UGC NET Paper 1 Memory Based Question -7 JAN 2026 SHIFT -2

Q1. Match the SWAYAM Prabha Channels in List I with their coordinating institution in List II:

List I (SWAYAM Prabha Channel)	List II (Coordinating Institution)
A. Channels 17-20	I. CEC and EMRCs
B. Channels 11-16 (Post-reorganization)	II. NPTEL (IITs)
C. Channels 01-10 (Pre-reorganization)	III. IGNOU
D. Channels 21 onwards	IV. IITs, specifically IIT Bombay, Delhi, Kanpur, etc.

1. A-IV, B-III, C-I, D-II
2. A-III, B-IV, C-II, D-I
3. A-II, B-I, C-III, D-IV
4. A-I, B-II, C-IV, D-III

Answer:
A
Sol:
Correct Option – (a)
Introduction:
The administration of the SWAYAM Prabha channels is distributed among several national institutions, ensuring content quality and management for their respective domains.
Information Booster:
• A. Channels 17-20: These are typically managed by IIT Bombay (e.g., Biotechnology, Electronics, Electrical Engg., Physics), which falls under the broader coordination of NPTEL/IITs. (A-IV)
• B. Channels 11-16 (Post-reorganization): In recent restructuring (e.g., from Sept 2023), IGNOU has been specifically entrusted with the responsibility of coordinating a block of channels (e.g., Social Sciences, Professional Education, Capacity Building). (B-III)
• C. Channels 01-10 (Pre-reorganization/Original Higher Education Channels): These were largely coordinated by the CEC (Consortium for Educational Communication) and its associated EMRCs (Educational Multimedia Research Centres), focusing on UG/PG subjects like Languages, Commerce, and Sciences. (C-I)
• D. Channels 21 onwards: These channels, covering subjects like Civil, Aeronautical, Mechanical, and Computer Science, are primarily coordinated by other IITs (e.g., IIT Delhi, IIT Kanpur, IIT Kharagpur, IIT Madras). (D-II)
Additional Knowledge:
The INFLIBNET Centre remains the institution responsible for maintaining the web portal for SWAYAM Prabha. The division of channels ensures that each coordinating institution focuses on its area of expertise (e.g., IITs on technical, CEC/IGNOU on general education).

Q2. Which MS-EXCEL formulae are equivalent to each other?
A. = A3 +A4+A5+A6
B. = SUM (A3:A6)
C. = SUM (A3, A6)
D. =SUM (A3, A4, A5, A6)

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

Answer:
B

Sol:

A. = A3 + A4 + A5 + A6: This formula adds the values in cells A3, A4, A5, and A6.

B. = SUM (A3:A6): This formula also sums the values in the range from A3 to A6, which includes A3, A4, A5, and A6.

C. = SUM (A3, A6): This formula only adds the values in A3 and A6, excluding A4 and A5.

D. =SUM (A3, A4, A5, A6): This formula is a SUM function that adds A3, A4, A5, and A6, similar to formula A and B.

From this, we can see that:

- Formulas A and B and D are equivalent as they all sum the same range of cells (A3, A4, A5, A6).
- Formula C is different because it only sums two cells (A3 and A6) and excludes A4 and A5.

Therefore, the formulas that are equivalent to each other are (b) A, B and D only.

Q3. In MS-EXCEL, a formula = B$1+ C$3+ 5 in cell D9 when copied to cell F12 will become:
Choose the correct answer from the options given below:
1. = D1 + E3 = 5
2. = B$2 + C$4 + 5
3. = C$1 + D$3 + 5
4. = D$1 + E$3 + 5

Answer:
D
Sol:
In MS-Excel, when a formula is copied to another cell, the references in the formula change based on the relative or absolute reference type. The dollar sign $ indicates an absolute reference, meaning the row or column will not change when the formula is copied to another cell. Here's the breakdown:
• B$1 is an absolute reference to row 1, so when the formula is copied to another cell, the column (B) changes, but the row (1) remains fixed.
• C$3 is an absolute reference to row 3, so when copied, the column (C) changes, but the row (3) stays fixed.
• The constant 5 remains unchanged regardless of where the formula is copied.
When copying the formula from D9 to F12:
• The B$1 reference moves from column B to column D, so it becomes D$1.
• The C$3 reference moves from column C to column E, so it becomes E$3.
• The constant 5 stays as is.
Thus, the new formula in cell F12 will be: = D$1 + E$3 + 5
Information Booster:
1. Absolute References: In Excel, the dollar sign $ is used to fix a reference to a specific row or column. For example, A1 fixes both the row and column, A$1 fixes the row, and $A1 fixes the column.
2. Relative References: If there is no dollar sign, the reference is relative. This means that both the row and column can change when the formula is copied to another cell.
3. Mixed References: We can use mixed references (e.g., A$1 or $A1) to lock either the row or the column while allowing the other part to adjust when copied.
Additional Knowledge:
Copying Formulas: When you copy a formula across multiple cells in Excel, understanding how references work (relative vs. absolute) can help you avoid errors and ensure that formulas work as intended.

Q4. Arrange the following stages of Web evolution in chronological order (First to Latest):
1. Semantic Web (Web 3.0)
2. Social Web (Web 2.0)
3. Read-only Web (Web 1.0)
4. Intelligent/Symbiotic Web (Web 4.0)

1. 3, 2, 1, 4
2. 3, 1, 2, 4
3. 2, 3, 1, 4
4. 1, 2, 4, 3

Answer:
A
Sol:
Correct Option – (a)
• Introduction: The World Wide Web has evolved from a static repository of information to a highly interactive and intelligent ecosystem.
• Information Booster:
• Web 1.0: Static pages, mostly read-only, limited user interaction (The Library).
• Web 2.0: User-generated content, social media, and interactivity (The Forum).
• Web 3.0: Machine-to-machine interaction, blockchain, and decentralized data (The Semantic Web).
• Web 4.0: Integration of AI, IoT, and human-machine symbiotic intelligence (The Intelligent Web).
• Additional Knowledge: Web 5.0 is currently conceptualized as the "Emotional Web," focusing on the interaction between humans and computers based on emotional intelligence and sensory input.

Q5. The full form of WWW is:
1. World White Web
2. World Wide Web
3. Worst Wide Web
4. Worst White Web

Answer:
B
Sol:
The full form of WWW is World Wide Web. It refers to the system of interlinked hypertext documents accessed via the internet. The WWW allows users to view and interact with text, images, videos, and other multimedia through web browsers.
Information Booster:
1. World Wide Web is a system that allows documents to be linked via hyperlinks and accessed using a web browser.
2. It was invented by Tim Berners-Lee in 1989 while working at CERN.
3. The World Wide Web relies on protocols like HTTP (HyperText Transfer Protocol) to retrieve documents and data over the internet.
4. It is an essential part of the internet, but it is distinct from the internet itself, which includes the underlying infrastructure and networking.
5. The WWW revolutionized communication, commerce, education, and entertainment by providing access to a vast range of information online.

Q6. Identify the correct ascending order of the following numbers under A-D represented in different bases:
(A) $(11101011)_2$ (Base-2 binary number)
(B) $(564)_8$ (Base-8 Octal number)
(C) $(614)_{10}$ (Base 10 decimal number)
(D) $(489)_{16}$ (Base 16 hexadecimal number)
Choose the correct answer from the options given below:
1. A, C, D, B
2. D, C, B, A
3. B, C, A, D
4. A, B, C, D

Answer:
D
Sol:
Step 1: Convert all numbers to Base-10 (Decimal)
Convert A
$= (11101011)_2$
:
1. Expand the binary number using powers of 2:
$(11101011)_2 = (1\times2^7)+(1\times2^6)+(1\times2^5)+(0\times2^4)+(1\times2^3)+(0\times2^2)+(1\times2^1)+(1\times2^0)$
2. Perform the calculations: = 128 + 64 + 32 + 0 + 8 + 0 + 2 + 1 = 235
3. The decimal value of A is 235.

Convert B
$= (564)_8$
:
1. Expand the octal number using powers of 8:
$(564)_8 = (5 \times 8^2) + (6 \times 8^1) + (4 \times 8^0)$
2. Perform the calculations:
$= (5 \times 64) + (6 \times 8) + (4 \times 1) = 320 + 48 + 4 = 372$
3. The decimal value of B is 372.

Convert C
$= (614)_{10}$
:
• C is already in Base-10, so no conversion is needed.
• The decimal value of C is 614.

Convert D
$= (489)_{16}$
:
1. Expand the hexadecimal number using powers of 16:
$(489)_{16} = (4 \times 16^2) + (8 \times 16^1) + (9 \times 16^0)$
2. Perform the calculations:
$= (4 \times 256) + (8 \times 16) + (9 \times 1) = 1024 + 128 + 9 = 1161$
3. The decimal value of D is 1161.

Step 2: Arrange the Decimal Values in Ascending Order
The converted decimal values are:

- A = 235
- B = 372
- C = 614
- D = 1161

Arrange these in ascending order:
235 (A), 372 (B), 614 (C), 1161 (D)

Q7. In the context of Bluetooth and Wi-Fi as wireless communication technologies, which of the following statements are true?
A. Bluetooth allows for short-range data transfer between electronic devices, whereas Wi-Fi allows electronic devices to connect to the Internet.
B. Bluetooth needs a direct line of sight for data transmission, whereas Wi-Fi does not need it.
C. Bluetooth limits the number of devices that can connect at any one time, whereas Wi-Fi is open to more devices and more users.
D. Bluetooth does not need a direct line of sight for data transmission, whereas Wi-Fi does need it.
Choose the correct answer from the options given below:
1. A and B only
2. B and C only
3. A, C and D only
4. A and C only

Answer:
D
Sol:
The correct answer is (d) A and C only.
Statement A: True. Bluetooth is primarily designed for short-range data transfer between devices like phones, headphones, computers, and speakers. It works within a short range, typically around 10 meters. On the other hand, Wi-Fi allows devices to connect to the internet wirelessly, with a broader range (up to 100 meters or more, depending on the standard). Wi-Fi is used for internet connectivity in homes, offices, and public places.
Statement B: False. Bluetooth does not require a direct line of sight for data transmission. Bluetooth signals are able to pass through obstacles like walls and furniture, though performance may degrade with distance or interference. Wi-Fi, similarly, does not strictly require a direct line of sight but is more prone to interference when there are obstructions like thick walls between devices.
Statement C: True. Bluetooth has a limitation on the number of devices that can connect simultaneously. Typically, a Bluetooth network can connect up to seven devices at once in a piconet configuration. In contrast, Wi-Fi can support a much larger number of devices, especially with modern standards like 802.11ac or 802.11ax, which are designed for dense environments such as offices and public hotspots.
Statement D: False. Bluetooth does not require a direct line of sight, while Wi-Fi does not need a direct line of sight either. Both technologies rely on radio frequency (RF) waves, and while obstacles can reduce the quality of the connection, neither strictly requires a line of sight.
Information Booster: 1. Bluetooth Range and Limitations (A & C):
- Bluetooth is designed for low-power, short-range communication. Typically, it operates in ranges from 1 to 100 meters, depending on the Bluetooth class. The technology is commonly used for connecting peripherals like wireless keyboards, mice, headphones, and fitness trackers.
- Wi-Fi, in comparison, is used for higher-speed data transmission over a longer range, providing internet connectivity to multiple devices within a home or office network. It supports hundreds of devices, making it suitable for large networks.

2. Data Transmission without Line of Sight (B & D):

• Both Bluetooth and Wi-Fi can operate without a direct line of sight, as they use radio waves. However, performance can be affected by physical obstructions (walls, furniture), electromagnetic interference, and the distance between devices. Bluetooth tends to have a shorter range and is more susceptible to interference from obstacles, while Wi-Fi typically has a longer range and can handle interference better. Additional Knowledge: · Bluetooth (B): Bluetooth was originally designed for short-range device-to-device communication and works using a frequency of 2.4 GHz. It does not require a direct line of sight, allowing users to connect devices in environments with obstacles.
• Wi-Fi (D): While Wi-Fi also doesn't need a line of sight, obstacles such as walls and thick materials can degrade the signal strength and range. Wi-Fi networks are typically more robust in terms of handling interference and supporting larger numbers of connected devices.

Q8. A boat takes an hour to cover a certain distance downstream in a river. It takes $1\frac{1}{2}$ hour to cover the same distance upstream. Assuming that the speed of boat is same in both downstream and upstream directions, what is the ratio of speed of boat to that of stream in the river?
1. 2 : 3
2. 5 : 1
3. 3 : 2
4. 5 : 2

Answer:
B
Sol:
Solution:
Let:
Speed of boat in still water = b
Speed of stream = s
Distance = d
Downstream speed = b + s
Upstream speed = b − s
Time downstream = d / (b + s) = 1 hour → d = b + s
Time upstream = d / (b − s) = 1.5 hours
So:
(b + s) / (b − s) = 1.5 = 3/2
Cross multiply:
2(b + s) = 3(b − s)
2b + 2s = 3b − 3s
5s = b
So ratio b : s = 5 : 1
Answer: (b) 5 : 1

Q9. Match the LIST-I with LIST-II

LIST - I (Learning Theory)	LIST - II (Core Mechanism/Concept)
A. Classical Conditioning	I. Learning through observation and imitation
B. Social Learning Theory	II. Association between stimulus and response
C. Cognitive Load Theory	III. Learning as network creation/connection
D. Connectivism	IV. Managing working memory capacity during instruction

Choose the correct answer from the options given below:

1. A - II, B - I, C - IV, D – III
2. A - I, B - II, C - III, D - IV
3. A - IV, B - III, C - II, D – I
4. A - III, B - IV, C - I, D – II

Answer:
A
Sol:
Correct Option - (a)
Introduction: This question asks to match different learning theories with their fundamental mechanisms or core concepts. Understanding these connections is essential for grasping the diverse ways in which learning is theorized to occur.
Information Booster: Let's analyze each pairing:
A. Classical Conditioning
• Core Mechanism/Concept: II. Association between stimulus and response. Classical conditioning, famously demonstrated by Ivan Pavlov, involves learning through the association of a neutral stimulus with a stimulus that naturally elicits a response, eventually leading the neutral stimulus to elicit a similar response. It's about involuntary, reflexive responses.
B. Social Learning Theory
• Core Mechanism/Concept: I. Learning through observation and imitation. Developed by Albert Bandura, Social Learning Theory (later Social Cognitive Theory) posits that individuals learn behaviors, attitudes, and emotional reactions by observing others (models) and the consequences of their actions, without necessarily direct reinforcement. Key concepts include observational learning, modeling, and vicarious reinforcement.
C. Cognitive Load Theory
• Core Mechanism/Concept: IV. Managing working memory capacity during instruction. Proposed by John Sweller, Cognitive Load Theory focuses on how instructional design can manage the demands placed on a learner's limited working memory capacity to optimize learning. It distinguishes between intrinsic (inherent difficulty), extraneous (poor design), and germane (schema construction) cognitive load.
D. Connectivism
• Core Mechanism/Concept: III. Learning as network creation/connection. Connectivism, a learning theory for the digital age (developed by George Siemens and Stephen Downes), suggests that learning is a process of connecting specialized information nodes or sources. It emphasizes that knowledge resides in connections and networks, and learning involves the ability to navigate, create, and grow these networks, especially in a world of rapidly changing information.
Additional Knowledge: These theories represent different paradigms in learning:
• Behaviorism (Classical Conditioning) focuses on observable behaviors and environmental stimuli.
• Social Learning Theory bridges behaviorism and cognitivism by including cognitive factors like attention and motivation in observational learning.
• Cognitive Load Theory is a cognitive theory that provides practical guidelines for instructional design based on how the human mind processes information.
• Connectivism is a relatively newer theory, often considered a "learning theory for the digital age," that attempts to explain learning in complex, networked environments where knowledge is constantly evolving and distributed.

Q10. The Convention of Biological Diversity (CBD) was first opened for signature during:
1. Conference on human environment

2. Earth Summit
3. Montreal Protocol
4. COP1

Answer:
B
Sol:
The Convention on Biological Diversity (CBD) was first opened for signature at the Earth Summit held in Rio de Janeiro, Brazil, in 1992. The CBD is a multilateral treaty aimed at conserving biodiversity, promoting sustainable use of its components, and ensuring fair and equitable sharing of benefits arising from the utilization of genetic resources.
The Earth Summit, also known as the United Nations Conference on Environment and Development (UNCED), marked a major milestone in international environmental agreements, including the CBD.
The CBD was adopted on 22 May 1992 and opened for signature during this summit.
Information Booster:
CBD Objectives:
Conservation of biological diversity.
Sustainable use of biodiversity.
Fair and equitable sharing of benefits from genetic resource utilization.
Earth Summit (1992):
Major outcomes included the CBD, Agenda 21, and the United Nations Framework Convention on Climate Change (UNFCCC).
Highlighted the need for sustainable development globally.
Importance of the CBD:
It is the first comprehensive global agreement addressing all aspects of biodiversity.
Focuses on ecosystem, species, and genetic diversity.
Additional Knowledge:
Conference on Human Environment (a):
Held in Stockholm in 1972, it laid the foundation for global environmental governance but did not address biodiversity directly.
Montreal Protocol (c):
Focused on reducing ozone-depleting substances and is considered one of the most successful environmental agreements but unrelated to biodiversity.
COP1 (d):
Refers to the First Conference of Parties under the CBD, held in Nassau, Bahamas, in 1994. It aimed at implementing the objectives of the CBD.

Q11. Which of the following is not considered as self- generated feedback?
1. Assurance
2. Previewing
3. Retracing
4. Observation

Answer:
A
Sol:
Introduction:
Self-generated feedback refers to the process of monitoring and evaluating one's own performance or progress.
Information Booster:

Assurance: Assurance typically involves external validation or confirmation, whereas self-generated feedback involves internal monitoring and evaluation.
Self-Generated Feedback Options
The following options are considered self-generated feedback:
Previewing: mentally rehearsing or anticipating a task or performance
Retracing: reviewing or reflecting on past actions or experiences
Observation: monitoring one's behaviour or performance
Assurance, on the other hand, often involves external feedback or validation from others.

Q12. Arrange the following statistical measures in increasing order:
(A) Sixth decile
(B) Median
(C) Third quartile
(D) 67th percentile
misChoose the correct answer from the options given below:
1. (A), (D), (B), (C)
2. (B), (C), (A), (D)
3. (B), (A), (D), (C)
4. (A), (C), (D), (B)
Answer:
C
Sol:
To arrange the statistical measures in increasing order, we need to understand their equivalences and positions within a dataset.
1. Median (B):
• The median divides the dataset into two equal halves, corresponding to the 50th percentile.
• The median is less than the sixth decile (60th percentile), 67th percentile, and the third quartile.
2. Sixth Decile (A):
• The sixth decile corresponds to the 60th percentile, slightly higher than the median (50th percentile).
3. 67th Percentile (D):
• This measure is higher than the 60th percentile but less than the third quartile (75th percentile).
4. Third Quartile (C):
• The third quartile corresponds to the 75th percentile, higher than all the other measures listed.
Information Booster:
1. Median: Divides a dataset into two equal parts (50th percentile).
2. Deciles: Divide the dataset into ten equal parts; the 6th decile = 60th percentile.
3. Percentiles: Indicate the percentage of data below a certain value (e.g., 67th percentile = 67% of data below this value).
4. Quartiles: Divide the dataset into four equal parts; the third quartile = 75th percentile.

Q13. How much more energy is released in an earthquake whose value is 4 on Richter Scale than in an earthquake whose value is 3 on Richter Scale?
1. Twice
2. 10 %
3. 10 times
4. 50 %
Answer:

C
Sol:
Introduction: This question asks about the difference in energy released between two earthquakes with different magnitudes on the Richter scale. The Richter scale is logarithmic, and understanding its properties is key to answering this.
Information Booster:
The Richter scale is a base-10 logarithmic scale that measures the amplitude of the largest seismic wave recorded by a seismograph. This means:
- An increase of one whole number on the Richter scale represents a tenfold (10 times) increase in the amplitude of the seismic waves.

However, the question specifically asks about the energy released. The relationship between Richter magnitude (M) and the energy released (E) is not linear. It's given by the formula:

$$\log_{10} E = 11.8 + 1.5M$$

Let's calculate the energy released for an earthquake of magnitude 4 (E_4) and magnitude 3 (E_3):

For M = 4: $\log_{10} E_4 = 11.8 + (1.5 \times 4) \log_{10} E_4 = 11.8 + 6.0 \log_{10} E_4 = 17.8$

For M = 3: $\log_{10} E_3 = 11.8 + (1.5 \times 3) \log_{10} E_3 = 11.8 + 4.5 \log_{10} E_3 = 16.3$

Now, to find how much more energy is released, we calculate the ratio E_4 / E_3 : $= \quad = 10^{(17.8-16.3)} = 10^{1.5}$

Calculating $10^{1.5} : 10^{1.5} = 10^{\,} = \quad = \quad \approx 31.62$

So, an earthquake with a value of 4 on the Richter scale releases approximately 31.6 times more energy than an earthquake with a value of 3.
Analysing the Options:
- Twice: (2 times) - Incorrect.
- 10 %: (0.1 times) - Incorrect, and indicates a decrease.
- 10 times: This is the factor for the increase in *amplitude* of seismic waves for a one-unit increase in Richter magnitude, not the energy released. However, it is a very common misconception to apply this factor to energy.
- 50 %: (0.5 times) - Incorrect, and indicates a decrease.

Q14. Match the ancient educational institutions in List I with their primary field of specialization or a defining feature in List II:

List I (Ancient Institution)	List II (Specialization/Feature)
A. Nalanda	I. Site where Chanakya is believed to have taught statecraft
B. Takshashila	II. Center for Vajrayana Buddhist philosophy, established by Pala King Dharmapala
C. Vikramashila	III. Famous for the vast library complex, *Dharmaganja* (Mountain of Truth)
D. Valabhi	IV. Noted center for Hinayana Buddhism and the study of Nyaya

1. A-III, B-IV, C-II, D-I
2. A-III, B-I, C-II, D-IV
3. A-III, B-I, C-IV, D-II
4. A-I, B-III, C-II, D-IV

Answer: B

Sol:

Correct Option – (b)

Introduction:

Ancient Indian universities were centers of international excellence, each developing distinct characteristics and specializations that attracted scholars from across the globe, including from China, Persia, and Greece.

Information Booster:

• A. Nalanda (Bihar): Flourished under the Gupta Empire. It was renowned for its vast monastic complex and the immense three-building library, Dharmaganja (meaning 'Treasury of Dharma'). (A-III)

• B. Takshashila (Rawalpindi, Pakistan): Predates Nalanda and is considered one of the earliest universities. It's historically linked to famous scholars like Pāṇini (Grammar) and Chanakya (Arthashastra/Statecraft). (B-I)

• C. Vikramashila (Bihar): Established by the Pala ruler Dharmapala in the late 8th century, it became a major center for the study of Vajrayana Buddhism and tantric arts. (C-II)

• D. Valabhi (Gujarat): A significant learning center in Western India (Maitraka Dynasty), it was a renowned hub for Hinayana Buddhism and the study of the Nyaya (logic) school of Hindu philosophy. (D-IV)

Additional Knowledge:

The accounts of Chinese pilgrims like Xuanzang and Faxian are crucial sources for modern historians to understand the curriculum, administration, and international importance of these ancient centers of learning.

Q15. Which one of the following is used as a reference to measure the Global Warming Potential (GWP) of a greenhouse gas?

1. Carbon dioxide (CO_2)
2. Methane (CH_4)
3. Chlorofluorocarbon (CFC)
4. Hydrofluorocarbon (HFC)

Answer:

A

Sol:

The Global Warming Potential (GWP) of a greenhouse gas is measured relative to carbon dioxide (CO_2), which is assigned a GWP of 1 as the baseline reference. GWP quantifies the heat-trapping ability of a gas in the atmosphere over a specific time period, typically 20, 100, or 500 years.

Key Points:

1. Carbon Dioxide as the Reference:

- CO_2 is the most common greenhouse gas emitted through human activities, making it a standard reference for GWP measurements.
- All other greenhouse gases are compared to CO_2 to determine their relative impact on global warming.

2. GWP of Other Gases (Over 100 years):

- Methane (CH_4): GWP of ~25.
- Nitrous Oxide (N_2O): GWP of ~298.
- Hydrofluorocarbons (HFCs): GWP can range from hundreds to thousands.
- Chlorofluorocarbons (CFCs): GWP can exceed 10,000.

3. Relevance of GWP:

- Helps policymakers prioritize mitigation strategies by understanding the relative impacts of different greenhouse gases.

Information Booster:

1. Global Warming Potential (GWP):

- Measures the heat a greenhouse gas traps compared to CO_2 over a specific time frame.

2. Importance:

- Used to estimate the relative contribution of different gases to global warming.

3. Examples of GWP Values (100 years):

- CO_2: 1
- CH_4: ~25
- N_2O: ~298
- CFC-11: ~4,660
- HFC-23: ~12,400

Additional Knowledge:

1. (b) Methane (CH_4):

- Methane has a GWP of ~25, which is significantly higher than CO_2, but it is not used as the reference gas.

2. (c) Chlorofluorocarbon (CFC):

- CFCs have extremely high GWPs but are not used as the reference due to their limited use after the Montreal Protocol.

3. (d) Hydrofluorocarbon (HFC):

- HFCs also have high GWPs but are measured relative to CO_2.

Q16. Which among the following is not a form of fallacy of Defective Induction?

A. The argument from ignorance
B. Complex question
C. False cause
D. Hasty Generalization
E. Begging the question

Choose themost appropriateanswer from the options given below:

1. A and C Only
2. B and E Only
3. D and E Only

4. A and B Only

Answer:

B

Sol:

The following are NOT fallacies of Defective Induction:

- Complex Question (B)– A fallacy of Presumption (loading multiple questions into one).
- Begging the Question (E)– A fallacy of Circular Reasoning (assuming the conclusion within the premise).

Information Booster:

1. Defective induction involves insufficient or weak evidence leading to an unsupported conclusion.
2. The argument from ignorance wrongly claims something is true simply because it hasn't been disproven.
3. False cause errors attribute causation without proper justification.
4. Hasty generalization is jumping to broad conclusions from a small sample.
5. Complex question fallacy improperly presumes facts in the question itself.
6. Begging the question involves circular reasoning, not weak evidence.

Additional Information:

1. Argument from Ignorance (A)– Assuming something is true simply because it hasn't been proven false (or vice versa). (A form of Defective Induction)
2. False Cause (C)– Incorrectly assuming a causal relationship between two events. (A form of Defective Induction)
3. Hasty Generalization (D)– Drawing a broad conclusion from insufficient or biased evidence. (A form of Defective Induction)

Q17. Which informal fallacy is committed in the following statement- "American Indians are disappearing. That man is an American Indian'.

1. Red Herring
2. Hasty Generalization
3. Begging the question
4. Fallacy of division

Answer:

D

Sol:

The statement "American Indians are disappearing. That man is an American Indian" commits the fallacy of division. This fallacy occurs when one erroneously attributes something true of a group (in this case, "American Indians are disappearing") to an individual member of that group (the specific man being referred to as an American Indian).

Q18. Electrostatic Precipitator is used in Thermal Power Plants to remove which of the following air pollutants?

1. Polycycli Aromatic Hydrocarbons
2. Gaseous Pollutants
3. Fly ash
4. Volatile Organic Compounds

Answer:

C

Sol:

Introduction
Electrostatic precipitators (ESPs) are devices used to control air pollution by removing particulate matter from gas streams. In thermal power plants, ESPs play a crucial role in reducing emissions.
Information Booster
• ESP's primary function is to remove Fly ash and other particulate matter from the flue gas emissions of thermal power plants.
• Fly ash is a byproduct of coal combustion and can cause significant air pollution if not properly controlled.
Additional Knowledge
Polycyclic Aromatic Hydrocarbons (PAHs): These are organic compounds that can be emitted during coal combustion. However, ESPs are not specifically designed to remove PAHs, which are typically controlled using other technologies like activated carbon or scrubbers.
Gaseous Pollutants: ESPs are not effective in removing gaseous pollutants, such as SO2, NOx, or CO2. These pollutants require separate control technologies like scrubbers or selective catalytic reduction.
Volatile Organic Compounds (VOCs): Like PAHs, VOCs are not typically controlled using ESPs. Instead, technologies like activated carbon, scrubbers, or thermal oxidation are used to remove VOCs from gas streams.
The correct answer is: Fly ash. Electrostatic precipitators are specifically designed to remove particulate matter like fly ash from the emissions of thermal power plants.

Q19. Match the term (List I) with its definition in formal logic (List II):

List I (Term)	List II (Definition)
A. Valid Argument	I. A deductive argument that is valid AND has all true premises.
B. Invalid Argument	II. A deductive argument where the conclusion follows from the premises.
C. Sound Argument	III. A deductive argument where premises do not guarantee the conclusion.
D. Cogent Argument	IV. An inductive argument that is strong and has all true premises.

Options:
1. A-II, B-III, C-I, D-IV
2. A-I, B-II, C-III, D-IV
3. A-II, B-IV, C-I, D-III
4. A-IV, B-III, C-II, D-I

Answer:
A
Sol:
Correct Option – (a)
Information Booster
• Validity: Concerns structure only. If the premises are true, the conclusion *would have to be* true.
• Soundness: Structure + Fact. The argument is valid and the premises *actually are* true in the real world.
• Cogency: The inductive equivalent of soundness.
Additional Knowledge
An argument can be Valid but Unsound (e.g., "All cats are birds; all birds fly; therefore all cats fly"). The structure is correct, but the premises are factually false.

Q20. Match List I with List II:

List I (Statistical Test)	List II (Application)
A. One-way ANOVA	I. To compare the means of two independent groups
B. Paired Samples t-test	II. To determine if there is a significant association between two categorical variables
C. Chi-square ($\chi 2$) test	III. To compare the means of more than two groups
D. Independent Samples t-test	IV. To compare the means of the same group before and after an intervention

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Choose the correct answer from the options given below:

1. . A-I, B-II, C-III, D-IV
2. . A-III, B-IV, C-II, D-I
3. . A-II, B-III, C-I, D-IV
4. . A-IV, B-I, C-II, D-III

Answer:

B

Sol:

Correct Option - (b)

Introduction

This question tests your understanding of the application of different statistical tests based on the nature of the data and the research question. Choosing the right test is a foundational skill in quantitative research. The tests listed—ANOVA, t-tests, and Chi-square—are some of the most commonly used for hypothesis testing.

Information Booster

• A. One-way ANOVA is used to compare the means of three or more independent groups to see if there are any statistically significant differences between them. For example, you might use an ANOVA to compare the average test scores of students from three different teaching methods. Thus, it matches with III.

• B. Paired Samples t-test is used when you have two sets of observations on the same group of subjects, such as a pre-test and a post-test score. It determines if there is a significant change in the mean from one measurement to the next. For example, comparing the stress levels of a group of participants before and after a meditation program. Thus, it matches with IV.

• C. Chi-square ($\chi 2$) test is a non-parametric test used to examine the relationship between two categorical variables. For example, a researcher could use a Chi-square test to see if there is a relationship between a person's gender (male/female) and their preferred mode of transportation (car/bus/train). Thus, it matches with II.

• D. Independent Samples t-test is used to compare the means of two independent, unrelated groups. For example, to compare the average salaries of male and female employees in an organization. It's the simplest form of a t-test. Thus, it matches with I.

Additional Knowledge

• The t-test is a parametric test, meaning it assumes the data follows a normal distribution. It is used for comparing means when the sample size is small.

• ANOVA is an extension of the t-test and is also a parametric test. It is used to compare means when there are more than two groups. The "F-statistic" is the key output of an ANOVA test.

• Chi-square is a non-parametric test, meaning it does not assume a normal distribution for the data. This makes it a versatile tool for analyzing frequency data and nominal-level variables.

Q21. The criterion of "dependendability' in qualitative research parallels which of the following criteria in quantitative research?

1. Objectivity
2. internal validity
3. external validity
4. reliability

Answer:

D

Sol:

In qualitative research, dependability refers to the consistency and stability of research findings over time. It ensures that the research process is logical, traceable, and well-documented. This concept parallels reliability in quantitative research, which measures the consistency of a research instrument or method in producing similar results under consistent conditions.

Both dependability and reliability focus on the repeatability and trustworthiness of the findings, ensuring that results are not random or idiosyncratic. In qualitative studies, dependability is often ensured through audit trails, peer review, and detailed documentation of the research process.

Information Booster:

1. Dependability in qualitative research is one of Lincoln and Guba's criteria for trustworthiness.
2. It requires researchers to clearly document their methods and decisions, enabling replication or understanding by others.
3. Reliability in quantitative research ensures that an instrument consistently measures a variable under similar conditions.
4. Dependability can be enhanced by maintaining detailed records, methodological transparency, and triangulation.
5. While reliability emphasizes standardization, dependability acknowledges the dynamic nature of qualitative settings.
6. Both terms aim to bolster the credibility of research outcomes.
7. A "dependability audit" in qualitative research is analogous to statistical reliability checks in quantitative research.

Q22. Given below are two statements:

One is labelled as Assertion (A) and the other is labelled as Reason (R),

Assertion (A): Qualitative research is guided by positivistic epistemology

Reason (R): The aim of quantitative research is only to test hypothesis.

In the light of the above statements, choose the most appropriate answer from the options given below :

1. Both (A) and (R) are correct and (R) is the correct explanation of (A)
2. Both (A) and (R) are correct but (R) is NOT the correct explanation of (A)
3. (A) is correct but (R) is not correct
4. (A) is not correct but (R) is correct

Answer:

D

Sol:

The Assertion (A) is incorrect because qualitative research is not guided by positivistic epistemology; it is usually associated with interpretivist or constructivist epistemologies that emphasize understanding subjective meanings and experiences rather than seeking objective, measurable truths. Positivism is typically aligned with quantitative research.

The Reason (R) is correct because quantitative research often focuses on hypothesis testing, using statistical methods to confirm or refute predefined hypotheses, although it can also involve other goals such as exploring relationships between variables.
Information Booster: 1. Qualitative research is generally aligned with interpretivism, focusing on understanding human experiences and social phenomena through methods like interviews and observations.
2. Positivism emphasizes objectivity, observable facts, and often aligns with quantitative methods such as surveys and experiments.
3. Quantitative research often involves testing hypotheses, using numerical data to support or refute theoretical predictions.
4. In qualitative research, the emphasis is on depth, context, and the meaning individuals or groups attribute to their experiences.
5. Positivist research in the social sciences is more commonly associated with quantitative methods like surveys and experiments.
6. Interpretivist epistemology is more suitable for qualitative approaches, which prioritize understanding social reality from the perspective of the individuals involved.

Q23. Arrange the following steps involved in the process of data collection in the correct sequence:
1. Data interpretation
2. Identification of data requirements
3. Data organization and classification
4. Data collection

Choose the correct sequence:
1. 2 → 4 → 3 → 1
2. 4 → 2 → 3 → 1
3. 2 → 3 → 4 → 1
4. 3 → 4 → 2 → 1

Answer:
A
Sol:
The correct sequence of the data collection process begins with identifying the data requirements, which clearly defines the purpose, scope, and type of data needed. Once the requirements are established, data is collected from appropriate sources based on the defined objectives. After collection, the data must be organized and classified so that it can be systematically arranged and made suitable for analysis. Finally, data interpretation is performed to derive meaningful insights and conclusions from the organized data. Therefore, the correct logical sequence is 2 → 4 → 3 → 1.
Information Booster:
1. Data requirements identification: Determines what data is needed, why it is needed, and in what form.
2. Data collection: Involves gathering data from primary or secondary sources.
3. Data organization and classification: Structures data into categories, tables, or groups for clarity.
4. Data interpretation: Extracts meaning, patterns, and conclusions from the organized data.

Additional Knowledge:
- Data collection is a systematic process, and skipping or rearranging steps leads to inaccurate results.
- Primary data is collected first-hand, while secondary data is collected from existing sources.
- Incorrect options are wrong because they either interpret data before organizing it or organize data before actual collection.

Q24. Which of the following are remote data collection procedures?
(A) Third party interview
(B) Pop-ups
(C) Data base e-mail
(D) Instant messaging
(E) Panel discussions
Choose the correct answer from the options given below:
1. (A), (B), (C) only
2. (B), (C), (D) only
3. (C), (D), (E) only
4. (A), (B), (E) only

Answer:
B

Sol:
Pop-ups, Data base e-mail, and Instant messaging are common remote data collection procedures used in digital environments. These methods allow researchers or businesses to gather data from individuals without requiring face-to-face interactions. Pop-ups are often used in web-based surveys, data base e-mails are employed for sending out surveys or questionnaires, and instant messaging allows for real-time data collection in online environments.

Information Booster: · Remote data collection involves gathering data without physical interaction, often through digital or online methods.

• Pop-ups can be triggered on websites to collect data from users through short surveys or questionnaires.

• Database e-mails are a form of email marketing or research where surveys are distributed to a large audience.

• Instant messaging platforms like WhatsApp or Slack can be utilized to collect feedback or conduct interviews in real-time.

• Remote methods offer a wide reach and convenience but may face issues like low response rates or survey fatigue.

Additional Knowledge:
Third party interview: This method usually involves an external entity conducting interviews but is more commonly used in-person rather than remotely.

Panel discussions: These are group discussions typically conducted in person, though they can be virtual; however, they are not primarily classified under remote data collection procedures.

Q25. Match List I with List II.

List I (Statement)	List II (Logical Equivalent)
A. No fishes are mammals	I. No fishes are non-mammals
B. All fishes are mammals	II. No mammals are fishes
C. Some fishes are mammals	III. Some mammals are non-fishes
D. Some mammals are not fishes	IV. Some mammals are fishes

Choose the correct answer from the options given below:
Match the Following
1. A-IV, B-I, C-II, D-III
2. A-II, B-III, C-IV, D-I
3. A-II, B-I, C-IV, D-III

4. A-III, B-II, C-IV, D-I

Answer:

C

Sol:

The correct match is (c) A-II, B-I, C-IV, D-III

- No fishes are mammals is logically equivalent to II. No mammals are fishes.
- Both statements indicate that there is no overlap between the categories of fishes and mammals.
- All fishes are mammals is logically equivalent to I. No fishes are non-mammals.
- If all fishes are mammals, it means there are no fishes that are not mammals.
- Some fishes are mammals is logically equivalent to IV. Some mammals are fishes.
- If some fishes are mammals, then it must be true that some mammals are also fishes.
- Some mammals are not fishes is logically equivalent to III. Some mammals are non-fishes.
- If some mammals are not fishes, it implies that some mammals belong to the non-fish category.

Q26. Which of the following universities is located nearest to the Krishna River?

1. Osmania University
2. Acharya Nagarjuna University
3. Andhra University
4. University of Hyderabad

Answer:

B

Sol:

Acharya Nagarjuna University is located near Guntur district in Andhra Pradesh, which lies close to the banks of the Krishna River. The Krishna River flows through the central part of Andhra Pradesh, passing near regions such as Vijayawada and Guntur, making Acharya Nagarjuna University geographically the closest among the given options. Therefore, option (b) is the correct answer.

Information Booster:

1. Krishna River: One of the longest rivers in India, flowing through Maharashtra, Karnataka, Telangana, and Andhra Pradesh.
2. Acharya Nagarjuna University: Located near Guntur, Andhra Pradesh, close to the Krishna River basin.
3. Geographical MCQs: Often test knowledge of rivers, universities, and their locations in India.

Additional Knowledge:

- Osmania University and University of Hyderabad are located in Hyderabad, near the Musi River, not the Krishna River.
- Andhra University is located in Visakhapatnam, which is a coastal city and far from the Krishna River.

Q27. Which of the following statements is/are true about a syllogism?

1. In a syllogism, conclusions follow necessarily from premises.
2. A syllogism can have false premises but still be logically valid.
3. All syllogisms are deductive reasoning forms.

Options:

1. 1 and 3 only
2. 2 and 3 only
3. 1, 2, and 3

4. 1 and 2 only
Answer:
C
Sol:
Correct Option – (c)
Introduction: A syllogism is a deductive reasoning form in which a conclusion is drawn from two or more premises.
Information Booster:
• Statement 1: True, because syllogisms derive conclusions from premises logically.
• Statement 2: True, because validity is about the logical structure, not the truth of premises.
• Statement 3: True, since all syllogisms are examples of deductive reasoning.
Additional Information: Many confuse "valid" with "true" — a syllogism can be valid but factually wrong if its premises are false.

Q28. In Indian logic (Nyāya philosophy), which Pramāṇa is considered as the primary and most important source of valid knowledge?
1. Pratyakṣa (Perception)
2. Anumāna (Inference)
3. Upamāna (Comparison)
4. Śabda (Verbal testimony)
Answer:
A
Sol:
Correct Option – (a)
Introduction: In Indian epistemological systems, particularly Nyāya, Pramāṇa refers to the valid means or instruments of acquiring true knowledge (pramā). While multiple pramāṇas are accepted, one is considered foundational.
Information Booster: Pratyakṣa (Perception) is regarded as the primary and most fundamental pramāṇa in Nyāya philosophy. It is defined as direct, sense-mediated cognition that arises from the contact of a sense organ with an object. Nyāya argues that all other pramāṇas ultimately depend on perception for their validation. For instance, an inference (anumāna) must be based on a perceived correlation (e.g., seeing smoke and fire together on a mountain).
Additional Knowledge: Different schools of Indian philosophy accept a different number of pramāṇas. Cārvāka materialism accepts only Pratyakṣa. Sāṅkhya and Yoga accept three (Pratyakṣa, Anumāna, Śabda), while Nyāya accepts four (the above three plus Upamāna). Mīmāṃsā and Vedānta accept six, adding Arthāpatti (presumption) and Anupalabdhi (non-apprehension).

Q29. Arrange the steps of the research process in the correct sequence.
(A) Collecting data
(B) Reviewing the literature
(C) Designing the methodology
(D) Formulating a research process
(E) Analysis and Interpretation
Choose the correct answer from the options given below:
1. (D), (B), (A), (C) and (E)
2. (D), (B), (C), (A) and (E)
3. (D), (C), (B), (A) and (E)

4. (A), (C), (B), (E) and (D)

Answer:

B

Sol:

The correct sequence of the research process generally follows these steps:

- (D)Formulating a research process: The first step is to clearly define the research problem and objectives.
- (B)Reviewing the literature: After formulating the research process, reviewing existing literature is crucial to understanding the current state of research in the field.
- (C)Designing the methodology: Once the literature is reviewed, the next step is to design the methodology for data collection and analysis.
- (A)Collecting data: After finalizing the methodology, the data is collected through various methods.
- (E)Analysis and Interpretation: Finally, the collected data is analyzed and interpreted to draw conclusions.

Information Booster:

1. Formulating a research process involves determining the research questions, objectives, and scope.
2. Reviewing the literature helps identify gaps in knowledge, relevant theories, and existing studies that guide the research.
3. Designing the methodology includes deciding on research methods (qualitative/quantitative), sampling techniques, and tools for data collection.
4. Collecting data is done using the selected tools and methods, such as surveys, experiments, or observations.
5. Analysis and Interpretation involves organizing, processing, and analyzing the data to draw conclusions and discuss findings.

Q30. Given below are two statements:

Statement I: A discrete variable can represent only finite set of values.

Statement II: A continuous variable can be broken into subparts including fractions.

In the light of the above statements, Choose the correct answer from the options given below:

1. Both Statement I and Statement II are true
2. Both Statement I and Statement II are false
3. Statement I is true but Statement II is false
4. Statement I is false but Statement II is true

Answer:

A

Sol:

Statement I is true because a discrete variable refers to a variable that can take on only a finite or countable number of values. For example, the number of students in a class or the number of books on a shelf represents discrete variables because they are distinct and finite.

Statement II is also true as a continuous variable can indeed be broken down into fractions or decimals. Continuous variables take on an infinite number of possible values within a given range. Examples include measurements such as height, weight, and time, where the variable can be divided into smaller parts, including fractional values.

Information Booster: 1. Discrete variables take specific, distinct values, such as the number of objects, events, or individuals.

2. Continuous variables can be divided into an infinite number of smaller increments, such as lengths, weights, or times.

3. Discrete variables are countable and usually expressed in whole numbers, whereas continuous variables are measurable and can include decimal or fractional values.
4. In research, it's crucial to identify whether the variables are discrete or continuous, as this affects the statistical methods used.
5. Continuous variables can cover any value within a certain range, making them ideal for scientific and measurement-related research.
6. Discrete variables are limited in the values they can assume, often used in cases where only specific numbers or categories are involved.

Q31. The Shimla Commission is also known as:
1. Sadler Commission
2. Hunter Commission
3. Mudaliar Commission
4. Kothari Commission

Answer:
B
Sol:
The Shimla Commission was officially known as the Indian Education Commission of 1882, which was chaired by Sir William Hunter. Since the commission submitted its report at Shimla and was headed by Hunter, it came to be popularly known as the Hunter Commission as well as the Shimla Commission. Hence, option (b) is the correct answer.
Information Booster:
1. Shimla Commission: Appointed in 1882 to review the progress of education in British India.
2. Hunter Commission: Named after its chairman Sir William Hunter.
3. Focus area: Primary and secondary education, especially expansion of elementary education.
4. Significance: Emphasized the role of local bodies in managing primary education.

Additional Knowledge:
- Sadler Commission (1917–19): Focused on university education.
- Mudaliar Commission (1952–53): Related to secondary education in independent India.
- Kothari Commission (1964–66): Comprehensive review of the Indian education system.
- Options (a), (c) and (d) are incorrect because they belong to different periods and educational levels.

Q32. Match the following research types with their relationship to theory and hypothesis:

List-I (Research Type)	List-II (Relationship to Theory/Hypothesis)
A. Quantitative Research	1. Develops theories from observed data (Inductive).
B. Qualitative Research	2. Tests theories with empirical data (Deductive).
C. Mixed Methods Research	3. Combines both deductive and inductive approaches.

Choose the correct option:
1. A-2, B-1, C-3
2. A-1, B-2, C-3
3. A-2, B-3, C-1
4. A-3, B-1, C-2

Answer:
A
Sol:
Correct Option – (a)
Introduction

This question addresses a more advanced concept in research methodology: the relationship between the research type and the researcher's approach to theory and hypothesis testing.
Information Booster
• A. Quantitative Research (2): This research type is typically deductive. The researcher starts with an existing theory, formulates a specific hypothesis based on that theory, and then collects data to see if the hypothesis is supported. The goal is to verify the theory.
• B. Qualitative Research (1): This research type is typically inductive. The researcher begins with observations and data collection without a predefined theory or hypothesis. As the data is analyzed, patterns and themes emerge, and the researcher builds a new theory from the ground up.
• C. Mixed Methods Research (3): This approach intentionally uses both quantitative and qualitative methods. This allows the researcher to use a deductive approach (testing a hypothesis with numbers) and an inductive approach (exploring a topic with narratives). The two approaches are often integrated to provide a more complete picture.
Additional Knowledge
The deductive-inductive distinction is a cornerstone of research philosophy. Mixed methods research, by combining both, offers a powerful way to get the breadth (from quantitative data) and depth (from qualitative data) that a single approach cannot provide.

Q33. Match the following Pre-Independence Education Commissions/Committees with their primary focus area in the context of higher education:

List-I (Commission/Committee)	List-II (Primary Focus in Higher Education)
A- Hunter Commission (1882)	1- Comprehensive reorganization of Calcutta University and collegiate education
B- Sadler Commission (1917)	2- Expansion and improvement of primary education, with limited HE focus
C- Hartog Committee (1929)	3- Mass literacy and reviewing the system post-Saddler expansion
D- Sargent Plan (1944)	4- Formulating a post-war national system of education

Codes
1. 2 1 3 4
2. 1 2 4 3
3. 2 1 4 3
4. 1 2 3 4
Answer:
A
Sol:
Correct Option – (a)
Introduction: This matching question evaluates the understanding of the distinct mandates and central contributions of various pre-independence educational policies, preventing their conflation.
Information Booster:
• Hunter Commission (A-2): Primarily focused on the state of primary and secondary education in India. Its higher education recommendations were secondary, mainly suggesting the grant-in-aid system and affiliating more colleges.
• Sadler Commission (B-1): Its entire mandate was the specific and in-depth reorganization of Calcutta University, making it a landmark report solely dedicated to university education structure and quality.

• Hartog Committee (C-3): Appointed to review the progress of education after the Saddler reforms, it focused on the problem of "mass versus quality," highlighting the high wastage and stagnation in primary schools and the unchecked, poor-quality expansion of universities.
• Sargent Plan (D-4): This was a comprehensive, long-term plan for the post-war reconstruction of India's entire educational system, from pre-primary to university education, aiming for a standardized national structure.
Additional Knowledge: While Wood's Despatch (1854) is called the "Magna Carta of English Education," the Sargent Plan (1944) was the first concrete blueprint for a free and universal education system in India, though it was never implemented due to the war and subsequent partition.

Q34. In digital communication, a Television broadcast and a Radio broadcast are examples of _____ type of transmission.
1. automatic
2. half-duplex
3. simplex
4. full-duplex

Answer:
C
Sol:
In digital communication, simplex transmission refers to a one-way communication system where data flows in only one direction from the sender to the receiver. The receiver cannot send any feedback or response. This is exactly how television and radio broadcasting work — the signals are transmitted from the broadcasting station, and the audience only receives the content without transmitting anything back. There is no return path or communication from the viewer or listener to the source in these systems, making it a clear case of simplex mode.
Information Booster:
1. Simplex transmission is unidirectional – data flows from sender to receiver only.
2. Examples include TV broadcast, radio broadcast, keyboard to CPU, and mouse to computer.
3. Simplex systems are efficient for mass communication where feedback is not needed.
4. Digital broadcasting systems use modulation techniques like AM, FM, and digital encoding.
5. Simplex mode is widely used in public address systems and information display systems.

Additional Information:
• Half-duplex systems allow two-way communication, but only one direction at a time (e.g., walkie-talkies).
• Full-duplex systems support simultaneous two-way communication (e.g., telephone).
• Automatic transmission refers to a mechanical process in automotive engineering, not a communication mode.

Q35. Match the following Post-Independence Commissions/Policies with their primary chairperson or the key minister associated with their formulation:

List-I (Commission/Policy)	List-II (Chairperson/Key Figure)
A- University Education Commission (1948)	1- Dr. D.S. Kothari
B- Education Commission (1964)	2- Dr. S. Radhakrishnan
C- National Policy on Education (1986)	3- Prof. Yash Pal
D- Committee to Advise on Renovation and Rejuvenation of Higher Education (2009)	4- Shri K.C. Pant (as Chairman of the NPE Review Committee)

Codes:

1. 2 1 4 3
2. 1 2 3 4
3. 2 1 3 4
4. 1 2 4 3

Answer:
A
Sol:
Correct Option – (a)
Introduction: This matching question assesses the ability to correctly associate the visionary leaders with the foundational documents they spearheaded, which is essential for a nuanced understanding of India's educational history.
Information Booster:
• University Education Commission (A-2): Chaired by Dr. Sarvepalli Radhakrishnan, the then Vice-President of India and a renowned philosopher. Its focus was on university education.
• Education Commission (B-1): Chaired by Dr. D.S. Kothari, the then Chairman of the University Grants Commission (UGC). It took a holistic view of the entire educational landscape.
• National Policy on Education (C-4): While announced by Prime Minister Rajiv Gandhi, the policy was formulated based on the recommendations of a committee chaired by Shri K.C. Pant. It is incorrect to attribute its chairmanship to a single individual like Prof. Yash Pal.
• Committee on Renovation of Higher Education (D-3): This was the "Yash Pal Committee," chaired by the eminent scientist and educator Prof. Yash Pal. Its report led to the creation of the Rashtriya Uchchatar Shiksha Abhiyan (RUSA).
Additional Knowledge: The National Knowledge Commission (2005) was chaired by Sam Pitroda. The New Education Policy (NEP) 2020 was formulated by a committee chaired by Dr. K. Kasturirangan.

Q36. If a researcher decides to have a control group in a 'placebo' design, he/she should have how many groups?

1. One group
2. Two groups
3. Three groups
4. Four groups

Answer:
C
Sol:
In a placebo design, when a control group is included, typically, there are three groups:
1. Experimental group: Receives the actual treatment or intervention.
2. Control group: Receives a placebo (a substance that looks like the treatment but has no therapeutic effect).
3. Placebo control group: In some designs, there is a group that receives no treatment at all, ensuring that the effects observed are only due to the experimental intervention.

This three-group design allows the researcher to compare the effects of the experimental treatment, placebo treatment, and no treatment to understand if the treatment has a genuine effect.
Information Booster:
1. The experimental group receives the actual intervention to test the treatment's effectiveness.
2. The placebo control group receives a placebo to account for the psychological effects of believing they are receiving treatment.
3. The control group may receive no treatment or a standard treatment to isolate the effect of the experimental intervention.

4. Using three groups helps researchers differentiate between the true effects of the treatment, the placebo effect, and no treatment effects.

Q37. Which of the following has the highest Biological Oxygen Demand (BOD)?
1. Drinking water
2. Unpolluted surface water
3. Polluted surface water
4. Municipal sewage effluent

Answer:
D
Sol:
Biological Oxygen Demand (BOD) refers to the amount of oxygen required by microorganisms to break down organic matter in water. It is a key indicator of water pollution. Higher BOD values indicate higher levels of organic pollutants, which can deplete oxygen levels in water bodies and harm aquatic life.
1. (d) Municipal sewage effluent:
• Very High BOD (up to 100–400 mg/L): Municipal sewage contains high levels of organic waste, making it the source with the highest BOD among the options.
Information Booster:
1. BOD Levels and Pollution:
• Less than 3 mg/L: Clean water.
• 3–5 mg/L: Moderately polluted water.
• Above 5 mg/L: Heavily polluted water.
2. Sources of High BOD:
• Domestic sewage.
• Industrial waste.
• Agricultural runoff.
3. Impact of High BOD:
• Depletes oxygen in water.
• Causes fish kills and loss of biodiversity.
Additional Knowledge:
1. (a) Drinking water:
• Low BOD (less than 1 mg/L): Drinking water is treated and contains minimal organic material, resulting in very low BOD.
2. (b) Unpolluted surface water:
• Moderate BOD (1–2 mg/L): Unpolluted natural water bodies contain some organic matter but are not significantly contaminated.
3. (c) Polluted surface water:
• Higher BOD (5–20 mg/L): Polluted surface water contains more organic matter, leading to higher oxygen consumption by microorganisms.

Q38. Arrange the following gases in ascending order of their global warming potential (GWP):
A. CO_2 B. CH_4 C. SF_6 D. CFC-11 E. N_2O Choose the correct answer from the options given below:
1. A, B, C, E, D
2. A, B, E, D, C
3. B, C, A, E, D
4. A, E, B, D, C

Answer:
B
Sol:
The global warming potential (GWP) of a gas is a measure of how much heat it can trap in the atmosphere relative to CO_2, over a specific time period (usually 100 years). The gases in ascending order of GWP are:
- A. CO_2: The reference gas with a GWP of 1.
- B. CH_4 (Methane): GWP of around 25-28 over 100 years, making it more potent than CO_2.
- E. N_2O (Nitrous oxide): GWP of approximately 298, making it much more potent than CH_4.
- D. CFC-11: GWP of about 4,660, used in refrigeration, contributing significantly to global warming.
- C. SF_6 (Sulfur hexafluoride): One of the most potent greenhouse gases, with a GWP of 23,500, making it the most powerful among the listed gases.

Information booster:
1. CO_2 has the lowest GWP, serving as the reference with a GWP of 1.
2. CH_4 is a much stronger greenhouse gas than CO_2 but has a shorter atmospheric lifetime.
3. SF_6 is a synthetic gas with an extremely high GWP, used in electrical insulation and industrial applications.
4. CFCs (chlorofluorocarbons) are ozone-depleting substances but also have high global warming potential, contributing to both ozone depletion and global warming.
5. N_2O is a potent greenhouse gas emitted from agricultural activities, combustion, and industrial processes.

Q39. If 20% of the males from department R move to department S, find the total number of males in department S now.The table below shows the number of people (in thousands) in five different departments, the percentage of males, and the ratio of certified to non-certified people. Use this table to answer the questions.

Department	Total people (in thousands)	Percentage of Males	Certified : Non-certified
P	42	58%	5 : 4
Q	28	46%	7 : 3
R	36	62%	3 : 2
S	50	40%	11 : 9
T	60	75%	4 : 5

1. 24,200
2. 24,464
3. 24,600
4. 24,800

Answer:
B
Sol:
Solution:
Males in R = 62% of 36,000 = 22,320
20% move to S = 4,464
Males in S initially = 40% of 50,000 = 20,000
New males in S = 20,000 + 4,464 = 24,464
Answer: (b)

Q40. Total certified people from department Q are what percent of total non-certified people from department P?The table below shows the number of people (in thousands) in five different departments, the percentage of males, and the ratio of certified to non-certified people. Use this table to answer the questions.

Department	Total people (in thousands)	Percentage of Males	Certified : Non-certified
P	42	58%	5 : 4
Q	28	46%	7 : 3
R	36	62%	3 : 2
S	50	40%	11 : 9
T	60	75%	4 : 5

1. 100%
2. 102.5%
3. 105%
4. 110%

Answer:
C
Sol:
Solution:
Certified in Q = (7/10) × 28,000 = 19,600
Non-certified in P = (4/9) × 42,000 = 18,666.67
Required percent = (19,600 / 18,666.67) × 100 = 105%
Answer: (c)

Q41. If 30% of males in department T are non-certified, find the ratio of non-certified males to non-certified females in T.The table below shows the number of people (in thousands) in five different departments, the percentage of males, and the ratio of certified to non-certified people. Use this table to answer the questions.

Department	Total people (in thousands)	Percentage of Males	Certified : Non-certified
P	42	58%	5 : 4
Q	28	46%	7 : 3
R	36	62%	3 : 2
S	50	40%	11 : 9
T	60	75%	4 : 5

1. 27 : 40
2. 81 : 119
3. 5 : 9
4. 119 : 81

Answer:
B
Sol:
Solution:
In T: males = 75% of 60,000 = 45,000; females = 15,000
Overall non-certified in T = (5/9) × 60,000 = 33,333.33
Non-certified males = 30% of 45,000 = 13,500
Non-certified females = 33,333.33 − 13,500 = 19,833.33
Ratio = 13,500 : 19,833.33 = 81 : 119
Answer: (b)

Q42. Find the ratio of total females from departments P and S together to the total non-certified males from departments Q and R together (assume the certified/non-certified split is uniform across genders).The table below shows the number of people (in thousands) in five different departments, the percentage of males, and the ratio of certified to non-certified people. Use this table to answer the questions.

Department	Total people (in thousands)	Percentage of Males	Certified : Non-certified
P	42	58%	5 : 4
Q	28	46%	7 : 3
R	36	62%	3 : 2
S	50	40%	11 : 9
T	60	75%	4 : 5

1. 1985 : 533
2. 861 : 289
3. 215 : 72
4. 2000 : 540

Answer:
A
Sol:
Solution:
Females in P = 42,000 × (1 − 0.58) = 17,640
Females in S = 50,000 × (1 − 0.40) = 30,000
Total females (P+S) = 47,640
Non-certified fraction: Q = 3/10, R = 2/5
Males in Q = 46% of 28,000 = 12,880 → non-certified males = 0.3 × 12,880 = 3,864
Males in R = 62% of 36,000 = 22,320 → non-certified males = 0.4 × 22,320 = 8,928
Total non-certified males (Q+R) = 12,792
Required ratio = 47,640 : 12,792 = 1985 : 533
Answer: (a)

Q43. In department P, if the number of certified males equals certified females, find the number of non-certified females in P.The table below shows the number of people (in thousands) in five different departments, the percentage of males, and the ratio of certified to non-certified people. Use this table to answer the questions.

Department	Total people (in thousands)	Percentage of Males	Certified : Non-certified
P	42	58%	5 : 4
Q	28	46%	7 : 3
R	36	62%	3 : 2
S	50	40%	11 : 9
T	60	75%	4 : 5

1. 5,900
2. 5,973
3. 6,000
4. 6,100

Answer:
B

Sol:
Solution:
Step 1: Total males and females in Department P
Total people in P = 42,000
Male % = 58%
Female % = 42%
Males = 58% of 42,000 = 24,360
Females = 42% of 42,000 = 17,640
Step 2: Find number of certified and non-certified people
Certified : Non-certified = 5 : 4
Total ratio = 9 parts
So each part = 42,000 ÷ 9 = 4,666.67
Certified people = 5 × 4,666.67 = 23,333.33
Non-certified people = 4 × 4,666.67 = 18,666.67
Step 3: Apply given condition
Given:
Certified males = Certified females
So certified people are split equally:
Certified males = Certified females
= 23,333.33 ÷ 2
= 11,666.67 each
Step 4: Find non-certified females
Total females = 17,640
Certified females = 11,666.67
Non-certified females =
17,640 − 11,666.67
= 5,973.33 ≈ 5,973
Final Answer: 5,973 non-certified females

Q44. Identify the sequence of appropriate words (A-D) that correctly fills the blanks in the following paragraph:
Optical ____ devices convert electrical signals into light pulses, which are then transmitted through a thin fiber of glass or plastic. The core of the fiber is surrounded by a(n) ____ material, which helps to keep the light signal confined. The process of using this technology is a form of data transmission known as ____, which allows for ____ high-speed internet and telecommunications.
A. Fiber
B. Total Internal Reflection
C. Cladding
D. Transmitting
Choose the correct answer from the options given below:
1. . D, A, C, B
2. . B, A, D, C
3. . A, C, B, D
4. . C, B, A, D
Answer:
C
Sol:
Correct Option - (c)

Introduction: The correct answer is (c), as the words provided in this order complete the paragraph logically and accurately.
Information Booster:
• The first blank should be filled with "Optical fiber devices," as optical fiber is the core technology described.
• The second blank is filled with " Cladding," which is the material that surrounds the core of an optical fiber and, due to the principle of total internal reflection, confines the light signal.
• The third blank is filled with " Total Internal Reflection," the physical process that keeps the light signal inside the fiber.
• The final blank is filled with " Transmitting," describing the action of the technology.
So, the correct sequence is A (Fiber), C (Cladding), B (Total Internal Reflection), and D (Transmitting), making option (c) the correct choice..

Q45. Mediated communication reflects
1. The communicator's cultural background
2. Social expectations of the under-privileged
3. Ethical desires of the society
4. Majoritarian hegemony of language

Answer:
A
Sol:
Mediated communication reflects the communicator's cultural background because the way people communicate through media, whether traditional or digital, is shaped by their cultural values, norms, and perspectives. Cultural background influences language use, symbols, and communication preferences, which are reflected in the media content and style.
Information Booster: · Cultural background shapes how individuals use symbols, language, and media.
• Mediated communication can include news, social media, television, and online platforms.
• Media content often reflects cultural values and practices of the communicator.
• Cross-cultural communication can reveal differences in mediated communication styles.
• Mediated communication adapts to the preferences of the target audience.
Additional Knowledge: Social expectations of the under-privileged: While social expectations may influence content creation, especially in media aimed at social change, this is more about targeting specific groups rather than a characteristic of mediated communication.
Ethical desires of the society: Ethics play a role in media regulation and content creation, but mediated communication focuses more on how culture shapes message delivery than purely ethical concerns.
Majoritarian hegemony of language: Language dominance can impact media, but mediated communication typically reflects cultural nuances beyond just language imposition.