	D	E	A
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The die is thrown once. What is the probability of getting (i) A? (ii) D?

- a) $1/6, 2/6$
- b) $2/6, 1/6$
- c) $3/6, 1/6$
- d) $2/6, 3/6$

Q.29) Solution (b)

Explanation:

Total number of outcomes = 6

- (i) Probability of getting A = Number of possible outcomes/Total number of favourable outcomes
Number of possible outcomes for the letter A = 2 = $2/6$
- (ii) Probability of getting D = Number of possible outcomes/Total number of favourable outcomes = $1/6$.

The probability of getting A and D is $2/6$ and $1/6$.

Read the following passage and answer the items that follow. Your answer to these items should be based on the passages only

Passage

For generations, companies have been selling fair skin to young Indian women, promising better marriage and employment prospects. However, over the last few years, men have become a favoured target audience. This followed the realisation that the Indian alpha male, denied a choice in male-specific grooming products, had been using women's fairness creams all along. Until the mid-2000s, deodorants and shaving creams were the only grooming products advertised for men. But India's largest consumer goods companies sensed an opportunity, and launched a slew of fairness products for male consumers.

In India, as in other parts of the world, light skin is the culturally accepted and endorsed form of beauty, and children absorb this message at a young age. According to a 2015 research report by Nielsen, urban Indian men believe that fair skin can improve professional prospects. The cultural pressure to look fair, argues Kiran Khalap, branding expert and founder at communications consultancy Chlorophyll, is something inherent in our society, not manufactured by companies. "And it is certainly not restricted to India: China and Japan have had skin-whitening products for centuries, well before they met Western 'white' people," he said. However, there is a growing awareness among consumers that companies are

exploiting their insecurities, and critics have taken some of the biggest fairness brands, and the celebrities who endorse them, to task for their casual discrimination.

Earlier this month, the “Dark is Beautiful” campaign was launched to encourage Indians to embrace a wider definition of beauty. These efforts are slowly making a difference, increasing awareness and encouraging consumers to take pride in their natural skin tones. That means Indian companies will eventually have to change their approach. “My sense is that brands will wake up to the new reality, and you will see propositions reworked around clearer skin (and) glow, rather than pure fairness,” Leo Burnett’s spokesman said.

Q.30) What is the central idea contained in the passage?

- a) Though people endorsed skin fairness products, they are now realising that they are being taken for a ride by such products.
- b) Only men ardently use whitening creams to boost their personality.
- c) The brand marketing of fairness product companies are evolving to appease the target audience of India.
- d) Brands are frivolous when it comes to campaigning of their beauty products.

Q.30) Solution (a)

Explanation:

The passage essentially talks about how we Indians are drawn towards the fairness syndrome and how this stance is changing thanks to the awareness among people that beauty companies are a farce and that natural skin tone is better rather than becoming fair. This is evident in option a.

Option b can be eliminated as it points at men being overtly fond of fairness products leaving the fact that even women obsess over such products.

Option c can be ruled out as it talks only about brand marketing and does not take anything else into consideration.

Option d can be ruled out as there is no inkling towards the brands being frivolous.

Hence, option a is correct.