RRB NTPC (UG) CBT-I Official Paper (Held On 16 Jun, 2026 Shift 2) (Previous Year Paper)

RRB NTPC • 2026 • 100 questions • 90 minutes • Answer key and solutions

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MATHEMATICS

Q1. A military camp has provisions for 360 soldiers for 50 days. After 10 days, 120 more soldiers arrive at the camp. Assuming the daily consumption per soldier remains constant, for how many more days will the remaining provisions last?

(a) 32 days
(b) 28 days
(c) 25 days
(d) 30 days

Q2. What is the mean proportional between 0.0009 and 0.25?

(a) 0.15
(b) 0.016
(c) 0.16
(d) 0.015

Q3. A car travels the first 60 km at 45 km/hr and the next 90 km at 60 km/hr. What is the average speed for the entire journey?

(Round off your answer to two decimal places.)

(a) 53.84 km/hr
(b) 50.78 km/hr
(c) 52.94 km/hr
(d) 54.56 km/hr

Q4. The sum of two positive numbers is 36 and their product is 180. The positive difference between them is:

(a) 37
(b) 32
(c) 34
(d) 24

Q5. The sides of a triangle are 75 cm, 21 cm, and 72 cm. What is the length (in cm) of its altitude corresponding to the side with a length of 21 cm?

(a) 65
(b) 90
(c) 107
(d) 72

Q6. The average age of 7 students in a class is 17 years. When a new student join the class, the average age of the class becomes 18 years. Find the age of the new student.

(a) 25 years
(b) 20 years
(c) 26 years

(d) 23 years

Q7. What is the smallest 5-digit number that is exactly divisible by 12, 15 and 20?

(a) 10320
(b) 10080
(c) 10020
(d) 10200

Q8. Find the volume of a cylinder whose height is 21 cm and its radius is 3/5 of the radius of another cylinder with a volume of 317900 cm^3 and a height of 14 cm. (Use $\pi = 22/7$)

(a) 161666 cm^3
(b) 171660 cm^3
(c) 171656 cm^3
(d) 171666 cm^3

Q9. If 45% of a number exceeds 20% of it by 36, then the number is:

(a) 164
(b) 144
(c) 124
(d) 184

Q10. Two taps can fill a cistern in 4 hours and 9 hours, respectively. A third tap can empty it in 9 hours. How long (in hours) will it take to fill one-fourth of the empty cistern if all the taps are opened together?

(a) 4
(b) 3
(c) 1
(d) 2

Q11. If on a sale, there is 40% discount on the marked price of Rs. 1,200, but the sale is done at Rs. 520 only, then how much additional discount did the customer get?

(a) 287/9%
(b) 26 7/9%
(c) 277/9%
(d) 257/9%

Q12. Simplify $\sqrt{(\sqrt{256} + \sqrt{144} + (2\sqrt{2})^2) + \sqrt{841} \times (\sqrt{2})^2}$

(a) $(\sqrt{2})^2$
(b) $(2\sqrt{2})^2$
(c) $(4\sqrt{2})^2$
(d) $(3\sqrt{2})^2$

Q13. If the interest on a sum of Rs. y at 2% per annum compounded annually for 2 years is Rs. 404, then the total amount payable at the end of the two-year period will be _____.

(a) Rs. 10,604
(b) Rs. 10,404
(c) Rs. 10,504
(d) Rs. 10,704

Q14. Find the smallest natural number x, for which $2x + 1$ is not a prime number.

(a) 3
(b) 4
(c) 2
(d) 5

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Q15. If the sum of the ages of a father and son is 56 years and the father is 24 years older than his son, what is the son's age (in years)?

(a) 20
(b) 16
(c) 24
(d) 32

Q16. A student's marks were incorrectly entered as 37 instead of 22. Due to this, the average marks of the class got increased by 5/4.

What is the number of students in the class?

(a) 21
(b) 4
(c) 11
(d) 12

Q17. Three numbers are in the ratio of 19 : 7 : 13, and their LCM is 8645. Their HCF is:

(a) 15
(b) 25
(c) 30
(d) 5

Q18. Two numbers differ by 8. If five times the smaller number is subtracted from twice the larger number, the result is 13. What is the larger number?

(a) 8
(b) 10
(c) 9
(d) 12

Q19. 15 men and 19 women can complete a piece of work in 8 days, and 9 men and 4 women can complete the same work in 14 days. The work of how many women is equivalent to that of one man?

(a) 18
(b) 17
(c) 15
(d) 16

Q20. A shopkeeper buys sugar at Rs. 48 per kg. While selling, he uses a faulty weighing scale that gives only 960 g instead of 1 kg. In addition, he marks the selling price at a profit of 20% on the cost price and then offers a discount of 10% on the marked price. Find the overall percentage profit or loss made by the shopkeeper.

(a) 11.4% profit
(b) 10% profit
(c) 12.5% profit
(d) 4.5% loss

Q21. What will be the total amount payable after 3 years on a principal of Rs. 4,000 at 5% per annum, compounded annually?

(a) Rs. 4,630.50
(b) Rs. 4,550.50
(c) Rs. 4,600.50
(d) Rs. 4,050.50

Q22. Simplify:

$(\sin^2 A)/(1 - \cos A) + (\sin^2 A)/(1 + \cos A)$

(a) 4
(b) 2
(c) 1

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(d) 3

Q23. What is the simplified value of the following expression?

$\{(3^3 + 5^2) \times 2^3 - 4^3\} \div (7 - 3)$

(a) 84
(b) 95
(c) 88
(d) 44

Q24. A grocery store gives a Buy 5, Get 2 Free offer. The price of each item is Rs. 300. A customer needs a total of 21 items and procures the items under this scheme. What is the effective cost per item? (Round off your answer to two decimal places.)

(a) Rs. 214.45
(b) Rs. 214.29
(c) Rs. 114.29
(d) Rs. 241.29

Q25. A, B and C started a business, investing amounts of Rs. 1,960, Rs. 1,660, and Rs. 1,130 respectively. If B's share in the profit earned by them is Rs. 968, what is the difference in the profit (in Rs.) earned by A and C?

(a) Rs. 487
(b) Rs. 484
(c) Rs. 486
(d) Rs. 482

Q26. Two trains are running on parallel tracks in the same direction. Train A is 90 m long and moves at 54 km/h. Train B is 75 m long and moves at 36 km/h. How much time will Train A take to completely overtake Train B?

(a) 30 seconds
(b) 33 seconds
(c) 22 seconds
(d) 25 seconds

Q27. Chetan's salary is Rs. 17,000 per month. He spends Rs. 4,000 on house rent, Rs. 2,500 on bills, and the rest of the amount is his monthly savings. Find his savings (in Rs.) in a year, if in the month of his birthday, he spent his complete monthly savings for a birthday celebration.

(a) 1,26,000
(b) 1,05,000
(c) 94,500
(d) 1,15,500

Q28. A trader buys 20 kg of rice for Rs. 1,000. He sells the rice at the rate of Rs. 60 per kg. What is the percentage profit made by the trader?

(a) 22%
(b) 20%
(c) 15%
(d) 18%

Q29. A hollow spherical shell is made of a metal of density 10 g/cm³. Its internal and external radius are 1 cm and 4 cm, respectively. What is the weight (in kg) of the shell?

(Use $\pi = 22/7$ and Density = Mass/Volume)

(a) 1.92
(b) 1.98
(c) 2.64
(d) 2.24

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Q30. A recipe uses 2 cups of rice for every 3 cups of water. If you want to cook using 6 cups of rice, how much water will you need?

(a) 3 cups
(b) 9 cups
(c) 7 cups
(d) 6 cups

GENERAL AWARENESS

Q31. In a computer system, a running program stores currently required data in RAM. What does RAM stand for?

(a) Random Active Memory
(b) Read Action Memory
(c) Random Access Memory
(d) Random Access Mode

Q32. "Appellate jurisdiction of the Supreme Court in appeals from High Courts in regard to civil matters" is provided in which of the following provisions of the Constitution of India?

(a) Article 133
(b) Article 131
(c) Article 134
(d) Article 132

Q33. The ‘Mesolithic Age’ is regarded as a transitional phase because it represents the shift between which two prehistoric periods?

(a) Bronze Age and Iron Age
(b) Palaeolithic Age and Neolithic Age
(c) Neolithic Age and Chalcolithic Age
(d) Chalcolithic Age and Iron Age

Q34. Which Indian city, as of October 2025, holds the world’s second-largest collection of Art Deco buildings, including the UNESCO-recognized Oval Maidan precinct with 94 structures?

(a) Kolkata
(b) Indore
(c) Jaipur
(d) Mumbai

Q35. Which day is celebrated as National Youth Day (Birthday of Swami Vivekananda) in India every year?

(a) January 12^(th)
(b) March 20^(th)
(c) February 16^(th)
(d) April 30^(th)

Q36. Which statement accurately explains the nature of the Inter Tropical Convergence Zone (ITCZ)?

(a) It forms a cold frontal region near the Himalayan ranges.
(b) It is an equatorial low-pressure belt where trade winds meet.
(c) It represents a zone of high pressure located near the poles.
(d) It marks a westerly wind system close to the Tropic of Capricorn.

Q37. Heat generated in an electrical resistor is measured in which SI unit?

(a) Joule
(b) Coulomb
(c) Watt
(d) Volt

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Q38. When was the Industrial Policy Resolution (IPR) adopted in India?

(a) 1959
(b) 1954
(c) 1956
(d) 1952

Q39. As of 1 March 2001, what was the population of India?

(a) 1,210 million
(b) 950 million
(c) 1,027 million
(d) 1,000 million

Q40. Which of the following naval ships participated in the SLINEX-25 exercise in Sri Lanka in August 2025?

(a) INS Vikrant and INS Trikand
(b) INS Talwar and INS Shivalik
(c) INS Kolkata and INS Satpura
(d) INS Rana and INS Jyoti

Q41. For Windows operating system, choose the correct option that shows the primary difference between Sleep and Hibernate power-saving modes with respect to memory and system state?

(a) Sleep keeps data in RAM; Hibernate saves it to disk
(b) Both save data to RAM
(c) Sleep saves system state to disk; Hibernate uses RAM
(d) Hibernate keeps data in RAM; Sleep saves to disk

Q42. Which one of the following best describes system software? Choose the correct option.

(a) Software used to create documents
(b) Software for playing multimedia files
(c) Software for browsing the internet
(d) Software that manages hardware and provides platform for application software

Q43. What is GII in the context of Human Development?

(a) Gender Inequality Information
(b) Gender Inequality Index
(c) Gender Inability Index
(d) General Inequality Index

Q44. Which edition of the Global Risks Report was released by the World Economic Forum in 2025?

(a) 21^(st) Edition
(b) 18^(th) Edition
(c) 20^(th) Edition
(d) 19^(th) Edition

Q45. The Morley-Minto Reforms were introduced by the British Government in India in _____.

(a) 1909
(b) 1905
(c) 1919
(d) 1935

Q46. Consider the following statements regarding Input and Output devices and select the correct option.

(i) A microphone is an input device that can capture sound, but it cannot output any sound.
(ii) The CPU's processing speed is much faster than the data transfer rate of external devices like printers.

(a) (i) False, (ii) False
(b) (i) True, (ii) False
(c) (i) True, (ii) True

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(d) (i) False, (ii) True

Q47. Which of the following Articles of the Indian Constitution deals with the Fundamental Duties?

(a) Article 52
(b) Article 50
(c) Article 51
(d) Article 51 'A'

Q48. Which of the following groups at the Second Round Table Conference claimed that Congress had no authority in their territories?

(a) Provincial governors
(b) Zamindars
(c) Indian princes
(d) British officials

Q49. A gastrointestinal disease caused by the protozoan Entamoeba histolytica leads to abdominal pain and stools with excess mucous and blood clots. It often spreads through contaminated food and water via houseflies acting as mechanical carriers. Which disease is described?

(a) Giardiasis
(b) Cholera
(c) Amoebiasis
(d) Ascariasis

Q50. The energy of light (photon) is a form of _____.

(a) Nuclear Energy
(b) Gravitational Potential Energy
(c) Electromagnetic Energy
(d) Mechanical Energy

Q51. The Pin River constitutes the most important right bank tributary of _____.

(a) Bhaga River
(b) Tsarab River
(c) Spiti River
(d) Chandra River

Q52. Under Article 164(1A), the total number of Ministers in a State, including the Chief Minister, shall NOT exceed:

(a) No limit is mentioned
(b) 15% of the strength of the Legislative Assembly
(c) 10% of the strength of the Legislative Assembly
(d) 20% of the strength of the Legislative Assembly

Q53. Which of the following traditional Indian percussion instruments is regarded as the predecessor of the modern Tabla?

(a) Dhol
(b) Pakhawaj
(c) Thavil
(d) Kanjira

Q54. Which of the following countries signed the OECD Multilateral Convention in October 2025 to Implement BEPS (Base Erosion and Profit Shifting)?

(a) Russia
(b) Japan
(c) Brazil
(d) India

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Q55. Which sector in India saw major growth due to globalisation?

(a) Handicrafts
(b) Mining
(c) Education
(d) IT and Services

Q56. Which feature separates the Malda Gap from the rest of the Ganga-Brahmaputra Plains?

(a) Rajmahal Hills
(b) Meghalaya Plateau
(c) Aravalli Range
(d) Bundelkhand Plateau

Q57. Which of the following best describes the authorship of the Rigveda?

(a) It was dictated by Valmiki as a poetic epic for oral transmission
(b) It was written by a single philosopher-king in ancient India
(c) It was composed solely by Sage Vyasa and compiled during the Mahabharata era
(d) It is a collection of hymns composed by various sages over generations

Q58. According to the WMO report cited in 2025, global warming in Jan–Aug 2025 was approximately how much above pre-industrial levels?

(a) 1.42°C
(b) 1.0°C
(c) 2.1°C
(d) 0.8°C

Q59. The Indian Medical Association (IMA) recently appointed a new President. Who assumed charge as the IMA National President in December 2025?

(a) Dr. Ketan Desai
(b) Dr. Dilip Bhanushali
(c) Dr. Anil Nayak
(d) Dr. Amit Chakrabarty

Q60. Which feature of the Brahmo Samaj best reflects its reformist interpretation of Hindu religious practice?

(a) Reviving Vedic polytheism and encouraging ritual offerings across India.
(b) Promoting monotheistic worship and rejecting ritual sacrifices entirely.
(c) Upholding hereditary priesthood and strengthening caste divisions everywhere.
(d) Defending priestly authority and supporting elaborate temple ceremonies.

Q61. Which Amendment made written Cabinet advice mandatory for Emergency in India?

(a) 24^(th) Amendment
(b) 44^(th) Amendment
(c) 26^(th) Amendment
(d) 42^(nd) Amendment

Q62. Nagarjuna Sagar Dam is constructed across which of the following rivers?

(a) Krishna
(b) Godavari
(c) Tungabhadra
(d) Bhima

Q63. From which month and year are the Corporate Average Fuel Efficiency (CAFE-3) norms scheduled to be implemented in India?

(a) April 2029
(b) April 2026
(c) April 2028

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(d) April 2027

Q64. In 2022, the President pardoned a woman jailed for a minor crime. Which Article of the Indian Constitution allows the President to grant pardons?

(a) Article 74
(b) Article 75
(c) Article 72
(d) Article 53

Q65. The Battle of Khanwa (1527) was fought between Babur and which of the following rulers?

(a) Rana Sanga
(b) Ibrahim Lodi
(c) Sher Shah Suri
(d) Bairam Khan

Q66. Which pigment is responsible for the green color of plants?

(a) Anthocyanin
(b) Xanthophyll
(c) Chlorophyll
(d) Carotene

Q67. Which government department launched the 5G Innovation Hackathon 2025, a six-month initiative aimed at accelerating the development of innovative 5G-powered solutions to address societal and industrial challenges?

(a) NITI Aayog
(b) Department of Science and Technology (DST)
(c) Ministry of Electronics and Information Technology (MeitY)
(d) Department of Telecommunications (DoT)

Q68. In which year was the first "Sanskrit Commission" constituted?

(a) 1956
(b) 2019
(c) 2013
(d) 1952

Q69. Which of the following is a hydroelectric power plant located on a Himalayan river?

(a) Mettur Hydroelectric Power Plant
(b) Krishnarajasagar Hydroelectric Power Plant
(c) Tehri Dam and Hydroelectric Power Plant
(d) Srisailam Hydroelectric Power Plant

Q70. Article 243ZI of the Indian Constitution empowers the State Legislature to make laws regarding co-operative societies. Which principle is NOT included in its scope?

(a) Democratic member control
(b) Compulsory State supervision
(c) Autonomous functioning
(d) Voluntary formation

GENERAL INTELLIGENCE AND REASONING

Q71. BGLQ is related to CHMR in a certain way based on the English alphabetical order. In the same way, VAFX is related to WBGY. To which of the following is PUZE related, in the same way?

(a) QVJK
(b) QVAF
(c) QVLP
(d) QVRT

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Q72. In a certain code language,

A @ B means ‘A is the mother of B’,

A × B means ‘A is the wife of B’,

A + B means ‘A is the brother of B’ and

A ÷ B means ‘A is the father of B’.

How is S related to H if ‘S × D ÷ R @ Y + H’?

(a) Mother's mother
(b) Mother's sister
(c) Mother
(d) Sister

Q73. Which of the following letter-number clusters will replace the question mark (?) in the given series to make it logically complete?

BLE 6 UEX 11 NXQ 16 GQJ 21 ?

(a) ZJC 26
(b) ZFB 25
(c) XHE 26
(d) YLI 25

Q74. Read the given statements and conclusions carefully. You have to take the given statements to be true even if they seem to be at variance from commonly known facts. You have to decide which conclusions logically follow/s from the given statements.

Statements: All gloves are bandages. No glove is a sling.

Conclusion (I) : Some slings are bandages

Conclusion (II) : All bandages are slings

(a) Both conclusions (I) and (II) follow
(b) Only conclusion (II) follows
(c) Neither conclusion (I) nor (II) follows
(d) Only conclusion (I) follows

Q75. Based on the English alphabetical order, three of the following four letter-cluster pairs are alike in a certain way and thus form a group. Which is the one that does not belong to that group?

(Note: The odd man out is not based on the number of consonants/vowels or their position in the letter cluster.)

(a) UG – QC
(b) MJ – IF
(c) RK – OG
(d) RF – NB

Q76. In a certain code language, ‘car event stop’ is coded as 'mb mj gs' and ‘stop van lime’ is coded as ‘ii mb rb’. How is ‘stop’ coded in the given language?

(a) mj
(b) ii
(c) gs
(d) mb

Q77. Refer to the given letter series and answer the question that follows. Counting to be done from left to right only.

(Left) O E D F F B G F G I Y U I L V U Y T S V T (Right)

How many such consonants are there, each of which is immediately preceded by a consonant and also immediately followed by a vowel?

(a) Two
(b) Three
(c) None
(d) One

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Q78. In a certain code language, ‘DESK’ is coded as ‘2794’ and ‘KIDS’ is coded as ‘6924’. What is the code for ‘I’ in the given code language?

(a) 2
(b) 6
(c) 9
(d) 4

Q79. Each vowel in the word CONTAIN is changed to the letter immediately following it in the English alphabetical order and each consonant is changed to the letter immediately preceding it in the English alphabetical order. Which of the following letters will be third from the left in the new group of letters thus formed?

(a) L
(b) N
(c) O
(d) M

Q80. Based on the English alphabetical order, three of the following four letter-clusters are alike in a certain way and thus form a group. Which letter-cluster DOES NOT belong to that group?

(Note: The odd one out is not based on the number of consonants/vowels or their position in the letter-cluster.)

(a) TWQM
(b) CFZV
(c) MPIE
(d) KNHD

Q81. Which of the following letter-number clusters will replace the question mark (?) in the given series to make it logically complete?

XK253, UO236, RS219, ?

(a) MV208
(b) OW202
(c) OV204
(d) NW206

Q82. If ‘P’ stands for ‘×’, ‘Q’ stands for ‘÷’, ‘R’ stands for ‘−’ and ‘S’ stands for ‘+’, what will come in place of the question mark ‘?’ in the following equation?

78 Q 3 S (55 Q 5) P 4 R 16 P 5 S 65 = ?

(a) 55
(b) 70
(c) 49
(d) 35

Q83. Town X is to the south of Town Y. Town Z is to the west of Town X. Town P is to the north of Town Z. Town Q is to the east of Town P. Town Y is to the north-west of Town Q. What is the position of Town X with respect to Town Q?

(a) South-west
(b) South-east
(c) North-west
(d) North-east

Q84. What will come in place of the question mark (?) in the following equation, if ‘+’ and ‘−’ are interchanged and ‘×’ and ‘÷’ are interchanged?

43 – 85 × 5 + 10 ÷ 3 = ?

(a) 38
(b) 32
(c) 30
(d) 35

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Q85. In a certain code language,

A # B means 'A is the daughter of B',

A @ B means 'A is the brother of B',

A ! B means 'A is the wife of B' and

A & B means 'A is the father of B'.

How is N related to V if 'N @ K # S & R ! V'?

(a) Wife's father
(b) Wife's brother
(c) Husband
(d) Son

Q86. Select the set in which the numbers are related in the same way as are the numbers of the following sets.

(NOTE: Operations should be performed on the whole numbers, without breaking down the numbers into their constituent digits. E.g. 13 – Operations on 13 such as adding/subtracting/multiplying etc. to 13 can be performed. Breaking down 13 into 1 and 3 and then performing mathematical operations on 1 and 3 is not allowed.)

91, 184

88, 178

(a) 99, 200
(b) 92, 184
(c) 76, 152
(d) 104, 218

Q87. Read the given statements and conclusions carefully. Assuming that the information given in the statements is true, even if it appears to be at variance with commonly known facts, decide which of the given conclusions logically follow(s) from the statements.

Statements: Some stones are minerals. All minerals are elements.

Conclusions

(I) Some elements are stones.

(II) All stones are minerals.

(a) Both conclusions (I) and (II) follow
(b) Only conclusion (I) follows
(c) Neither conclusion (I) nor (II) follows
(d) Only conclusion (II) follows

Q88. What should come in place of the '?' in the given series?

19 36 59 94 147 ?

(a) 226
(b) 228
(c) 220
(d) 224

Q89. In a row of 35 people facing the north, Geeta is 15^(th) from the right end. If Nalini sits 14^(th) to the left of Geeta, what is Nalini's position from the left end of the row?

(a) 4^(th)
(b) 9^(th)
(c) 7^(th)
(d) 5^(th)

Q90. What should come in place of '?' in the given series?

28 33 44 61 84 113 ?

(a) 140
(b) 148
(c) 137

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(d) 143

Q91. Based on the English alphabetical order, three of the following four are alike in a certain way and thus form a group. Which is the one that does not belong to that group?

(Note: The odd man out is not based on the number of consonants/vowels or their position in the letter cluster.)

(a) GHL
(b) EFJ
(c) FGK
(d) YAD

Q92. RWFG is related to OTCD in a certain way based on the English alphabetical order. In the same way, FKTU is related to CHQR. To which of the following options is WBKL related, following the same logic? 13385

(a) THYU
(b) TYHI
(c) TUHO
(d) THYI

Q93. What should come in place of ? in the given series based on the English alphabetical order?

GJL ORT WZB EHJ ?

(a) MOQ
(b) MQQ
(c) MNP
(d) MPR

Q94. Seven boxes A, B, C, D, E, F and G are kept one over the other but not necessarily in the same order. Exactly two boxes are kept between E and B. B is kept on one of the positions above E. C is kept at the bottommost position. Box G is kept immediately above E. Exactly two boxes are kept between D and G. Only one box is kept below F. Which box is immediately below B?

(a) F
(b) E
(c) A
(d) G

Q95. Each letter in the word PREDIAL is changed to the letter immediately following it in the English alphabetical order and then all the letters thus obtained are arranged in the English alphabetical order. Which of the following letters will be fourth from the right in the new group of letters thus formed?

(a) M
(b) E
(c) F
(d) J

Q96. Aj, Bv, Cu, Dq, Em, Fh and Gt are sitting around a circular table, facing the centre.

Gt sits third to the left of Fh. Em sits second to the left of Fh. Bv sits third to the right of Em. Aj is the immediate neighbour of Cu and Gt.

How many people sit between Dq and Aj when counted from the left of Aj?

(a) Three
(b) One
(c) Four
(d) Two

Q97. What will come in place of the question mark (?) in the following equation if '+' and '−' are interchanged and '×' and '÷' are interchanged?

12 − 50 ÷ 2 × 2 + 15 = ?

(a) 48
(b) 45

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(c) 47
(d) 49

Q98. ORVS is related to QTXU in a certain way based on the English alphabetical order. In the same way, PSWT is related to RUYV. To which of the following is HKOL related, following the same logic? 13913

(a) JMQN
(b) JLPN
(c) JNPW
(d) JMPN

Q99. Sima ranked 12th from the top and 13th from the bottom in her class. How many students are there in her class?

(a) 23
(b) 20
(c) 22
(d) 24

Q100. Seven people F, G, H, L, M, O and Q are sitting around a circular table, facing the centre of the table. Only three people sit between G and F when counted from the right of F. Q sits to the immediate right of G. Only three people sit between Q and M when counted from the left of Q. O sits to the immediate right of H. How many people sit between L and H when counted from the left of H?

(a) Three
(b) Four
(c) One
(d) Two

ANSWER KEY

1	d	2	d	3	c	4	d	5	d	6	a	7	c	8	d	9	b	10	c
11	c	12	b	13	b	14	b	15	b	16	d	17	d	18	c	19	d	20	c
21	a	22	b	23	c	24	b	25	b	26	b	27	d	28	b	29	c	30	b
31	c	32	a	33	b	34	d	35	a	36	b	37	a	38	c	39	c	40	d
41	a	42	d	43	b	44	c	45	a	46	c	47	d	48	c	49	c	50	c
51	c	52	b	53	b	54	c	55	d	56	a	57	d	58	a	59	c	60	b
61	b	62	a	63	d	64	c	65	a	66	c	67	d	68	a	69	c	70	b
71	b	72	a	73	a	74	c	75	c	76	d	77	a	78	b	79	d	80	c
81	b	82	a	83	a	84	c	85	b	86	a	87	b	88	d	89	c	90	b
91	d	92	b	93	d	94	c	95	d	96	a	97	c	98	a	99	d	100	d

SOLUTIONS

Q1. Answer: (d) 30 days

Shortcut Trick
Remaining food is sufficient for 360 soldiers for 40 days (50 − 10).
Total soldiers after arrival = 360 + 120 = 480 soldiers.
Using M1D1 = M2D2 logic on remaining stock: 360 × 40 = 480 × Days.
Days = 14400 ÷ 480 = 30 days.
Therefore The correct answer is 30 days.
Alternate Method
Given:
Initial soldiers (M1) = 360
Initial provision time (D1) = 50 days

Elapsed time = 10 days

Newly joined soldiers = 120

Calculations:

=> Total provision units = 360 × 50 = 18,000 units

=> Provision consumed in 10 days = 360 × 10 = 3,600 units

=> Remaining provision = 18,000 − 3,600 = 14,400 units

=> Total soldiers now = 360 + 120 = 480

=> Number of days for remaining provisions = Remaining stock ÷ Total soldiers

=> Number of days = 14,400 ÷ 480

=> Number of days = 30 days

Therefore The correct answer is 30 days.

Additional Information

Chain Rule (Work and Time)

The amount of work or provisions is directly proportional to the number of people and the number of days: M1×D1×H1 = M2×D2×H2.

Inverse Variation

For a constant amount of food, the number of days the food lasts is inversely proportional to the number of soldiers. If men increase, days decrease.

Effective Man-Days

The total quantity of provisions is often measured in man-days, which is the product of the number of men and the number of days they can be fed.

Q2. Answer: (d) 0.015

Shortcut Trick

The Mean Proportional between two numbers a and b is calculated as √(a × b).

Given a = 0.0009 and b = 0.25.

Mean proportional = √(0.0009 × 0.25) = 0.03 × 0.5 = 0.015.

Therefore The correct answer is 0.015.

Alternate Method

Given: First number (a) = 0.0009 and Second number (b) = 0.25.

In a mean proportion a : x = x : b, where x is the mean proportional value.

Calculation:

=> $x^2 = a \times b$

=> $x^2 = 0.0009 \times 0.25$

=> $x = \sqrt{(0.0009 \times 0.25)}$

=> $x = \sqrt{(9/10000 \times 25/100)}$

=> $x = \sqrt{(225/1000000)}$

=> x = 15/1000

=> x = 0.015

Therefore The correct answer is 0.015.

Additional Information

Third Proportional

For two numbers a and b, the third proportional c is such that a : b = b : c, calculated as $c = b^2/a$.

Fourth Proportional

For three numbers a, b, and c, the fourth proportional d is such that a : b = c : d, calculated as d = (b × c)/a.

Continued Proportion

A sequence of numbers a, b, c, d... is in continued proportion if a/b = b/c = c/d and so on.

Q3. Answer: (c) 52.94 km/hr

Shortcut Trick

Average Speed = (D1 + D2) ÷ (D1/S1 + D2/S2)

Average Speed = (60 + 90) ÷ (60/45 + 90/60)

Average Speed = 150 ÷ (4/3 + 3/2) = 150 ÷ (17/6)

Average Speed = 900 ÷ 17 ≈ 52.94 km/hr
Therefore The correct answer is 52.94 km/hr.
Alternate Method
Given:
First distance (d1) = 60 km | Speed (s1) = 45 km/hr
Second distance (d2) = 90 km | Speed (s2) = 60 km/hr
Formula Used:
Average Speed = Total Distance ÷ Total Time
Time = Distance ÷ Speed
Calculations:
=> Time taken for the first part (t1) = 60 ÷ 45 = 4/3 hours
=> Time taken for the second part (t2) = 90 ÷ 60 = 3/2 hours
=> Total Time = t1 + t2 = 4/3 + 3/2
=> Total Time = (8 + 9) ÷ 6 = 17/6 hours
=> Total Distance = 60 + 90 = 150 km
=> Average Speed = 150 ÷ (17/6) = (150 × 6) ÷ 17
=> Average Speed = 900 ÷ 17 = 52.9411... km/hr
Therefore The correct answer is 52.94 km/hr.
Additional Information
Average Speed for Equal Distances
If a body travels two equal distances at speeds x and y, the average speed is given by (2 × x × y) ÷ (x + y).
Average Speed for Equal Time Intervals
If a body travels at speeds x and y for equal time intervals, the average speed is simply the arithmetic mean: (x + y) ÷ 2.
Relative Speed Concept
For objects moving in the same direction, relative speed = S1 − S2. For opposite directions, relative speed = S1 + S2.

Q4. Answer: (d) 24

Shortcut Trick
The Shortcut formula to find the Difference when Sum and Product are given:
Difference² = Sum² − 4 × Product
=> Difference² = 36² − 4 × 180
=> Difference² = 1296 − 720 = 576
=> Difference = √576 = 24
Therefore The correct answer is 24.
Alternate Method
Given:
Sum of two Positive Numbers (x + y) = 36
Product of the numbers (xy) = 180
Formula Used: (x − y)² = (x + y)² − 4xy
=> (x − y)² = (36)² − 4 × 180
=> (x − y)² = 1296 − 720
=> (x − y)² = 576
=> x − y = √576
=> x − y = 24
Therefore The correct answer is 24.
Additional Information
Algebraic Identities
(x + y)² = x² + y² + 2xy and (x − y)² = x² + y² − 2xy. Subtracting these gives (x + y)² − (x − y)² = 4xy.
Finding Individual Numbers
If Sum (S) and Difference (D) are known, the larger number is (S + D) ÷ 2 and the smaller number is (S − D) ÷ 2.
Sum of Squares
The sum of squares of two numbers can be found using x² + y² = (x + y)² − 2xy.

Q5. Answer: (d) 72

Shortcut Trick

Check the ratio of the sides: 75 : 21 : 72 ÷ 3 = 25 : 7 : 24.

The numbers 7, 24, and 25 form a Pythagorean triplet, which means the triangle is right-angled.

In a right-angled triangle, the altitude corresponding to one leg is simply the length of the other leg.

The sides forming the right angle are 21 cm and 72 cm.

Therefore The correct answer is 72 cm.

Alternate Method

Given: The sides of the triangle are 75 cm, 21 cm, and 72 cm.

Formula Used: Area of a triangle = (1 ÷ 2) × base × altitude

=> First, identify the type of triangle using the Pythagoras Theorem: $21^2 + 72^2 = 441 + 5184 = 5625$.

=> Since $75^2 = 5625$, the sides satisfy $a^2 + b^2 = c^2$, making it a right-angled triangle.

=> In this triangle, the longest side (75 cm) is the hypotenuse, and the other two sides (21 cm and 72 cm) are the legs (base and perpendicular).

=> Area = (1 ÷ 2) × product of legs = (1 ÷ 2) × 21 × 72.

=> Also, Area = (1 ÷ 2) × base (21 cm) × altitude (h).

=> (1 ÷ 2) × 21 × 72 = (1 ÷ 2) × 21 × h.

=> h = 72 cm.

Therefore The correct answer is 72 cm.

Additional Information

Pythagorean Triplets

Sets of three positive integers a, b, and c, such that $a^2 + b^2 = c^2$. Common triplets include (3, 4, 5), (5, 12, 13), and (7, 24, 25).

Altitude of a Right Triangle

The two legs of a right-angled triangle act as altitudes to each other. The altitude to the hypotenuse can be found using: (Leg1 × Leg2) ÷ Hypotenuse.

Heron's Formula

For any triangle with sides a, b, and c, Area = $\sqrt{(s \times (s - a) \times (s - b) \times (s - c))}$, where semi-perimeter s = (a + b + c) ÷ 2.

Q6. Answer: (a) 25 years

Shortcut Trick

Age of new student = New Average + (Initial count of students × Increase in average)

=> Increase in Average Age = 18 − 17 = 1 year

=> Age = 18 + (7 × 1) = 25 years

Therefore The correct answer is 25 years.

Alternate Method

Given:

Initial number of students = 7

Initial average age = 17 years

New average age = 18 years

Formula Used:

Total Age = Average Age × Number of Students

Calculations:

=> Total age of 7 students = 7 × 17 = 119 years

=> Total number of students after 1 joins = 8

=> Total age of 8 students = 8 × 18 = 144 years

=> Age of new student = Total age of 8 students − Total age of 7 students

=> Age = 144 − 119

=> Age = 25 years

Therefore The correct answer is 25 years.

Additional Information

Basic Average Formula

The Average of a set of numbers is the sum of the values divided by the total number of values: Average = (Sum of observations)

÷ (Total number of observations).

Effect of Adding a Constant

If a constant value 'k' is added to each observation in a data set, the original average also increases by exactly 'k'.

Weighted Average

When two groups with different averages are combined, the combined average is (n1x1 + n2x2) ÷ (n1 + n2), where n is the count and x is the average of each group.

Q7. Answer: (c) 10020

Shortcut Trick

The LCM of 12, 15, and 20 is 60.

The smallest 5-digit number is 10000.

Dividing 10000 by 60 leaves a remainder of 40.

Smallest 5-digit multiple = 10000 + (60 − 40) = 10020.

Therefore The correct answer is 10020.

Alternate Method

Given: The numbers are 12, 15, and 20. We need to find the smallest 5-digit number divisible by all three.

Formula Used: Required Number = Smallest 5-digit number + (LCM − Remainder)

=> Prime factorization of divisors:

=> 12 = 2 × 2 × 3 = $2^2 \times 3$

=> 15 = 3 × 5

=> 20 = 2 × 2 × 5 = $2^2 \times 5$

=> LCM = $2^2 \times 3 \times 5 = 4 \times 3 \times 5 = 60$

=> Smallest 5-digit number = 10000

=> Dividing 10000 by 60: 10000 = (166 × 60) + 40

=> Remainder = 40

=> Number to be added = 60 − 40 = 20

=> Required number = 10000 + 20 = 10020

Therefore The correct answer is 10020.

Additional Information

LCM (Least Common Multiple)

The smallest positive integer that is perfectly divisible by a given set of numbers. It is found by taking the highest power of all prime factors involved.

Divisibility by 60

A number is divisible by 60 if it satisfies the divisibility rules of 3 (sum of digits), 4 (last two digits), and 5 (ends in 0 or 5) simultaneously.

Smallest N-digit Divisible Number

To find the smallest N-digit number divisible by x, use: 10^(N−1) + (x − Remainder(10^(N−1) ÷ x)).

Q8. Answer: (d) 171666 cm^3

Shortcut Trick

Ratio of volumes of two cylinders: $V1/V2 = (r1/r2)^2 \times (h1/h2)$

$V1 = 317900 \times (3/5)^2 \times (21/14)$

$V1 = 317900 \times (9/25) \times (3/2) = 317900 \times (27/50)$

$V1 = 6358 \times 27 = 171666\ cm^3$

Therefore The correct answer is 171666 cm^3.

Alternate Method

Given:

Height of first cylinder (h1) = 21 cm

Volume of second cylinder (V2) = 317900 cm^3

Height of second cylinder (h2) = 14 cm

Radius of first cylinder (r1) = 3/5 × radius of second cylinder (r2)

Formula Used: Volume of cylinder = $\pi r^2 h$

Calculations:

=> Volume of second cylinder (V2) = π × r2² × h2
=> 317900 = (22/7) × r2² × 14
=> 317900 = 22 × r2² × 2
=> 317900 = 44 × r2²
=> r2² = 317900 ÷ 44 = 7225
=> r2 = √7225 = 85 cm
=> Radius of first cylinder (r1) = 3/5 × 85 = 3 × 17 = 51 cm
=> Volume of first cylinder (V1) = π × r1² × h1
=> V1 = (22/7) × (51)² × 21
=> V1 = 22 × 2601 × 3
=> V1 = 66 × 2601 = 171666 cm³
Therefore The correct answer is 171666 cm³.
Additional Information
Curved Surface Area of Cylinder
The area of the curved surface is given by the formula CSA = 2πrh.
Total Surface Area of Cylinder
The sum of the areas of the curved surface and the two circular bases: TSA = 2πr(h + r).
Volume and Ratio Property
If the radius and height of two cylinders are in the ratio r1:r2 and h1:h2, then the ratio of their volumes is (r1/r2)² × (h1/h2).

Q9. Answer: (b) 144

Shortcut Trick
Find the percentage difference: 45% − 20% = 25%.
The question states that 25% of the number is 36.
To get the total number (100%), multiply by 4 (since 25% × 4 = 100%).
Result = 36 × 4 = 144.
Therefore The correct answer is 144.
Alternate Method
Given:
First percentage = 45%
Second percentage = 20%
Difference in values = 36
Calculations:
=> Let the number be x.
=> According to the problem: 45% of x − 20% of x = 36
=> (45 − 20)% of x = 36
=> 25% of x = 36
=> (25 ÷ 100) × x = 36
=> (1 ÷ 4) × x = 36
=> x = 36 × 4
=> x = 144
Therefore The correct answer is 144.
Additional Information
Percentage Formula
The value of P% of a number N is calculated as (P × N) ÷ 100.
Finding the Base Number
If x% of a number is V, the original number is (V ÷ x) × 100.
Common Fraction Equivalents
Knowing common fractions like 20% = 1/5, 25% = 1/4, and 50% = 1/2 helps in faster calculation during competitive exams.

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Q10. Answer: (c) 1

Shortcut Trick

Tap B (fills in 9 hr) and Tap C (empties in 9 hr) have equal rates and opposite effects.

Their net Efficiency is zero, meaning only Tap A effectively fills the cistern.

Tap A takes 4 hr to fill the complete cistern.

Time to fill one-fourth of the cistern = 4 hr × 1/4 = 1 hr.

Therefore The correct answer is 1 hr.

Alternate Method

Given:

Time taken by Tap A = 4 hr

Time taken by Tap B = 9 hr

Time taken by Tap C (Emptying) = 9 hr

Formula Used:

Efficiency = Total Work ÷ Time

Person	Days	Total Work	Efficiency
Tap A	4	36	9
Tap B	9	4	
Tap C (Emptying)	9	−4	

Calculations:

=> Total Efficiency of all taps = 9 + 4 − 4 = 9 units/hr.

=> Target to fill one-fourth of the cistern = 36 ÷ 4 = 9 units.

=> Time required = 9 units ÷ 9 units/hr = 1 hr.

Therefore The correct answer is 1 hr.

Additional Information

Inlet and Outlet Pipes

An inlet pipe fills the tank (positive efficiency), while an outlet pipe empties the tank (negative efficiency).

Net Efficiency

When multiple pipes work together, the net filling or emptying rate is the algebraic sum of their individual efficiencies.

LCM Method

The capacity of the tank is usually assumed to be the Least Common Multiple (LCM) of the individual time periods given in the problem.

Q11. Answer: (c) 277/9%

Shortcut Trick

Price after 40% discount = 60% of 1200 = Rs. 720.

Final Sale Price = Rs. 520.

Additional Discount value = 720 − 520 = Rs. 200.

Additional Discount % = (200 ÷ 720) × 100 = (5 ÷ 18) × 100 = 250/9% = 27(7)/(9)%.

Therefore The correct answer is 27(7)/(9)%.

Alternate Method

Given:

Marked Price (MP) = Rs. 1,200

First Discount = 40%

Final Sale Price (SP) = Rs. 520

Formula:

Price after discount = MP × (100 − Discount%) ÷ 100

Calculations:

=> Price after 40% discount = 1200 × (1 − 0.40)

=> Price after 40% discount = 1200 × 0.60 = Rs. 720

=> Total Additional Discount needed = 720 − 520 = Rs. 200

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=> Additional Discount % = (Additional Discount ÷ Mid Price) × 100
=> Additional Discount % = (200 ÷ 720) × 100
=> Additional Discount % = (5 ÷ 18) × 100 = 500/18%
=> Additional Discount % = 250/9% = 27 7/9%
Therefore The correct answer is 27(7)/(9)%.
Additional Information
Successive Discounts
When two discounts a% and b% are given, the equivalent single discount is calculated as: [a + b − (ab ÷ 100)]%.
Marked Price (MP)
The price printed on the product. Discounts are always calculated on the Marked Price unless stated otherwise.
Selling Price (SP)
The actual price at which an item is sold after all discounts. SP = MP − Discount.

Q12. Answer: (b) $(2\sqrt{2})^2$

Given:
$\sqrt{(\sqrt{256} + \sqrt{144} + (2\sqrt{2})^2) + \sqrt{841} \times (\sqrt{2})^2}$
Formula used:
$\sqrt{x^2} = x$
$(a\sqrt{b})^2 = a^2 \times b$
Calculations:
=> $\sqrt{(\sqrt{(16 + 12 + 8) + 29 \times 2})}$
=> $\sqrt{(\sqrt{36 + 58})}$
=> $\sqrt{(6 + 58)}$
=> $\sqrt{64}$
=> 8
Now, checking the options:
A. $(\sqrt{2})^2 = 2$
B. $(2\sqrt{2})^2 = 4 \times 2 = 8$
C. $(4\sqrt{2})^2 = 16 \times 2 = 32$
D. $(3\sqrt{2})^2 = 9 \times 2 = 18$
Therefore The correct answer is option (2).

Q13. Answer: (b) Rs. 10,404

Shortcut Trick
Effective rate of Compound Interest for 2 years at 2% = 2 + 2 + (2 × 2)/100 = 4.04%.
Given Compound Interest (4.04%) = Rs. 404.
=> Principal (y) = (404 ÷ 4.04) × 100 = Rs. 10,000.
Total Amount = Principal + Interest = 10,000 + 404 = Rs. 10,404.
Therefore The correct answer is Rs. 10,404.
Alternate Method
Given: Interest (CI) = Rs. 404, Rate (r) = 2% per annum, Time (n) = 2 years.
Formula Used: Amount (A) = $P(1 + r/100)^n$ and CI = A − P
=> $CI = y[(1 + 2/100)^2 - 1]$
=> $404 = y[(51/50)^2 - 1]$
=> $404 = y[2601/2500 - 1]$
=> $404 = y[101/2500]$
=> $y = (404 \times 2500) \div 101$
=> $y = 4 \times 2500 = 10,000$
=> Total Amount (A) = Principal (y) + Interest
=> Total Amount (A) = 10,000 + 404 = 10,404
Therefore The correct answer is Rs. 10,404.
Additional Information

Effective Percentage Rate

For two successive changes of a% and b%, the effective change is (a + b + ab/100)%.

CI vs SI Difference

The difference between Compound Interest and Simple Interest for 2 years is $P(r/100)^2$.

Amount Property

In Compound Interest, the Total Amount of the previous year becomes the Principal for the next year.

Q14. Answer: (b) 4

Shortcut Trick

A natural number is a positive integer starting from 1 (1, 2, 3, ...).

Evaluate the expression 2x + 1 sequentially:

For x = 1, 2, 3 → 2x + 1 = 3, 5, 7 (all are prime numbers)

For x = 4 → 2(4) + 1 = 9 (composite number, not prime)

Therefore The correct answer is 4.

Alternate Method

Given:

An algebraic expression: 2x + 1

We need to find the smallest natural number x such that 2x + 1 is not a prime number.

Definition and Method:

A natural number belongs to the set {1, 2, 3, 4, ...}.

A prime number is a positive integer greater than 1 that has no positive divisors other than 1 and itself.

We substitute sequential natural numbers for x into the expression and check for primality.

Calculations:

=> For x = 1:

=> 2(1) + 1 = 3 (Prime number)

=> For x = 2:

=> 2(2) + 1 = 5 (Prime number)

=> For x = 3:

=> 2(3) + 1 = 7 (Prime number)

=> For x = 4:

=> 2(4) + 1 = 9 (Composite number, since 9 = 3 × 3)

Since 9 is divisible by 3, it is not a prime number. Hence, the smallest natural number satisfying the given condition is x = 4.

Therefore The correct answer is 4.

Additional Information

Prime Numbers

A prime number is a positive integer greater than 1 that has exactly two distinct positive divisors: 1 and itself. Examples include 2, 3, 5, 7, 11, etc.

Composite Numbers

A composite number is a positive integer greater than 1 that has more than two distinct positive divisors. For example, 4, 6, 8, 9, 10 are composite numbers.

Natural Numbers

Natural numbers are the set of positive integers starting from 1, i.e., {1, 2, 3, 4, ...}. Note that 0 is not considered a natural number in this context.

Primality of 2x + 1

For any integer x, the expression 2x + 1 always represents an odd number. Thus, we are looking for the smallest odd composite number greater than 1, which is 9.

Q15. Answer: (b) 16

Shortcut Trick

When the sum (S) and difference (D) of two ages are known:

Son's age (Smaller value) = (Sum − Difference) ÷ 2

Son's age = (56 − 24) ÷ 2

Son's age = 32 ÷ 2 = 16 years

Therefore The correct answer is 16 years.

Alternate Method

Given:

=> Sum of Father and Son's ages = 56 years

=> Difference between Father and Son's ages = 24 years

=> Let the age of the son be x years.

=> According to the question, the father is 24 years older than the son.

=> Father's age = (x + 24) years

=> Sum of their ages: x + (x + 24) = 56

=> 2x + 24 = 56

=> 2x = 56 − 24

=> 2x = 32

=> x = 32 ÷ 2

=> x = 16

Therefore The correct answer is 16 years.

Additional Information

Linear Equations in Ages

Age problems are typically solved by forming a linear equation where the unknown age is represented by a variable like 'x'.

Constant Age Difference

The difference between the ages of two individuals never changes over time. If the father is 24 years older now, he will always be 24 years older.

Sum and Difference Rule

If (A + B) = S and (A − B) = D, then the larger value A = (S + D) ÷ 2 and the smaller value B = (S − D) ÷ 2.

Q16. Answer: (d) 12

Shortcut Trick

Error in total sum = 37 − 22 = 15 marks.

Given average marks increase = 5/4 = 1.25.

Number of students = Total Increase in Sum ÷ Increase in Average.

=> 15 ÷ 1.25 = (15 × 4) ÷ 5 = 12.

Therefore The correct answer is 12.

Alternate Method

Given:

Incorrect entry = 37

Correct entry = 22

Average increase = 5/4

Formula used:

Average = Total Sum of Marks ÷ Number of Students

Total Increase in Sum = Number of Students × Increase in Average

Calculations:

=> Net effect on total sum = 37 − 22 = 15.

=> Let the total number of students be n.

=> (New Sum − Old Sum) ÷ n = 5/4

=> 15 ÷ n = 5/4

=> 5 × n = 15 × 4

=> 5 × n = 60

=> n = 60 ÷ 5 = 12.

Therefore The correct answer is 12.

Additional Information

Average Property (Constant Change)

If every value in a data set is increased or decreased by a constant k, the average also increases or decreases by k.

Relationship between Sum and Average

The change in total sum is always equal to the number of terms × the change in average (i.e., ΔSum = n × ΔAvg).

Correction of Errors

Correct Average = [Incorrect Sum + (Correct Value − Incorrect Value)] ÷ Total Number of Items.

Q17. Answer: (d) 5

Shortcut Trick

Ratio of numbers = 19 : 7 : 13

Since 19, 7, and 13 are all prime numbers, they are co-prime to each other.

For co-prime ratios, LCM = (Product of Ratios) × HCF

8645 = (19 × 7 × 13) × HCF => 8645 = 1729 × HCF

HCF = 8645 ÷ 1729 = 5

Therefore The correct answer is 5.

Alternate Method

Given:

Ratio of three numbers = 19 : 7 : 13

Least Common Multiple (LCM) = 8645

Formula Used:

Let the HCF be x. Then the numbers are ax, bx, and cx.

LCM of (ax, bx, cx) = x × LCM(a, b, c)

Calculations:

=> Let the three numbers be 19x, 7x, and 13x, where x is the HCF.

=> Since 19, 7, and 13 are prime numbers, their LCM is the product of these numbers and their common factor x.

=> LCM = 19 × 7 × 13 × x

=> 8645 = 1729 × x

=> x = 8645 ÷ 1729

=> x = 5

Therefore, the Highest Common Factor (HCF) of the numbers is 5, which corresponds to Option 4.

Therefore The correct answer is 5.

Additional Information

Relationship between HCF and LCM

For any two numbers a and b, the product of the numbers is equal to the product of their HCF and LCM: a × b = HCF(a, b) × LCM(a, b).

HCF of Co-prime Numbers

The HCF of two or more co-prime numbers (numbers that have no common factor other than 1) is always 1.

LCM and HCF of Fractions

LCM of fractions = (LCM of Numerators) ÷ (HCF of Denominators). HCF of fractions = (HCF of Numerators) ÷ (LCM of Denominators).

Q18. Answer: (c) 9

Shortcut Trick

Use Option Verification to identify the number satisfying both conditions.

If the larger number is 9, then the smaller number is 9 − 8 = 1.

Check the second condition: (2 × 9) − (5 × 1) = 18 − 5 = 13.

The result matches the condition given in the problem.

Therefore The correct answer is 9.

Alternate Method

Given:

Difference between numbers = 8

Result of (2 × Larger − 5 × Smaller) = 13

Formula Used:

Method of Linear Equations using Substitution.

Calculations:

=> Let the larger number be x and the smaller number be y.

=> From the first condition: x − y = 8 → y = x − 8

=> From the second condition: 2x − 5y = 13

=> Substitute the value of y in the second equation:

=> 2x − 5(x − 8) = 13

=> 2x − 5x + 40 = 13

=> −3x = 13 − 40

=> −3x = −27

=> x = −27 ÷ (−3) = 9

Therefore The correct answer is 9.

Additional Information

Linear Equations in One Variable

Equations where the highest power of the variable is 1, generally expressed as ax + b = 0.

Substitution Method

A technique to solve simultaneous equations by expressing one variable in terms of another and substituting it into the other equation.

Verification Technique

Fastest method for objective exams where you plug option values into the given constraints to see which one satisfies all conditions.

Q19. Answer: (d) 16

Shortcut Trick

Equate the total work done in both cases: (15M + 19W) × 8 days = (9M + 4W) × 14 days.

Divide both sides by 2: (15M + 19W) × 4 = (9M + 4W) × 7.

Expand and group terms: 60M + 76W = 63M + 28W => 3M = 48W.

Thus, 1 man is equivalent to 16 women.

Therefore The correct answer is 16.

Alternate Method

Given:

Case 1: (15 men + 19 women) can do the work in 8 days.

Case 2: (9 men + 4 women) can do the same work in 14 days.

Formula Used:

Total Work = Efficiency × Time

Group	Days	Total Work	Efficiency
Group 1 (15M + 19W)	8	56 (LCM)	7
Group 2 (9M + 4W)	14	4	

Calculations:

=> 15M + 19W = 7 ... (i)

=> 9M + 4W = 4 ... (ii)

=> To find the ratio 1M/1W, use cross-multiplication or elimination.

=> From (ii), 4W = 4 − 9M.

=> Substitute into (i) by multiplying (i) by 4: 60M + 19(4W) = 28.

=> 60M + 19(4 − 9M) = 28.

=> 60M + 76 − 171M = 28.

=> 111M = 48 => M = 48/111 = 16/37.

=> Substituting M in 4W = 4 − 9M => 4W = 4 − 9(16/37) = (148 − 144)/37 = 4/37.

=> W = 1/37.

=> Ratio M/W = (16/37) ÷ (1/37) = 16.

=> 1 man = 16 women.

Therefore The correct answer is 16.

Additional Information

Work-Efficiency Relation

Efficiency (E) is inversely proportional to Time (T). For the same work, E1 × T1 = E2 × T2.

Man-Day Concept

Total work is often measured in man-days, calculated as (Number of persons × Number of days taken).

Composite Efficiency

When different types of workers (men, women, children) work together, their individual efficiencies are summed to find the group's total efficiency.

Q20. Answer: (c) 12.5% profit

Shortcut Trick

Net Profit Ratio = (True Weight ÷ Faulty Weight) × (Markup Factor) × (Discount Factor)

Net Ratio = (1000 ÷ 960) × (120 ÷ 100) × (90 ÷ 100)

Net Ratio = (25/24) × (6/5) × (9/10) = 45/40 = 9/8

Profit % = [(9 − 8) ÷ 8] × 100 = 1/8 × 100 = 12.5%

Therefore The correct answer is 12.5% profit.

Alternate Method

Given:

Cost Price (CP) per kg = Rs. 48

Markup percentage = 20%

Discount percentage = 10%

Faulty weight used = 960 g instead of 1000 g

Calculations:

=> Marked Price (MP) for 1000 g = 48 + (20 ÷ 100) × 48 = 48 + 9.6 = Rs. 57.6

=> Selling Price (SP) for 1000 g = 57.6 − (10 ÷ 100) × 57.6 = 57.6 − 5.76 = Rs. 51.84

=> The shopkeeper delivers only 960 g, so his actual cost is for 960 g.

=> Actual CP for 960 g = (48 ÷ 1000) × 960 = 0.048 × 960 = Rs. 46.08

=> Total Profit = SP for 1000 g (received from customer) − Actual CP for 960 g

=> Total Profit = 51.84 − 46.08 = Rs. 5.76

=> Profit % = (Total Profit ÷ Actual CP) × 100

=> Profit % = (5.76 ÷ 46.08) × 100 = 1/8 × 100 = 12.5%

Therefore The correct answer is 12.5% profit.

Additional Information

Dishonest Dealer Formula

Profit % = [(True Weight − False Weight) ÷ False Weight] × 100 when selling at cost price.

Successive Discounts/Markups

Effective change of two percentages x and y is given by the formula: [x + y + (xy ÷ 100)].

General Profit Relation

Selling Price (SP) = CP × (100 + Profit%) ÷ 100 = MP × (100 − Discount%) ÷ 100.

Q21. Answer: (a) Rs. 4,630.50

Shortcut Trick

Rate = 5% = 1/20 → Principal : Amount ratio for 1 year = 20 : 21.

For 3 years, Ratio = $(20)^3 : (21)^3$ = 8000 : 9261.

Given 8000 units = Rs. 4,000 => 1 unit = Rs. 0.5.

Total Amount = 9261 × 0.5 = Rs. 4,630.50.

Therefore The correct answer is Rs. 4,630.50.

Alternate Method

Given:

Principal (P) = Rs. 4,000

Rate (R) = 5% per annum

Time (n) = 3 years

Formula Used:

Amount (A) = $P(1 + R/100)^n$

Calculations:

=> $A = 4000 \times (1 + 5/100)^3$

=> $A = 4000 \times (1 + 1/20)^3$

=> $A = 4000 \times (21/20)^3$

=> $A = 4000 \times (9261 / 8000)$

=> $A = 9261 / 2$

=> A = Rs. 4,630.50

Therefore The correct answer is Rs. 4,630.50.

Additional Information

Compound Interest (CI) Formula

$CI = P[(1 + R/100)^n - 1]$, where P is Principal, R is Rate, and n is Time.

Difference between CI and SI for 3 Years

Difference = $P(R/100)^2 \times (3 + R/100)$. This formula helps find the gap between simple and compound interest quickly.

Successive Percentage Method

The effective rate for 5% over 3 years is calculated as [5 + 5 + (5×5)/100] = 10.25% for 2 years, then combining 10.25% and 5% to get 15.7625% for 3 years.

Q22. Answer: (b) 2

Shortcut Trick

Use the Value Substitution Method by assuming A = 90°.

At A = 90°, the values are sin 90° = 1 and cos 90° = 0.

Substitute these into the expression: $(1^2) / (1 - 0) + (1^2) / (1 + 0)$.

=> 1 / 1 + 1 / 1 = 2.

Therefore The correct answer is 2.

Alternate Method

Given: $(\sin^2 A) / (1 - \cos A) + (\sin^2 A) / (1 + \cos A)$

Formula Used: $\sin^2 A + \cos^2 A = 1 \Rightarrow \sin^2 A = 1 - \cos^2 A$

=> Factor out $\sin^2 A$: $\sin^2 A [1 / (1 - \cos A) + 1 / (1 + \cos A)]$

=> Take the LCM inside the bracket: $\sin^2 A [(1 + \cos A + 1 - \cos A) / ((1 - \cos A)(1 + \cos A))]$

=> Simplify the numerator and apply $(a-b)(a+b) = a^2-b^2$: $\sin^2 A [2 / (1 - \cos^2 A)]$

=> Substitute $1 - \cos^2 A = \sin^2 A$: $\sin^2 A [2 / \sin^2 A]$

=> 2

Therefore The correct answer is 2.

Additional Information

Fundamental Trigonometric Identities

The three primary identities are $\sin^2\theta + \cos^2\theta = 1$, $1 + \tan^2\theta = \sec^2\theta$, and $1 + \cot^2\theta = \text{cosec}^2\theta$.

Algebraic Manipulations

Trigonometric expressions often utilize $a^2 - b^2 = (a - b)(a + b)$, such as $1 - \cos^2 A = (1 - \cos A)(1 + \cos A)$.

Substitution Method

In objective exams, substituting standard angles like 0°, 30°, 45°, 60°, or 90° can solve complex identities rapidly, provided the expression remains defined.

Q23. Answer: (c) 88

Given:

$\{(3^3 + 5^2) \times 2^3 - 4^3\} \div (7 - 3)$

Formula used:

BODMAS rule (Brackets, Orders/Exponents, Division, Multiplication, Addition, Subtraction)

Calculations:

=> $\{(27 + 25) \times 8 - 64\} \div (7 - 3)$

=> $\{52 \times 8 - 64\} \div 4$

=> $\{416 - 64\} \div 4$

=> $352 \div 4$

=> 88

Therefore The correct answer is option (3).

Q24. Answer: (b) Rs. 214.29

Shortcut Trick

The Buy 5, Get 2 Free offer implies that out of every 7 items, 5 are paid and 2 are free.

Effective Price = [Paid Items ÷ Total Items] × Price per Item

Effective Price = [5 ÷ (5 + 2)] × 300 = (5 ÷ 7) × 300

Effective Price = 1500 ÷ 7 = Rs. 214.285...

Therefore The correct answer is Rs. 214.29.

Alternate Method

Given:

Price of each item (MRP) = Rs. 300

Scheme = Buy 5, Get 2 Free

Total items needed = 21 items

=> Total items in one complete offer set = 5 + 2 = 7 items

=> Number of such sets required to get 21 items = 21 ÷ 7 = 3 sets

=> Total items paid for by the customer = 3 sets × 5 items/set = 15 items

=> Total cost paid = 15 items × Rs. 300 = Rs. 4500

=> Total items received = 21 items

=> Effective cost per item = Total cost paid ÷ Total items received

=> Effective cost = 4500 ÷ 21 = 1500 ÷ 7

=> Effective cost = 214.2857... ≈ Rs. 214.29

Therefore, the correct option is 2.

Therefore The correct answer is Rs. 214.29.

Additional Information

Discount Percentage Formula

In a 'Buy X, Get Y Free' offer, the Discount % = [Y ÷ (X + Y)] × 100.

Effective Price with Discount

The Effective Cost Price can also be calculated as: Marked Price × (1 − Discount Rate). Here, Discount Rate = 2/7.

Successive Discounts

If an additional cash discount is given on top of a 'Buy X, Get Y' offer, the net discount is calculated using the successive percentage formula: d_(net) = d1 + d2 − (d1 × d2)/100.

Q25. Answer: (b) Rs. 484

Shortcut Trick

Ratio of investments of A : B : C = 1960 : 1660 : 1130 = 196 : 166 : 113.

Difference in profit shares of A and C = 196 − 113 = 83 units.

Given, B's share = 166 units = Rs. 968.

Since 83 is exactly half of 166, the required difference = 968 ÷ 2 = Rs. 484.

Therefore The correct answer is Rs. 484.

Alternate Method

Given:

Investment of A = Rs. 1,960

Investment of B = Rs. 1,660

Investment of C = Rs. 1,130

Profit share of B = Rs. 968

Formula Used:

In a partnership, Profit Ratio = Investment Ratio × Time Period (where Time is same for all).

Calculations:

=> Ratio of profits of A : B : C = 1960 : 1660 : 1130

=> Ratio = 196 : 166 : 113

=> Let the profits be 196x, 166x, and 113x respectively.

=> 166x = 968

=> x = 968 ÷ 166 = 484 ÷ 83

=> Difference in profit earned by A and C = 196x − 113x = 83x

=> Difference = 83 × (484 ÷ 83)

=> Difference = Rs. 484

Therefore The correct answer is Rs. 484.

Additional Information

Partnership Profit Sharing

Profit is distributed among partners in the ratio of (Investment1 × Time1) : (Investment2 × Time2). If the time period is equal, profit depends solely on the investment ratio.

Simple vs. Compound Partnership

In a simple partnership, all partners invest for the same duration. In a compound partnership, the duration of investments varies for different partners.

Active and Sleeping Partners

An active partner manages the business and may receive a fixed salary or a percentage of the profit before the remaining profit is distributed according to investment ratios.

Q26. Answer: (b) 33 seconds

Shortcut Trick

Relative Speed (Same Direction) = 54 − 36 = 18 km/h

Convert to m/s: 18 × (5/18) = 5 m/s

Total Distance = Sum of lengths = 90 + 75 = 165 m

Time taken = Total Distance ÷ Relative Speed = 165 ÷ 5 = 33 sec

Therefore The correct answer is 33 sec.

Alternate Method

Given:

Length of Train A (L1) = 90 m | Speed of Train A (V1) = 54 km/h

Length of Train B (L2) = 75 m | Speed of Train B (V2) = 36 km/h

Formula Used:

Relative Speed (Same Direction) = V1 − V2

Time = (L1 + L2) ÷ Relative Speed

Calculations:

=> Total distance to be covered = 90 + 75 = 165 m

=> Relative speed of trains = (54 − 36) km/h = 18 km/h

=> Converting km/h to m/s: 18 × (5/18) m/s = 5 m/s

=> Time taken to overtake = Total distance ÷ Relative speed

=> Time = 165 ÷ 5 = 33 seconds

Therefore, Option (2) is the correct answer.

Therefore The correct answer is 33 sec.

Additional Information

Relative Speed (Opposite Direction)

When two objects move towards each other, their relative speed is the sum of their individual speeds: V_(rel) = V1 + V2.

Speed Conversion Unit

To convert km/h to m/s, multiply by 5/18. To convert m/s to km/h, multiply by 18/5.

Train Overtaking/Crossing a Point

If a train crosses a stationary pole or a person, the distance covered is equal to the length of the train only.

Q27. Answer: (d) 1,15,500

Shortcut Trick

Net monthly savings = 17,000 − (4,000 + 2,500) = Rs. 10,500.

Since the savings of the birthday month is spent entirely, effective saving occurs for 11 months.

Total annual savings = 10,500 × 11 = Rs. 1,15,500.

Therefore The correct answer is Rs. 1,15,500.

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Alternate Method

Given:

Monthly salary of Chetan = Rs. 17,000

Monthly house rent = Rs. 4,000

Monthly bills = Rs. 2,500

Formula Used:

Monthly savings = Monthly salary − Total expenditure

Annual savings = Monthly savings × Number of months saved

Calculations:

=> Total monthly expenditure = 4,000 + 2,500 = Rs. 6,500

=> Monthly savings = 17,000 − 6,500 = Rs. 10,500

=> In the birthday month, savings = Rs. 0 (as he spent the complete amount for celebration)

=> Total months in a year = 12

=> Effective months for savings = 12 − 1 = 11 months

=> Total savings in a year = 10,500 × 11

=> Total savings = Rs. 1,15,500

Therefore The correct answer is Rs. 1,15,500.

Additional Information

Income and Savings Relationship

Income is always the sum of expenditure and savings (Income = Expenditure + Savings). Any increase in expenditure without a change in income directly reduces savings.

Annual Calculation Adjustments

When calculating annual values from monthly data, verify if any specific months have deviations or zero values due to special events like a birthday celebration.

Savings Percentage

The savings percentage can be calculated as (Monthly Savings ÷ Monthly Salary) × 100. In this case: (10,500 ÷ 17,000) × 100 ≈ 61.76%.

Q28. Answer: (b) 20%

Shortcut Trick

Ratio of Cost Price (CP) to Selling Price (SP) = 1000 : (20 × 60)

CP : SP = 1000 : 1200 = 5 : 6

Profit = 6 − 5 = 1 unit

Profit % = (1 ÷ 5) × 100 = 20%

Therefore The correct answer is 20%.

Alternate Method

Given:

Quantity of rice = 20 kg

Cost Price (CP) of 20 kg rice = Rs. 1000

Selling Price (SP) of 1 kg rice = Rs. 60

Formula Used:

Profit = Total SP − Total CP

Profit % = (Profit ÷ CP) × 100

Calculations:

=> Total Selling Price (SP) = 20 × 60 = Rs. 1200

=> Profit = 1200 − 1000 = Rs. 200

=> Profit % = (200 ÷ 1000) × 100

=> Profit % = 20%

Therefore The correct answer is 20%.

Additional Information

Loss Percentage

When CP > SP, a loss occurs. Loss % = (Loss ÷ CP) × 100, where Loss = CP − SP.

Marked Price & Discount

Discount is a reduction offered on the Marked Price (MP). SP = MP − Discount.

Profit Margin on SP

Sometimes profit is calculated on SP for business analysis. Profit % on SP = (Profit ÷ SP) × 100.

Q29. Answer: (c) 2.64

Shortcut Trick

Volume of shell = 4/3 × π × ($R^3 - r^3$) = 4/3 × 22/7 × ($4^3 - 1^3$)

=> Volume = 4/3 × 22/7 × 63 = 4 × 22 × 3 = 264 cm^3

Mass = Density × Volume = 10 × 264 = 2640 g

Weight in kg = 2640 ÷ 1000 = 2.64 kg

Therefore The correct answer is 2.64 kg.

Alternate Method

Given:

Metal density (ρ) = 10 g/cm^3

Internal radius (r) = 1 cm

External radius (R) = 4 cm

Formula Used:

Volume of hollow sphere = 4/3 × π × ($R^3 - r^3$)

Mass = Density × Volume

Calculations:

=> Volume = 4/3 × 22/7 × ($4^3 - 1^3$)

=> Volume = 4/3 × 22/7 × (64 − 1)

=> Volume = 4/3 × 22/7 × 63

=> Volume = 4 × 22 × 3 = 264 cm^3

=> Mass = 10 × 264 = 2640 g

=> Weight (in kg) = 2640 ÷ 1000 = 2.64 kg

Therefore The correct answer is 2.64 kg.

Additional Information

Volume of a Solid Sphere

The volume of a complete solid sphere is given by V = 4/3 × π × r^3.

Surface Area of a Sphere

The total surface area of a sphere is 4 × π × r^2, and for a hollow shell, the total surface area is $4\pi R^2 + 4\pi r^2$.

Unit Conversion

Always ensure units are consistent; 1 kg = 1000 g and 1 m^3 = 10^6 cm^3.

Q30. Answer: (b) 9 cups

Shortcut Trick

The Ratio of Rice to Water is 2 : 3.

Current Rice quantity = 6 cups, which is 3 times the original amount (6 ÷ 2 = 3).

To maintain the same proportion, multiply the Water quantity by the same factor: 3 × 3 = 9 cups.

Therefore The correct answer is 9 cups.

Alternate Method

Given:

Initial Rice (R1) = 2 cups

Initial Water (W1) = 3 cups

New Rice (R2) = 6 cups

Formula Used:

Direct Proportion: R1 / W1 = R2 / W2

Calculations:

=> 2 / 3 = 6 / W2

=> 2 × W2 = 6 × 3

=> 2 × W2 = 18

=> W2 = 18 ÷ 2

=> W2 = 9

Therefore The correct answer is 9 cups.

Additional Information

Direct Proportion

Two quantities are in direct proportion if an increase in one leads to a corresponding increase in the other such that their ratio (x/y = k) remains constant.

Unitary Method

To solve using the unitary method, first find the amount of water needed for 1 cup of rice (3 ÷ 2 = 1.5) and then multiply by the desired amount (1.5 × 6 = 9).

Scaling Factor

The scaling factor is the constant multiplier used to increase or decrease both parts of a ratio simultaneously while maintaining the original relationship.

Q31. Answer: (c) Random Access Memory

The correct answer is Random Access Memory.

Key Points

• RAM stands for Random Access Memory, which serves as the primary memory or main memory of a computer system.

• It is called Random Access because any memory cell or storage location can be accessed directly by the CPU in the same amount of time, regardless of its physical position, unlike sequential access devices like magnetic tapes.

• The RAM stores the operating system, application programs, and data currently in use so that they can be quickly reached by the processor.

• It is volatile memory, meaning that all the information stored in RAM is lost as soon as the power supply is switched off or the system is rebooted.

• RAM is a Read/Write memory, which allows the computer to both read existing data and write new data into it at extremely high speeds.

Additional Information

• Types of RAM:

• SRAM (Static Random Access Memory): It uses transistors to store data and does not need to be refreshed periodically. It is faster and more expensive than DRAM and is primarily used as Cache Memory.

• DRAM (Dynamic Random Access Memory): It stores data using capacitors and transistors. Since capacitors leak charge, DRAM must be refreshed thousands of times per second. It is used as the main system memory.

• SDRAM (Synchronous DRAM): This type synchronizes its speed with the system clock, allowing the CPU to process instructions more efficiently.

• Comparison with ROM:

• Unlike RAM, ROM (Read Only Memory) is non-volatile, meaning it retains its data even after power is lost. It typically contains the BIOS (Basic Input/Output System) necessary for the computer to start up.

• Capacity and Speed:

• Modern RAM capacity is measured in Gigabytes (GB), and its speed is often measured in Megahertz (MHz) or Megatransfers per second (MT/s). Higher capacity and speed allow for better multitasking performance.

Q32. Answer: (a) Article 133

The correct answer is Article 133.

Key Points

• Article 133 of the Constitution of India defines the appellate jurisdiction of the Supreme Court in appeals from High Courts specifically regarding civil matters.

• According to this provision, an appeal lies to the Supreme Court from any judgment, decree, or final order in a civil proceeding of a High Court if the High Court certifies under Article 134A that the case involves a substantial question of law of general importance.

• The High Court must also be of the opinion that the said question needs to be decided by the Supreme Court to grant the certificate.

• Prior to the 30th Constitutional Amendment Act, 1972, civil appeals were allowed if the amount or value of the subject matter of the dispute was not less than 20,000 rupees; however, this monetary requirement was abolished, and the focus shifted entirely to the substantial question of law.

• Under clause (2) of Article 133, any party appealing to the Supreme Court may also argue that a substantial question of law as to

the interpretation of the Constitution has been wrongly decided.

Additional Information

• Article 131:

• Specifies the Original Jurisdiction of the Supreme Court.

• It empowers the court to hear disputes between the Government of India and one or more States, or between two or more States, to the exclusion of any other court.

• Article 132:

• Deals with the appellate jurisdiction of the Supreme Court in appeals from High Courts in certain cases involving constitutional matters.

• It applies if the High Court certifies that the case involves a substantial question of law regarding the interpretation of the Constitution.

• Article 134:

• Delineates the appellate jurisdiction of the Supreme Court in criminal matters.

• It provides for an appeal if a High Court has, on appeal, reversed an order of acquittal and sentenced an accused to death, or has withdrawn a trial to itself and awarded a death sentence.

Q33. Answer: (b) Palaeolithic Age and Neolithic Age

The correct answer is Palaeolithic Age and Neolithic Age.

Key Points

• The Mesolithic Age, often referred to as the Middle Stone Age, represents a crucial cultural and technological bridge between the Palaeolithic Age (Old Stone Age) and the Neolithic Age (New Stone Age).

• This period is termed transitional because it reflects the shift from the hunter-gatherer lifestyle of the Pleistocene epoch to the food-producing, sedentary societies of the Holocene epoch.

• Geographically and climatically, it coincided with the end of the last Ice Age around 10,000 BCE, leading to warmer climates, increased rainfall, and the expansion of forests and grasslands.

• Technologically, it is defined by the production of microliths, which are very small, geometric stone tools made of chert, chalcedony, or agate, typically measuring 1 to 5 cm in length.

• The economy of the Mesolithic people remained based on hunting, fishing, and gathering, but it also saw the earliest evidence of animal domestication, particularly the dog, which paved the way for the agricultural revolution.

• Prominent Mesolithic sites in India include Bagor in Rajasthan, Adamgarh in Madhya Pradesh, and Langhnaj in Gujarat, providing evidence of both microlithic industries and early burials.

Additional Information

• Palaeolithic Age:

• The earliest period of human history, characterized by the use of crude, unpolished stone tools like hand-axes and cleavers.

• Humans were entirely nomadic and relied on hunting large animals and gathering wild plants during the Ice Age.

• Neolithic Age:

• Marked by the Neolithic Revolution, where humans began settled agriculture and pottery making.

• Tools became polished and grounded for higher efficiency in farming and construction.

• Chalcolithic Age:

• Known as the Copper-Stone Age, it marked the first use of metals alongside stone tools.

• It serves as the transition between the Neolithic and the Bronze Age.

• Iron Age:

• Characterized by the widespread smelting of iron ore, leading to the creation of stronger tools and weapons.

• In the Indian context, it is often associated with the Painted Grey Ware (PGW) culture and the Vedic period.

Q34. Answer: (d) Mumbai

The correct answer is Mumbai.

Key Points

• Mumbai is home to the world's second-largest collection of Art Deco buildings, a title it holds globally after Miami, USA. This architectural movement flourished in the city between the 1930s and 1950s, symbolizing the city's transition toward modernity.

• In 2018, the Victorian Gothic and Art Deco Ensembles of Mumbai were collectively inscribed as a UNESCO World Heritage Site. This recognition covers a total of 94 structures, primarily concentrated in the Oval Maidan and Marine Drive precincts.

• The Oval Maidan serves as a unique architectural boundary; its western side is flanked by a seamless row of Art Deco apartment blocks, while the eastern side features 19th-century Victorian Gothic public buildings, creating a grand urban ensemble.

• The style in Mumbai is often referred to as Indo-Deco, as it blended the sleek, streamlined aesthetic of international Art Deco

with Indian motifs and imagery, such as tropical flora and mythological figures.

• As of October 2025, these heritage structures continue to define the city's skyline, with iconic landmarks like Eros Cinema and Regal Cinema serving as prime examples of the movement's cinematic and maritime influences. Therefore, the correct option is (4).

Additional Information

• Distinct Features of Mumbai Art Deco:

• Nautical Themes: Influenced by Mumbai's status as a port city, many buildings feature porthole windows, curved balconies, and railing designs that mimic ocean liners.

• Tropical Motifs: Buildings often incorporate bas-reliefs depicting palm trees, sunbursts, and local agricultural scenes, grounding the global style in the Indian context.

• UNESCO Significance:

• The ensemble represents the modernization of Mumbai through two distinct phases of urban planning: the Victorian era for public administration and the Art Deco era for residential and commercial expansion.

• The Backbay Reclamation project provided the necessary land for this 20th-century architectural explosion, turning the waterfront into a modernist corridor.

Q35. Answer: (a) January 12^(th)

The correct answer is January 12^(th).

Key Points

• National Youth Day, also known as Rashtriya Yuva Diwas, is observed every year on January 12 to celebrate the birth anniversary of Swami Vivekananda, one of India's most influential spiritual leaders.

• The Government of India officially declared this day in 1984, and the first nationwide celebration took place on January 12, 1985, to inspire the youth of the country.

• The primary objective of the day is to propagate the philosophy and ideals of Swami Vivekananda among the Indian youth, encouraging them to contribute to the nation's progress with energy and character.

• Swami Vivekananda was born on January 12, 1863, in Kolkata; his teachings focus on self-reliance, spirituality, and the potential of the youth to transform society.

Additional Information

• Swami Vivekananda and his Legacy:

• He was the chief disciple of the mystic Ramakrishna Paramahansa and established the Ramakrishna Mission in 1897 to provide social service and spiritual education.

• He gained global recognition after his historic speech at the Parliament of the World's Religions in Chicago in 1893, where he introduced Vedanta and Yoga to the West.

• His works and speeches, such as 'Karma Yoga' and 'Raja Yoga', remain fundamental texts for modern spiritual and philosophical study.

• Other Notable Observances:

• March 20^(th): This day is celebrated globally as World Sparrow Day to raise awareness about the conservation of sparrows and as the International Day of Happiness.

• April 30^(th): Observed as Ayushman Bharat Diwas in India, highlighting the goals of the Ayushman Bharat scheme to provide health insurance to the underprivileged.

Q36. Answer: (b) It is an equatorial low-pressure belt where trade winds meet.

The correct answer is It is an equatorial low-pressure belt where trade winds meet..

Key Points

• The Inter Tropical Convergence Zone (ITCZ) is a permanent low-pressure belt encircling the Earth near the Equator, where the solar insolation is maximum throughout the year.

• It is the region where the Northeast trade winds from the Northern Hemisphere and the Southeast trade winds from the Southern Hemisphere converge, forcing the air to rise into the atmosphere.

• As the converged air mass rises due to convection, it cools adiabatically, leading to the formation of towering cumulonimbus clouds and frequent, intense thunderstorms.

• The ITCZ is not stationary; it migrates North or South depending on the apparent movement of the Sun. For instance, during the Northern summer, it moves over the Indian subcontinent, establishing the Monsoon Trough.

• Due to the vertical movement of air rather than horizontal flow, this zone is often characterized by very light or calm winds, traditionally known to sailors as the Doldrums.

Additional Information

• Climatic Significance

• Hadley Cell: The ITCZ represents the ascending branch of the Hadley Cell, a major component of the Earth's atmospheric circulation system.

• Monsoon Connection: The shift of the ITCZ to about 20°N−25°N latitude over India in July is a primary driver for the Southwest Monsoon.

• Precipitation: This belt is responsible for the high annual rainfall found in tropical rainforest regions like the Amazon Basin and the Congo Basin.

• Distinction from other zones

• High-Pressure Belts: Unlike the ITCZ, the Subtropical Highs (Horse Latitudes) and Polar Highs are regions of descending air and high atmospheric pressure.

• Westerlies: These are prevailing winds in the mid-latitudes (between 30° and 60°), which flow towards the poles, unlike the trade winds that converge at the ITCZ.

• Frontal Systems: Cold fronts and warm fronts are features of the Extra-tropical Cyclones in temperate regions, whereas the ITCZ is a thermal, tropical phenomenon.

Q37. Answer: (a) Joule

The correct answer is Joule.

Key Points

• Heat generated in an electrical resistor is a form of thermal energy produced by the collision of electrons with the atoms of the resistive material.

• The International System of Units (SI) identifies the Joule (J) as the standard unit for all forms of energy, work, and heat.

• The relationship between electricity and heat is defined by Joule's Law of Heating, which states that the heat produced (H) in a conductor is equal to the product of the square of the current (I), the resistance (R), and the time (t) for which the current flows.

• The mathematical expression for this law is $H = I^2Rt$, where the resulting energy is measured in Joules.

• One Joule is defined as the work done or energy transferred when a force of one Newton moves an object through a distance of one meter in the direction of the force.

Additional Information

• Coulomb:

• It is the SI unit of electric charge.

• One Coulomb represents the amount of charge transported by a constant current of one Ampere in one second.

• Watt:

• It is the SI unit of power, which defines the rate at which energy is consumed or converted.

• One Watt is equivalent to one Joule per second (1 W = 1 J/s). While heat is energy (Joules), the rate at which a resistor generates heat is measured in Watts.

• Volt:

• It is the SI unit of electric potential, potential difference, and electromotive force (EMF).

• One Volt is defined as the potential difference across a conductor when a current of one Ampere dissipates one Watt of power.

Q38. Answer: (c) 1956

The correct answer is 1956.

Key Points

• The Industrial Policy Resolution (IPR) of 1956 was adopted by the Indian Parliament in April 1956, replacing the previous 1948 resolution to align with the goal of a socialist pattern of society.

• This resolution is famously regarded as the Economic Constitution of India because it provided the basic framework for the country's industrial strategy for several decades.

• The policy categorized industries into three distinct schedules: Schedule A (17 industries under exclusive state responsibility), Schedule B (12 industries progressively state-owned but supplemented by the private sector), and Schedule C (remaining industries left to the private sector).

• It aimed to accelerate the rate of economic growth and speed up industrialization, specifically focusing on the development of heavy industries and machine-making sectors.

• The IPR 1956 emphasized the Public Sector taking the lead role, ensuring that the government controlled the commanding heights of the economy to prevent the concentration of wealth.

• It provided the theoretical and legal basis for the Second Five-Year Plan, which was built upon the Mahalanobis Model of development.

Additional Information

• Second Five-Year Plan (1956–1961):

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• Formulated by Prasanta Chandra Mahalanobis, it prioritized heavy industrialization over agriculture.

• Focus was placed on iron and steel plants, chemical industries, and mining to build a self-reliant economy.

• Regional Balanced Development:

• The IPR 1956 used industrial licensing as a tool to promote regional equality by offering tax concessions and lower electricity tariffs to industries set up in backward regions.

• Small Scale Industries (SSI):

• In 1955, the Karve Committee (Village and Small-scale Industries Committee) highlighted the potential of small-scale industries for rural development.

• The 1956 resolution protected these industries by reserving products and providing subsidies to generate mass employment.

• Industrial Development and Regulation Act (IDRA), 1951:

• This legislative act provided the government with the necessary powers to regulate and license new and existing industrial units according to the priorities of the 1956 resolution.

Q39. Answer: (c) 1,027 million

The correct answer is 1,027 million.

Key Points

• The Census of India 2001 was the 14th Census of the country since 1872 and the 6th Census conducted after Independence.

• The reference moment for the 2001 Census was 00:00 hours of 1st March 2001, which served as the official date for calculating the nationwide population count.

• As of this reference date, the total population of India was recorded at 1,027,015,247, which is approximately 1,027 million or 1.027 billion.

• This census officially confirmed that India had crossed the one billion mark, making it the second country in the world after China to reach this demographic threshold.

• The population comprised 532.1 million males and 494.8 million females, reflecting the vast human resource and demographic diversity of the nation at the start of the 21st century.

Additional Information

• Population Growth and Density:

• The decadal growth rate from 1991 to 2001 was 21.54%, showing a slight decline compared to the previous decade.

• The population density in 2001 was 324 persons per square kilometer, increasing significantly from 267 in 1991.

• The sex ratio was recorded as 933 females per 1,000 males, showing a marginal improvement from 927 in the 1991 Census.

• Literacy and States:

• The literacy rate in 2001 stood at 64.84%, with Kerala maintaining the highest literacy and Uttar Pradesh being the most populous state.

• The subsequent 2011 Census recorded the population at 1,210 million, continuing the trend of substantial demographic expansion.

Q40. Answer: (d) INS Rana and INS Jyoti

The correct answer is INS Rana and INS Jyoti.

Key Points

• SLINEX-25 (Sri Lanka-India Naval Exercise 2025) is the 12th edition of the bilateral maritime exercise conducted between the Indian Navy and the Sri Lanka Navy in August 2025.

• The exercise was structured into two distinct phases: the Harbour Phase held at Colombo and the Sea Phase conducted in the Laccadive Sea off the western coast of Sri Lanka.

• The Indian Navy deployment for this iteration featured INS Rana, a Rajput-class guided-missile destroyer, and INS Jyoti, a fleet replenishment tanker, representing a balanced mix of combat power and logistical support.

• The primary objective of SLINEX-25 was to improve interoperability, strengthen mutual understanding, and exchange best practices in multi-faceted maritime operations including surface firing and tactical maneuvers.

• This exercise aligns with India's SAGAR (Security and Growth for All in the Region) policy and the Neighborhood First initiative, fostering regional maritime security and cooperation in the Indian Ocean Region (IOR).

Additional Information

• Participating Vessels and Specifics:

• INS Rana (D52): It is the fourth ship of the Rajput-class destroyers. Commissioned in 1982, it is equipped with BrahMos supersonic cruise missiles, Styx anti-ship missiles, and advanced anti-submarine warfare (ASW) capabilities.

• INS Jyoti (A58): A Komandarm Fedko-class replenishment oiler that provides essential logistics like fuel, ammunition, and provisions to the fleet, extending the blue-water reach of the Indian Navy.

• SLNS Sayurala: The Sri Lanka Navy typically participates with its Advanced Offshore Patrol Vessels (AOPV), such as SLNS Sayurala, to conduct joint visit, board, search, and seizure (VBSS) drills.

• Technical Concepts in Exercises:

• Sea Phase Operations: Focuses on complex drills such as asymmetric threat simulations, cross-deck helicopter operations, and coordinated maritime surveillance.

• Harbour Phase Activities: Includes professional interactions, subject matter expert exchanges (SMEE), and sports fixtures to build camaraderie between personnel.

• Other Notable Ships (Incorrect Options):

• INS Vikrant: India's first indigenous aircraft carrier (IAC-1), which serves as the flagship of the Western or Eastern fleets.

• INS Talwar: The lead ship of the Talwar-class stealth frigates, known for its stealth hull design and multi-role versatility.

• INS Kolkata: A Project 15A destroyer featuring the MF-STAR AESA radar and Barak-8 long-range surface-to-air missiles.

Q41. Answer: (a) Sleep keeps data in RAM; Hibernate saves it to disk

The correct answer is Sleep keeps data in RAM; Hibernate saves it to disk.

Key Points

• Sleep Mode is a low-power state that allows a Windows computer to resume full-power operation quickly. It achieves this by maintaining the power supply to the Random Access Memory (RAM), where all open applications, files, and the System State are stored. Because RAM is Volatile Memory, it requires a continuous trickle of electricity to retain data.

• Hibernate Mode is designed specifically to save power over longer durations. Instead of keeping data in the RAM, the Operating System takes a snapshot of the current session and writes it to the Hard Disk Drive (HDD) or Solid State Drive (SSD). Once the data is safely written to the Non-volatile Storage, the computer completely powers down, consuming zero electricity.

• The primary technical difference involves the Storage Medium and Data Persistence. In Sleep, if power is lost (e.g., a battery dies or a plug is pulled), any unsaved data in the RAM is permanently lost. In Hibernate, the data remains safe on the Disk even without power, and the session is restored when the user restarts the machine.

• In terms of Performance, waking from Sleep is significantly faster (often 1−3 seconds) because the CPU simply resumes processing from the existing RAM state. Resuming from Hibernate takes longer (15−60 seconds) because the Windows Boot Manager must read the saved session file from the Disk and reload it into the RAM.

Additional Information

• Hybrid Sleep

• This feature, primarily found on Desktop PCs, combines Sleep and Hibernate. It writes the session to the Disk but also keeps it in RAM.

• Its primary Key Function is to provide the speed of Sleep while offering the Data Redundancy of Hibernate in case of a sudden power outage.

• hiberfil.sys File

• This is a hidden System File located in the root folder of the drive where the Operating System is installed.

• The size of hiberfil.sys is approximately equal to the amount of Physical RAM installed on the system, as it must accommodate the entire Memory Dump during hibernation.

• Fast Startup

• Introduced in Windows 8 and continuing through Windows 10 and Windows 11, this feature uses Hibernation technology to save the Kernel Session to the disk during a standard shutdown.

• This allows the Operating System to boot much faster by skipping the full hardware initialization and loading the saved Kernel State directly from the Disk.

Q42. Answer: (d) Software that manages hardware and provides platform for application software

The correct answer is Software that manages hardware and provides platform for application software.

Key Points

• System software is defined as a type of computer program that is designed to run a computer's hardware and application programs.

• It acts as the primary interface between the physical components of the computer (the hardware) and the user-facing software, ensuring that the machine functions efficiently and reliably.

• The most prominent example of system software is the Operating System (OS), such as Windows, macOS, or Linux, which manages the Central Processing Unit (CPU), Main Memory (RAM), and Input/Output (I/O) devices.

• It provides a necessary runtime environment or platform; without system software, application software like games or web browsers would have no way to communicate instructions to the hardware.

• Beyond the OS, system software includes device drivers, which are specialized programs that allow the OS to interact with specific hardware like Graphic Cards, Printers, and Network Adapters.

• It also encompasses firmware like BIOS (Basic Input/Output System) or UEFI, which initializes the hardware during the booting process before the operating system takes control.

• System software typically runs in the background and is responsible for resource allocation, file management, and memory management tasks that are transparent to the user.

Additional Information

• Application Software: Unlike system software, application software is designed to perform specific tasks for the end-user.

• Document Creation: Tools like Microsoft Word, LibreOffice Writer, or Notepad are productivity applications used for text manipulation.

• Multimedia Players: Software such as VLC Media Player or Windows Media Player is used specifically for decoding and playing audio and video file formats.

• Web Browsers: Applications like Google Chrome, Mozilla Firefox, and Microsoft Edge are used to access and navigate the World Wide Web.

• Utility Software: Often categorized under system software, these programs help analyze, configure, and maintain the computer system, such as Antivirus software, Disk Cleanup tools, and Compression utilities like WinRAR.

• Programming Language Translators: These include Compilers, Interpreters, and Assemblers that convert high-level programming code into Machine Code that the hardware can execute.

Q43. Answer: (b) Gender Inequality Index

The correct answer is Gender Inequality Index.

Key Points

• The Gender Inequality Index (GII) is a composite metric introduced by the United Nations Development Programme (UNDP) in the 2010 Human Development Report to measure the loss in potential human development due to inequality between female and male achievements.

• It evaluates gender disparity across three fundamental dimensions: Reproductive Health, Empowerment, and Labour Market Participation.

• The Reproductive Health dimension is measured by two indicators: the Maternal Mortality Ratio (MMR) and the Adolescent Birth Rate (ABR).

• The Empowerment dimension is assessed by the share of parliamentary seats held by each gender and the attainment of at least secondary education by both women and men.

• The Labour Market dimension is represented by the labour force participation rate for both female and male populations aged 15 years and older.

• The GII value ranges from 0 to 1, where 0 signifies that women and men fare equally (perfect equality) and 1 signifies that one gender fares as poorly as possible in all measured dimensions (perfect inequality).

Additional Information

• Comparison with Other Indices:

• Human Development Index (HDI): A summary measure of average achievement in key dimensions of human development, including a long and healthy life, knowledge, and a decent standard of living.

• Gender Development Index (GDI): Introduced in 2014, it measures gender gaps in human development by calculating the ratio of female to male HDI values.

• Multidimensional Poverty Index (MPI): Captures the various deprivations experienced by people in their daily lives, such as poor health, lack of education, and low living standards.

• Global Context:

• The GII helps policy makers understand the opportunity cost of gender inequality and provides a mechanism to monitor progress toward Sustainable Development Goal 5 (SDG 5), which aims for Gender Equality.

Q44. Answer: (c) 20^(th) Edition

The correct answer is 20^th Edition.

Key Points

• The Global Risks Report is a flagship annual publication released by the World Economic Forum (WEF) ahead of its high-profile Annual Meeting in Davos, Switzerland.

• The 20^th Edition of the report was launched in January 2025, marking two full decades of the WEF tracking and analyzing the global risk landscape.

• The 2025 report is based on the results of the Global Risks Perception Survey (GRPS), which captures the insights of more than 1,500 experts across various sectors, including business, government, and civil society.

• The 20^th Edition focuses on the theme of a 'polycrisis,' where interconnected risks such as environmental degradation, technological disruption, and geopolitical instability compound one another.

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• The report serves as a critical tool for policy-makers and global leaders to understand the transition from short-term volatility (2-year horizon) to long-term structural shifts (10-year horizon).

Additional Information

• World Economic Forum (WEF):

• It was established in 1971 by Klaus Schwab as a not-for-profit foundation and is headquartered in Cologny, Geneva, Switzerland.

• The forum is committed to improving the state of the world through public-private cooperation.

• Historical Timeline of the Report:

• The 1^st Edition of the Global Risks Report was published in 2006, which initially focused on economic imbalances and the threat of a global pandemic.

• The 19^th Edition, released in 2024, prominently highlighted misinformation and disinformation as the top short-term global risks.

• The 18^th Edition, released in 2023, focused heavily on the cost-of-living crisis following the post-pandemic inflationary pressures.

• Risk Classification:

• The WEF classifies risks into five categories: Economic, Environmental, Geopolitical, Societal, and Technological.

• In recent editions, Environmental risks like biodiversity loss and climate action failure have consistently ranked as the most severe long-term threats.

Q45. Answer: (a) 1909

The correct answer is 1909.

Key Points

• The Morley-Minto Reforms, officially known as the Indian Councils Act 1909, were enacted by the British Parliament to introduce limited self-governance and increase Indian participation in the legislative process.

• The reforms were named after Lord John Morley, the then Secretary of State for India, and Lord Minto, who served as the Viceroy of India from 1905 to 1910.

• A defining and historically significant feature of the Act was the introduction of separate electorates for Muslims, a system where Muslim representatives were elected exclusively by Muslim voters.

• The Act significantly increased the size of the legislative councils at both the Central and Provincial levels; for instance, the membership of the Central Legislative Council was expanded from 16 to 60.

• It empowered members of the council to ask supplementary questions and move resolutions on the budget, although they could not vote on the entire budget.

• The reforms allowed for the first time the inclusion of an Indian in the Viceroy's Executive Council, with Satyendra Prasad Sinha being appointed as the Law Member.

Additional Information

• Background and Evolution of Reforms:

• The reforms were preceded by the Simla Deputation of 1906, where a group of Muslim leaders led by the Aga Khan demanded separate representation to safeguard their political interests.

• Due to the institutionalization of communal representation, Lord Minto is formally recognized in Indian history as the Father of Communal Electorate.

• The political trajectory established in 1909 was followed by the Montagu-Chelmsford Reforms in 1919, which introduced Dyarchy and a bicameral legislature at the center.

• Later, the Government of India Act 1935 further expanded the constitutional framework by proposing an All-India Federation and granting Provincial Autonomy, marking a major step toward the eventual independence of India.

• While the 1909 Act aimed to appease moderates in the Indian National Congress, it was later criticized for sowing the seeds of partition through religious segregation in politics.

Q46. Answer: (c) (i) True, (ii) True

The correct answer is (i) True, (ii) True.

Key Points

• A Microphone is a specialized transducer designed to convert sound waves (acoustic energy) into electrical signals (analog or digital) for computer processing; since its hardware architecture is strictly unidirectional for data entry and lacks the components to convert electrical signals back into audible sound waves, it is classified solely as an input device. Hence, statement (i) is correct.

• The Central Processing Unit (CPU) operates at extremely high speeds, with clock rates typically measured in Gigahertz (GHz), which allows it to process billions of operations per second, while external peripherals like printers are limited by mechanical constraints and the relatively slower data transfer rates of I/O interfaces (like USB or Wi-Fi). Hence, statement (ii) is correct.

Additional Information

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• Input Devices:

• These hardware components allow users to feed data into a computer system.

• Key examples include Keyboards (text entry), Optical Scanners (image digitization), and Joysticks (control signals).

• The primary function is to translate human-understandable data into binary format.

• Output Devices:

• These devices receive data from the computer and convert it into a form that is perceptible to humans.

• Common examples include Monitors (visual), Printers (hard copy), and Speakers (audio).

• While a microphone captures sound, a Speaker or Headset is required to output it.

• Speed Gap Management:

• Because the CPU is significantly faster than I/O devices, computers use Buffering and Spooling techniques.

• A Buffer is a temporary storage area in RAM that holds data while it is being transferred between two devices with different speeds.

• Print Spooling allows the CPU to offload a print job to the Hard Drive or Memory so the user can continue working while the slow printer catches up.

Q47. Answer: (d) Article 51 'A'

The correct answer is Article 51 'A'.

Key Points

• The Fundamental Duties of Indian citizens are contained in Article 51A, which is the only article under Part IV-A of the Indian Constitution.

• These duties were not part of the original Constitution; they were incorporated by the 42nd Constitutional Amendment Act, 1976, based on the recommendations of the Sardar Swaran Singh Committee.

• The concept of Fundamental Duties was borrowed from the Constitution of the erstwhile USSR (now Russia).

• Originally, the amendment introduced 10 Fundamental Duties. The 11th Fundamental Duty, regarding providing education opportunities to children between 6 and 14 years, was added by the 86th Constitutional Amendment Act, 2002.

• Fundamental Duties are non-justiciable in nature, meaning they cannot be directly enforced by the courts, but they serve as a guide for citizens to maintain discipline and commitment to the nation.

Additional Information

• Article 52:

• This article provides that there shall be a President of India, who is the head of the Indian State and the first citizen of India.

• Article 50:

• Contained within the Directive Principles of State Policy (DPSP), it directs the State to take steps to separate the judiciary from the executive in the public services of the State.

• Article 51:

• This article mandates the State to promote international peace and security, maintain just and honorable relations between nations, and encourage settlement of international disputes by arbitration.

Q48. Answer: (c) Indian princes

The correct answer is Indian princes.

Key Points

• The Second Round Table Conference took place in London from September 7, 1931, to December 1, 1931, following the Gandhi-Irwin Pact.

• During this conference, Mahatma Gandhi claimed that the Indian National Congress was the sole representative of the entire Indian population, including those living in the Princely States.

• The Indian princes, who represented over 560 semi-autonomous states, strongly contested this claim by asserting that the Congress possessed no legal or political authority over their territories.

• The princes maintained that their relationship was exclusively with the British Crown through the doctrine of Paramountcy and individual treaties, which exempted them from the jurisdiction of any political party in British India.

• This dispute over sovereignty was a major reason for the failure of the conference to reach a consensus on the All-India Federation, as the rulers feared the Congress would interfere with their internal autocratic administration.

Additional Information

• Second Round Table Conference:

• It was the only conference attended by the Indian National Congress after the suspension of the Civil Disobedience Movement.

• Other key stakeholders included B.R. Ambedkar, who demanded separate electorates for the Depressed Classes, and representatives of the Muslim League.

• Zamindars:

• This group consisted of influential landlords who held significant socio-economic power in British India but did not possess the sovereign territorial status that the princes did.

• Provincial Governors:

• These were British officials appointed to head the executive branch in British Indian provinces like Bengal and Bombay, operating under the Government of India Act.

Q49. Answer: (c) Amoebiasis

The correct answer is Amoebiasis.

Key Points

• Amoebiasis, also referred to as amoebic dysentery, is a gastrointestinal infection caused by the protozoan parasite Entamoeba histolytica.

• The parasite primarily inhabits the large intestine of humans, where it can cause ulceration of the intestinal lining.

• Clinical symptoms of the disease include abdominal pain, constipation, cramps, and the passage of stools characterized by excess mucous and blood clots.

• The transmission of the disease is facilitated by houseflies (Musca domestica), which serve as mechanical carriers by transferring the parasite from the feces of infected individuals to food and water supplies.

• Infection occurs through the fecal-oral route, specifically via the ingestion of contaminated food and drinking water containing the cysts of the parasite.

Additional Information

• Giardiasis:

• Caused by the flagellated protozoan Giardia lamblia.

• It affects the small intestine and typically leads to diarrhea, fatigue, and greasy stools that tend to float.

• Cholera:

• An acute diarrheal infection caused by the bacterium Vibrio cholerae.

• It is characterized by severe watery diarrhea, often described as rice-water stools, leading to rapid dehydration.

• Ascariasis:

• A helminthic disease caused by the common roundworm Ascaris lumbricoides.

• Symptoms include internal bleeding, muscular pain, fever, anemia, and potential blockage of the intestinal passage.

Q50. Answer: (c) Electromagnetic Energy

The correct answer is Electromagnetic Energy.

Key Points

• Light is fundamentally composed of photons, which are discrete packets or quanta of energy that lack rest mass but carry momentum.

• The energy of these photons is a manifestation of electromagnetic radiation, which occurs due to the synchronization of oscillating electric and magnetic fields.

• According to quantum mechanics, the energy (E) of a photon is determined by the Planck-Einstein relation: E = hf, where h is the Planck constant (approximately 6.626 × 10^(−34) J·s) and f is the frequency.

• Electromagnetic energy covers the entire electromagnetic spectrum, including visible light, infrared radiation, and ultraviolet rays, all of which travel at the speed of light (approximately 3 × 10^8 m/s) in a vacuum.

• Since light behaves as both a wave and a particle (wave-particle duality), its energy is transferred via electromagnetic waves that do not require a physical medium for conduction.

Additional Information

• Nuclear Energy

• Refers to the binding energy held within the atomic nucleus, typically harnessed via nuclear fission or nuclear fusion reactions.

• Gravitational Potential Energy

• A form of stored energy related to an object mass and its altitude or height within a gravitational field.

• Mechanical Energy

• Defined as the sum of kinetic energy and potential energy in a system, pertaining to macroscopic objects in motion or specific physical configurations.

Q51. Answer: (c) Spiti River

The correct answer is Spiti River.

Key Points

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• The Pin River is recognized as the most significant right-bank tributary of the Spiti River, located within the Lahaul and Spiti district of Himachal Pradesh.

• It originates from the base of the Pin-Parvati Pass, which acts as a high-altitude trekking corridor connecting the Parvati Valley in Kullu to the Spiti Valley.

• The river flows through the Pin Valley National Park, a high-altitude cold desert ecosystem famous for the conservation of the Snow Leopard and the Siberian Ibex.

• The confluence of the Pin River and the Spiti River occurs near Dankar (specifically near the Dhankar Monastery), where it adds substantial discharge to the main Spiti channel.

Additional Information

• Spiti River:

• It is a major mountain torrent that originates from the Kunzum Range of the Himalayas.

• The river system ultimately merges with the Sutlej River at Khab in the Kinnaur district.

• Chandra and Bhaga Rivers:

• The Chandra River originates near the Bara-lacha la pass, while the Bhaga River flows from the opposite side of the same pass.

• These two rivers meet at Tandi in Lahaul to form the Chenab River, which is a principal tributary of the Indus.

• Tsarab River:

• It is a key tributary of the Zanskar River, primarily flowing through the Zanskar region of Ladakh.

• It contributes to the Indus River basin and is known for its rugged, high-altitude path.

Q52. Answer: (b) 15% of the strength of the Legislative Assembly

The correct answer is 15% of the strength of the Legislative Assembly.

Key Points

• Article 164(1A) of the Constitution of India explicitly states that the total number of Ministers, including the Chief Minister, in the Council of Ministers in a State shall not exceed 15% of the total number of members of the Legislative Assembly of that State.

• This specific provision was inserted into the Constitution through the 91st Constitutional Amendment Act, 2003 to prevent the formation of jumbo cabinets and to reduce the financial burden on the state exchequer.

• The article also provides a mandatory minimum limit, specifying that the number of Ministers, including the Chief Minister, in a State shall not be less than twelve.

• The primary objective of this percentage cap is to ensure administrative efficiency and political stability by discouraging the practice of offering ministerial berths solely to appease various political factions or defectors.

Additional Information

• 91st Constitutional Amendment Act, 2003:

• This amendment also introduced a similar ceiling for the Union Council of Ministers under Article 75(1A), limiting their number to 15% of the total strength of the Lok Sabha.

• It strengthened the Anti-Defection Law (Tenth Schedule) by removing the provision that protected a split of one-third of the members of a political party.

• Article 164 Overview:

• Article 164(1): States that the Chief Minister shall be appointed by the Governor and other Ministers shall be appointed by the Governor on the advice of the Chief Minister.

• Article 164(2): Mandates that the Council of Ministers shall be collectively responsible to the Legislative Assembly of the State.

Q53. Answer: (b) Pakhawaj

The correct answer is Pakhawaj.

Key Points

• The Pakhawaj is a traditional barrel-shaped, two-headed percussion instrument that serves as the primary accompaniment for the Dhrupad genre of Hindustani classical music.

• Musicologists and historians widely regard the Pakhawaj as the direct ancestor of the Tabla due to structural similarities in the drum heads, specifically the application of the syahi (black permanent paste) used to modulate pitch and resonance.

• According to popular musical lore, the Tabla was created in the 13th century by the Sufi musician and poet Amir Khusrau, who reportedly divided a Pakhawaj into two separate pieces to produce a more versatile and portable sound.

• While the Pakhawaj is played with the full open palm and fingers, the Tabla evolved to accommodate more intricate finger-tapping techniques, though the right drum (Dayan) of the Tabla remains almost identical to the right head of the Pakhawaj.

Additional Information

• Dhol

• It is a large double-sided barrel drum used primarily in regional folk music across North India and Pakistan, most notably in

Bhangra performances.

• Unlike classical drums, it is played using wooden sticks (the dagga and tilli) and lacks the specialized syahi coating required for melodic precision.

• Thavil

• A high-pitched, barrel-shaped percussion instrument from South India, traditionally used in Carnatic music and temple festivals.

• It is typically paired with the Nadaswaram and is played with a stick on one side and fingers protected by plaster caps on the other.

• Kanjira

• The Kanjira is a frame drum from the tambourine family, used as a secondary percussion instrument in South Indian classical concerts.

• Its frame is traditionally made from jackfruit wood, and the drumhead was historically made from monitor lizard skin, giving it a unique, high-pitched snapping sound.

Q54. Answer: (c) Brazil

The correct answer is Brazil.

Key Points

• In October 2025, Brazil formally signed the Multilateral Convention (MLI) to implement measures related to the Base Erosion and Profit Shifting (BEPS) project, specifically targeting the Subject to Tax Rule (STTR) and Pillar Two components.

• The BEPS initiative, led by the OECD/G20 Inclusive Framework, aims to prevent multinational enterprises from exploiting gaps and mismatches in tax rules to avoid paying tax in jurisdictions where economic activities are performed.

• By signing the convention, Brazil has committed to aligning its domestic tax legislation with international standards, facilitating its ongoing process for OECD accession.

• The Multilateral Instrument (MLI) allows countries to modify their existing bilateral tax treaties simultaneously to include anti-abuse provisions without the need for lengthy individual renegotiations.

• This move represents a significant shift for Brazil, which historically maintained a unique transfer pricing system, but has now transitioned toward the OECD Transfer Pricing Guidelines to promote tax transparency and certainty.

Additional Information

• BEPS 2.0 Framework:

• Pillar One: Focuses on the reallocation of taxing rights over the largest and most profitable multinational enterprises to the jurisdictions where consumers are located.

• Pillar Two: Establishes a Global Minimum Tax rate of 15% to ensure that large corporations pay a fair share of tax regardless of where they operate.

• Subject to Tax Rule (STTR): A treaty-based rule that allows developing countries to "tax back" certain intra-group payments where these are subject to low nominal tax rates in the recipient country.

• OECD Role:

• The Organisation for Economic Co-operation and Development serves as a global forum for developing international standards on taxation, environment, and governance.

• The Inclusive Framework on BEPS currently brings together over 140 jurisdictions to collaborate on the implementation of the BEPS package.

Q55. Answer: (d) IT and Services

The correct answer is IT and Services.

Key Points

• The Economic Reforms of 1991 in India, characterized by Liberalisation, Privatisation, and Globalisation (LPG), created a conducive environment for the Information Technology (IT) and Services sectors to flourish.

• India became a global hub for outsourcing because of its ability to provide high-quality technical services at a fraction of the cost compared to developed nations, leveraging its vast pool of English-speaking and skilled professionals.

• Major Multinational Corporations (MNCs) set up their Global Delivery Centres in India, leading to the rapid growth of companies like TCS, Infosys, and Wipro.

• Technological advancements in telecommunications and the internet bridged the geographical gap, allowing the tertiary sector to contribute nearly 55 percent to India's Gross Domestic Product (GDP) post-globalisation.

Additional Information

• IT-Enabled Services (ITeS):

• This includes Business Process Outsourcing (BPO) and Knowledge Process Outsourcing (KPO), providing 24/7 customer support, payroll management, and data analytics to global clients.

• Cities such as Bengaluru (the Silicon Valley of India), Hyderabad, and Gurugram became epicenters for this growth.

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• Impact on Other Sectors:

• Handicrafts: Conversely, this sector faced a decline as global competition introduced cheap, mass-produced machine goods, making it difficult for traditional artisans to compete.

• Foreign Direct Investment (FDI): The services sector consistently receives the highest share of FDI inflows in India, emphasizing its importance in the globalized economy.

Q56. Answer: (a) Rajmahal Hills

The correct answer is Rajmahal Hills.

Key Points

• The Malda Gap, frequently referred to as the Garo-Rajmahal Gap, is a major geological depression that separates the main Indian Peninsular Plateau from its northeastern extension, the Meghalaya Plateau.

• This gap originated during the Tertiary period due to down-faulting of the crust, creating a tectonic rift that was subsequently filled with alluvial sediments carried by the Ganga and Brahmaputra river systems.

• The Rajmahal Hills, situated primarily in Jharkhand, represent the northeastern edge of the Chota Nagpur Plateau and serve as the physical western boundary of the Malda Gap.

• While the gap itself facilitates the merging of the Ganga Plains and the Brahmaputra Plains, the Rajmahal Hills act as the topographical feature that demarcates the transition from the stable peninsular block to the sedimentary depression. Hence, Rajmahal Hills is the correct feature.

Additional Information

• Meghalaya Plateau:

• It consists of the Garo, Khasi, and Jaintia Hills and is geologically part of the Deccan Plateau.

• It serves as the eastern boundary of the Malda Gap, rather than the feature separating the gap from the plains.

• Aravalli Range:

• Stretching from Gujarat to Delhi, these are among the oldest fold mountains in the world.

• They are located in the western part of India and act as a divide between the Thar Desert and the Ganga Basin.

• Bundelkhand Plateau:

• Located in central India across Uttar Pradesh and Madhya Pradesh, it is characterized by Archaean gneiss and granite rocks.

• It lies to the south of the Yamuna River and is far removed from the Malda Gap region.

Q57. Answer: (d) It is a collection of hymns composed by various sages over generations

The correct answer is It is a collection of hymns composed by various sages over generations.

Key Points

• The Rigveda is the oldest of the four Vedas and represents the earliest form of Indo-Aryan civilization literature, dating back approximately between 1500 BCE and 1000 BCE.

• It is a massive collection of 1,028 hymns (known as Suktas) that are organized into 10 Mandalas (books) of varying lengths and ages.

• Authorship is attributed to numerous Rishis (seer-poets) rather than a single individual; these sages belonged to different lineages or clans who composed these verses over several centuries.

• The Family Books (Mandalas 2 through 7) form the core and oldest part of the text, with each book dedicated to hymns composed by a specific family of sages like Ghritsamada, Vishvamitra, Atri, and Vashistha.

• The transmission of the Rigveda was strictly oral for many centuries, categorized as Shruti (that which is heard), ensuring the preservation of precise phonetics and accents across generations before it was ever committed to writing.

Additional Information

• Structure and Composition:

• The Purusha Sukta, found in the 10th Mandala, is a famous hymn that describes the spiritual unity of the universe and the origin of the Varna system.

• The Gayatri Mantra, one of the most sacred verses in Hinduism, is located in the 3rd Mandala and is attributed to Sage Vishvamitra.

• While predominantly male, the text includes hymns composed by nearly 27 female sages (Rishikas) such as Lopamudra, Ghosha, and Apala, highlighting the inclusive nature of early Vedic spiritual discourse.

• Context of Other Options:

• Valmiki is traditionally honored as the Adi Kavi and the author of the epic Ramayana, which belongs to the Itihasa category of literature.

• Sage Vyasa, or Veda Vyasa, is historically credited with the compilation and classification of the Vedas into four distinct collections (Rig, Sama, Yajur, and Atharva) rather than being the sole author of the content.

• The Mahabharata era is associated with the Later Vedic Period or the transition to the Epic Period, whereas the Rigveda was largely finalized during the Early Vedic Period.

Q58. Answer: (a) 1.42°C

The correct answer is 1.42degreeC.

Key Points

• The World Meteorological Organization (WMO) analysis of global temperature data for the period of January to August 2025 revealed that the global average temperature was approximately 1.42degreeC above the 1850−1900 pre-industrial baseline.

• This measurement is derived from a synthesis of six major international datasets, including NASA GISS, NOAA NCEI, and the Copernicus Climate Change Service (C3S), which utilize millions of observations from ships, buoys, and land-based weather stations.

• The figure of 1.42degreeC highlights a continuing trend where global temperatures are dangerously close to the 1.5degreeC threshold defined by the Paris Agreement as a critical limit for avoiding the most severe impacts of climate change.

• The warming observed during the first eight months of 2025 was driven by the unprecedented accumulation of greenhouse gases in the atmosphere, alongside the transition from a strong El Niño event to neutral or La Niña conditions.

Additional Information

• World Meteorological Organization (WMO):

• It is a specialized agency of the United Nations established in 1950 to coordinate international atmospheric science and meteorology.

• Headquartered in Geneva, Switzerland, it issues the annual State of the Global Climate report, which serves as a benchmark for international climate policy.

• Pre-industrial Baseline:

• The period 1850−1900 is used as a reference because it is the earliest period for which high-quality, global-scale instrumental temperature records are available.

• Warming relative to this period is the primary metric used by the Intergovernmental Panel on Climate Change (IPCC) to assess progress toward global climate goals.

• Atmospheric Drivers:

• The concentration of Carbon Dioxide (CO2) reached record levels in 2025, continuing to trap heat and increase the thermal energy of the oceans.

• Other key gases like Methane (CH4) and Nitrous Oxide (N2O) also contribute significantly to the total warming anomaly.

• Global Implications:

• A warming level of 1.42degreeC is associated with increased frequency of extreme weather events, including marine heatwaves, intense tropical cyclones, and prolonged droughts.

Q59. Answer: (c) Dr. Anil Nayak

The correct answer is Dr. Anil Nayak.

Key Points

• Dr. Anil Nayak (officially Dr. Anilkumar J. Nayak) officially assumed charge as the National President of the Indian Medical Association (IMA) for the 2025-2026 term in December 2025.

• The installation took place during NATCON 2025, the 100th national conference of the IMA, held in Ahmedabad, Gujarat, where the swearing-in ceremony was graced by Union Home Minister Shri Amit Shah and Gujarat CM Shri Bhupendra Patel.

• A distinguished Orthopedic Surgeon from Mehsana, Gujarat, Dr. Nayak has an extensive leadership record, having previously served as the National Honorary Secretary General of the IMA and President of the IMA Gujarat State Branch.

• He succeeded Dr. Dilip Bhanushali, who concluded his term as the National President for the 2024-2025 period.

Additional Information

• Indian Medical Association (IMA):

• Established in 1928 and headquartered in New Delhi, it is the largest voluntary organization of Allopathic doctors in India.

• It plays a critical role in healthcare policy, medical ethics, and safeguarding the interests of over 3.5 lakh doctor members.

• Dr. Dilip Bhanushali:

• Held the office of IMA National President for the year 2024-2025.

• He is a noted physician from Telangana who represented India at several global medical summits during his tenure.

• Dr. Ketan Desai:

• A former National President of the IMA and former President of the Medical Council of India (MCI) and the World Medical Association (WMA).

• Currently acts as the Chief Patron of the association.

• Dr. Amit Chakrabarty:

• A prominent urologist and former President of the Association of American Physicians of Indian Origin (AAPI), though not the IMA National President for 2025.

Q60. Answer: (b) Promoting monotheistic worship and rejecting ritual sacrifices entirely.

The correct answer is Promoting monotheistic worship and rejecting ritual sacrifices entirely..

Key Points

• The Brahmo Samaj, established by Raja Ram Mohan Roy in 1828, was founded on the principle of Monotheism, which emphasized the worship of one single, formless God (the Brahman). This was a direct challenge to the prevalent polytheistic practices and deity worship in 19th-century India.

• The movement sought to reform Hinduism by returning to the original philosophical roots found in the Upanishads and Vedanta, arguing that these ancient texts supported a rational, ethical, and monotheistic framework rather than the complex ritualism that had developed over centuries.

• A central tenet of the Samaj was the total rejection of idol worship and ritual sacrifices. The members believed that God should be reached through meditation, prayer, and the reading of scriptures, rather than through external physical offerings or the mediation of a priestly class.

• By advocating for the removal of meaningless ceremonies, the Brahmo Samaj aimed to create a simplified and purified form of religion that was accessible to all, regardless of caste or social status, thereby promoting social equality and humanism.

Additional Information

• Raja Ram Mohan Roy:

• Known as the Father of Indian Renaissance, he founded the Atmiya Sabha in 1815 before establishing the Brahmo Samaj.

• He played a pivotal role in the abolition of Sati in 1829 through the efforts of Lord William Bentinck.

• Evolution of the Samaj:

• After Roy, the leadership passed to Debendranath Tagore, who introduced the Brahmo Covenant.

• In 1866, the movement split into the Brahmo Samaj of India led by Keshab Chandra Sen and the Adi Brahmo Samaj led by Tagore.

• Vedic Polytheism vs. Reformism:

• While some later movements like the Arya Samaj emphasized Back to the Vedas, the Brahmo Samaj was distinct in its heavy reliance on the rationalist and universalist interpretation of the Upanishads.

Q61. Answer: (b) 44^(th) Amendment

The correct answer is 44^(th) Amendment.

Key Points

• The 44^(th) Constitutional Amendment Act was enacted in 1978 by the Janata Party government primarily to undo several changes made by the 42^(nd) Amendment and to provide safeguards against future misuse of emergency provisions.

• Before this amendment, the President could declare a National Emergency on the oral advice of the Prime Minister, as witnessed during the 1975 Emergency when Indira Gandhi advised the President without consulting her Cabinet.

• The act amended Article 352 to stipulate that the President can only issue a Proclamation of Emergency after receiving a written recommendation from the Union Cabinet (the Prime Minister and other ministers of Cabinet rank).

• It replaced the vague term 'internal disturbance' with 'armed rebellion' as a ground for declaring an emergency, ensuring it cannot be invoked for simple political unrest or protests.

• The amendment also mandated that the proclamation must be approved by both Houses of Parliament within one month (reduced from two months) by a special majority.

• Therefore, the 44^(th) Amendment is the legislation that made written Cabinet advice mandatory for imposing an emergency in India.

Additional Information

• 42^(nd) Amendment Act (1976):

• Known as the Mini-Constitution, it was passed during the Emergency to centralize power.

• It added Fundamental Duties via Article 51A and inserted Socialist, Secular, and Integrity into the Preamble.

• 24^(th) Amendment Act (1971):

• Enacted to counter the Golaknath case judgment, it affirmed Parliament's power to amend any part of the Constitution, including Fundamental Rights.

• It made it mandatory for the President to give assent to Constitution Amendment Bills.

• 26^(th) Amendment Act (1971):

• This act formally abolished the Privy Purses and privileges of the former rulers of Princely States in India.

• It omitted Articles 291 and 362 to ensure equality of status among all citizens.

Q62. Answer: (a) Krishna

The correct answer is Krishna.

Key Points

• The Nagarjuna Sagar Dam is recognized as one of the largest and tallest masonry dams in the world, serving as a pivotal multipurpose river valley project in India.

• It is constructed across the Krishna River, which is the fourth-largest river in India in terms of water inflow and basin area.

• The dam is geographically located on the border between Nalgonda district in Telangana and Palnadu district (formerly part of Guntur) in Andhra Pradesh.

• The foundation stone for this massive project was laid by the first Prime Minister of India, Pandit Jawaharlal Nehru, on December 10, 1955, and the dam was completed in 1967.

• The project is named after Acharya Nagarjuna, a renowned Buddhist philosopher and scholar of the 2nd century AD, who established a center of learning at the site now submerged under the reservoir, known as Nagarjunakonda.

• The structure stands approximately 124 meters high and features 26 radial floodgates, facilitating irrigation for over 10 lakh acres of agricultural land.

Additional Information

• Godavari River:

• Originates at Trimbakeshwar in Nashik, Maharashtra, and is the longest river in Peninsular India.

• It is often called the Dakshin Ganga and hosts major dams like the Jayakwadi and Sriram Sagar.

• Tungabhadra River:

• A major right-bank tributary of the Krishna River, formed by the confluence of the Tunga and Bhadra rivers at Koodli in Karnataka.

• The Tungabhadra Dam near Hospet is a significant multipurpose project on this river.

• Bhima River:

• Originates from the Bhimashankar hills in the Western Ghats of Maharashtra.

• It is the most important left-bank tributary of the Krishna River, flowing through Maharashtra, Karnataka, and Telangana.

Q63. Answer: (d) April 2027

Concept:

Corporate Average Fuel Efficiency (CAFE) norms are regulatory standards designed to reduce the carbon footprint of the automotive industry. These norms aim to lower the average fuel consumption (and thus CO2 emissions) of a vehicle manufacturer's entire fleet. In India, these standards are notified by the Ministry of Power through the Bureau of Energy Efficiency (BEE).

The implementation of CAFE norms in India is divided into specific phases, each with progressively stricter targets for fuel efficiency and emission levels.

Given

Target Phase: CAFE-3 (Phase 3)

Calculation

To determine the implementation date for CAFE-3, we look at the timeline established for CAFE norms in India:

• Phase 1 (CAFE-1): This phase was implemented from April 2017 to March 2022.

• Phase 2 (CAFE-2): This phase is currently in effect, having started in April 2022, and is scheduled to conclude in March 2027.

• Phase 3 (CAFE-3): Following the completion of Phase 2, the third phase of these efficiency norms is scheduled to begin on April 1, 2027.

• Phase 4 (CAFE-4): This subsequent phase is proposed to start after five years of Phase 3, beginning in April 2032.

The transition to CAFE-3 in April 2027 will require automobile manufacturers to further enhance engine technology, promote hybrid vehicles, and increase the share of Electric Vehicles (EVs) in their total sales to meet the stricter CO2 emission targets.

Final Answer: April 2027

Q64. Answer: (c) Article 72

The correct answer is Article 72.

Key Points

• Article 72 of the Indian Constitution empowers the President of India to grant pardons, reprieves, respites, or remissions of punishment, or to suspend, remit, or commute the sentence of any person convicted of any offense.

• This power extends to all cases where the punishment is by a Court Martial, cases involving an offense against a Union Law,

and all cases where the sentence is a death sentence.

• A Pardon completely absolves the offender from all sentences, punishments, and disqualifications, effectively placing them in the same position as if they had never committed the crime.

• Commutation denotes the substitution of one form of punishment for a lighter form; for instance, a death sentence may be commuted to rigorous imprisonment.

• Remission implies reducing the duration of the sentence without changing its nature, such as reducing a sentence of two years of rigorous imprisonment to one year.

• Respite involves awarding a lesser sentence in place of one originally imposed due to some special fact, such as the physical disability of a convict or the pregnancy of a woman offender.

• Reprieve signifies a temporary stay of the execution of a sentence, especially a death sentence, to allow the convict time to seek a pardon or commutation from the President.

Additional Information

• Article 53:

• Declares that the executive power of the Union is vested in the President and shall be exercised by him either directly or through officers subordinate to him in accordance with the Constitution.

• It also establishes the President as the Supreme Commander of the Defence Forces of the Union.

• Article 74:

• Provides for a Council of Ministers with the Prime Minister at the head to aid and advise the President, who shall, in the exercise of his functions, act in accordance with such advice.

• Article 75:

• Deals with other provisions as to Ministers, including their appointment by the President on the advice of the Prime Minister and their collective responsibility to the Lok Sabha.

• Article 161:

• While the President acts under Article 72, the Governor of a State possesses similar powers under Article 161 for offenses against State Laws, though the Governor cannot pardon a death sentence or a Court Martial sentence.

Q65. Answer: (a) Rana Sanga

The correct answer is Rana Sanga.

Key Points

• The Battle of Khanwa was a landmark military engagement fought on March 16, 1527, at Khanwa, located near Bharatpur in Rajasthan.

• The battle took place between the forces of the first Mughal Emperor Babur and a powerful Rajput confederacy led by Rana Sanga (Maharana Sangram Singh) of Mewar.

• Rana Sanga aimed to expel Babur from India and had gathered support from various Rajput chiefs and Afghan nobles, including Mahmud Lodi.

• Babur employed superior military technology, specifically artillery (cannons) and gunpowder, alongside the Tulughma tactical formation, which neutralized the numerical advantage of the Rajput cavalry.

• The Mughal victory at Khanwa was more decisive than the First Battle of Panipat, as it crushed the most potent internal threat to Babur and firmly established the Mughal Dynasty in Northern India.

• After the victory, Babur adopted the title of Ghazi to celebrate his triumph over the confederated forces.

Additional Information

• Ibrahim Lodi:

• He was the last Sultan of the Delhi Sultanate belonging to the Lodi Dynasty.

• He was defeated and slain by Babur in the First Battle of Panipat in 1526.

• Sher Shah Suri:

• The founder of the Suri Empire in North India, he was a brilliant administrator and general.

• He famously defeated Babur's son, Humayun, in the Battle of Chausa (1539) and the Battle of Kannauj (1540).

• Bairam Khan:

• He was a prominent military commander and the regent for the third Mughal Emperor, Akbar, during his minority.

• He led the Mughal army to victory against Hemu in the Second Battle of Panipat in 1556.

Q66. Answer: (c) Chlorophyll

The correct answer is Chlorophyll.

Key Points

• Chlorophyll is the primary biological pigment found in nearly all photosynthetic organisms, including green plants, cyanobacteria,

and algae. It is essential for the process of photosynthesis, which converts light energy into chemical energy.

• This pigment is concentrated within the thylakoid membranes of the chloroplasts, which are specialized organelles in plant cells. The presence of these organelles is the defining characteristic of the Kingdom Plantae.

• The green color of plants is a result of chlorophyll absorbing light mainly in the blue (wavelengths 430 nanometers) and red (wavelengths 660 nanometers) regions of the electromagnetic spectrum. It poorly absorbs green light, which is instead reflected or transmitted to our eyes.

• Chemically, chlorophyll features a porphyrin ring structure similar to the heme in hemoglobin, but with a Magnesium (Mg) atom at its center instead of iron. This magnesium core is critical for the excitation of electrons when struck by photons.

Additional Information

• Anthocyanin

• These are water-soluble vacuolar pigments that may appear red, purple, or blue depending on the pH levels.

• They are responsible for the vibrant colors of flowers like hibiscus, fruits like blueberries, and the changing colors of leaves in autumn.

• Xanthophyll

• Belonging to the carotenoid group, these pigments are responsible for yellow colors in nature.

• They act as accessory pigments, helping the plant absorb light frequencies that chlorophyll cannot and protecting the plant from photo-oxidation.

• Carotene

• These are orange-colored photosynthetic pigments that lack oxygen in their molecular structure.

• The most common form is beta-carotene, which is abundant in carrots and serves as a vital precursor for the synthesis of Vitamin A (Retinol) in the human body.

Q67. Answer: (d) Department of Telecommunications (DoT)

The correct answer is Department of Telecommunications (DoT).

Key Points

• The Department of Telecommunications (DoT), which is part of the Ministry of Communications, officially launched the 5G Innovation Hackathon 2025.

• This initiative is a six-month long program designed to catalyze the development of 5G-powered solutions that address specific industrial and societal challenges within India.

• The primary objective of the hackathon is to bridge the gap between theoretical innovation and market-ready products, encouraging the creation of indigenous intellectual property in the telecom sector.

• It targets a diverse group of participants, including startups, MSMEs, academic researchers, and students, providing them with access to 5G testbeds and professional mentorship.

• Selected winners and participants are often granted financial rewards and opportunities for pilot projects with industry leaders, facilitating the commercialization of their 5G use cases.

• By fostering a local ecosystem for high-speed, low-latency technology, the DoT aims to strengthen India’s position in the global telecommunications landscape.

• Therefore, the correct department identified for launching this initiative is the Department of Telecommunications, which corresponds to option 4.

Additional Information

• NITI Aayog:

• Functions as the premier policy think tank of the Government of India, replacing the erstwhile Planning Commission.

• Focuses on cooperative federalism and strategic initiatives like the Atal Innovation Mission (AIM), which promotes a culture of entrepreneurship across various sectors.

• Department of Science and Technology (DST):

• Operates under the Ministry of Science and Technology and is responsible for formulating policies related to science and technology in the country.

• It manages large-scale research projects and National Missions, such as those related to Quantum Technologies and Climate Change research.

• Ministry of Electronics and Information Technology (MeitY):

• Responsible for the Digital India program, e-governance, and the promotion of electronics manufacturing.

• While it oversees cybersecurity and software innovation, the specific governance and innovation programs for spectrum-related technologies like 5G fall under the DoT.

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Q68. Answer: (a) 1956

The correct answer is 1956.

Key Points

• The Government of India officially constituted the first Sanskrit Commission on October 1, 1956, to evaluate the state of Sanskrit education and research in the country.

• The commission was chaired by the renowned Indian philologist and linguist Suniti Kumar Chatterji, who was then the Chairman of the West Bengal Legislative Council.

• The primary mandate of the commission was to examine the existing facilities for Sanskrit studies in universities, secondary schools, and traditional Pathashalas, and to suggest measures for their improvement and coordination.

• The commission explored the significance of Sanskrit in the context of the Official Language policy and its role in the cultural unity of India.

• After conducting extensive inquiries and visiting various educational centers, the commission submitted its final, detailed report to the Ministry of Education in 1957.

Additional Information

• Structure and Recommendations of the 1956 Commission:

• The commission included notable members such as Dr. S.K. Belvalkar, Dr. V. Raghavan, and Dr. R.N. Dandekar.

• One of its major recommendations was the establishment of a Central Sanskrit Board to advise the government on matters relating to the promotion of the language.

• It proposed the integration of Sanskrit into the Three-Language Formula and suggested the creation of Sanskrit Universities to facilitate advanced research.

• Satyavrat Shastri and the Second Commission:

• A second Sanskrit Commission was later set up by the government in 2014, headed by Professor Satyavrat Shastri.

• This commission was tasked with developing a fresh roadmap for Sanskrit education in the modern globalized context, building upon the foundations laid in 1956.

• Constitutional and Cultural Context:

• Sanskrit is recognized as one of the Classical Languages of India and is listed in the Eighth Schedule of the Constitution of India.

• The Rashtriya Sanskrit Sansthan, now known as the Central Sanskrit University, was established following the spirit of the commission's recommendations to preserve and propagate Vedic and Sanskritic learning.

Q69. Answer: (c) Tehri Dam and Hydroelectric Power Plant

The correct answer is Tehri Dam and Hydroelectric Power Plant.

Key Points

• The Tehri Dam is a multi-purpose rock and earth-fill embankment dam located on the Bhagirathi River in the Tehri Garhwal district of Uttarakhand.

• The Bhagirathi River is a major Himalayan river and one of the two primary headstreams of the Ganga, originating from the Gaumukh snout of the Gangotri Glacier.

• It stands as the highest dam in India and is among the tallest in the world, with a height of 260.5 meters (855 feet) and a crest length of 575 meters.

• The project was commissioned by the Tehri Hydro Development Corporation (THDC) and currently has an installed capacity of 1000 MW in its first stage, providing electricity to states across Northern India.

Additional Information

• Mettur Hydroelectric Power Plant:

• Located on the Kaveri River in the Salem district of Tamil Nadu.

• The Kaveri is a Peninsular river that originates in the Brahmagiri range of the Western Ghats.

• Krishnarajasagar Hydroelectric Power Plant:

• Situated on the Kaveri River in the Mandya district of Karnataka.

• It is a vital source of irrigation and drinking water for Mysuru and Bengaluru, powered by a Peninsular river system.

• Srisailam Hydroelectric Power Plant:

• Constructed across the Krishna River, which is a major Peninsular river originating near Mahabaleshwar in Maharashtra.

• The dam is located in the Nallamala Hills and serves as one of the largest hydroelectric projects in South India.

Q70. Answer: (b) Compulsory State supervision

The correct answer is Compulsory State supervision.

Key Points

• Article 243ZI was inserted into the Constitution of India by the 97th Constitutional Amendment Act, 2011. This amendment added

Part IXB, which specifically deals with The Co-operative Societies.

• The article mandates that the Legislature of a State may, by law, make provisions for the incorporation, regulation, and winding up of co-operative societies based on specific democratic principles.

• The four core principles explicitly mentioned under Article 243ZI are voluntary formation, democratic member-control, member-economic participation, and autonomous functioning.

• The inclusion of these principles in the Constitution ensures that co-operative societies function as self-governing and economically viable institutions without undue external pressure.

• Compulsory State supervision is not included in the scope of Article 243ZI because the primary goal of the 97th Amendment was to reduce excessive government interference and promote the autonomy of these societies.

Additional Information

• The 97th Amendment Act, 2011 also introduced other significant changes:

• It added Article 43B to the Directive Principles of State Policy (DPSP), which tasks the State with the voluntary formation and professional management of co-operative societies.

• It amended Article 19(1)(c) to include the right to form co-operative societies as a Fundamental Right.

• Voluntary formation: Ensures that individuals have the freedom to join or leave a society of their own free will.

• Democratic member control: Establishes that the board and management are accountable to the members through regular elections.

• Autonomous functioning: Protects the society from being a State-controlled entity, allowing it to manage its internal affairs independently.

Q71. Answer: (b) QVAF

The logic followed here is,

For 'BGLQ' related to 'CHMR':

For 'VAFX' related to 'WBGY':

Applying the same logic to 'PUZE':

Thus, PUZE is related to QVAF.

Hence, the correct answer is 'Option 2'.

Q72. Answer: (a) Mother's mother

Preparing the family tree diagram by using the following symbols:

As per the given information:

Let us first decode the given symbols and then draw a family tree.

Symbol	@	×	•	÷
Meaning	Mother	Wife	Brother	Father

Given: S × D ÷ R @ Y + H

S is the wife of D and D is the father of R, so S is the mother of R. Further, R is the mother of H. Thus, S is the Mother's mother of H.

Hence, the correct answer is "Option 1".

Q73. Answer: (a) ZJC 26

The logic followed here is:

Combining the results, the missing cluster is ZJC 26.

Hence, the correct answer is "Option 1".

Q74. Answer: (c) Neither conclusion (I) nor (II) follows

The least possible Venn diagram for the given statements is:

(I) Some slings are bandages - Doesn't follow

(There is no direct relation between slings and bandages; maybe it is possible but not definite. Hence, it is false.)

(II) All bandages are slings - Doesn't follow

(There is no direct relation between slings and bandages; maybe it is possible but not definite. Hence, it is false.)

Neither conclusion (I) nor (II) follows

Hence, the correct answer is "option (3)".

Q75. Answer: (c) RK – OG

The logic follows here,
For UG – QC,
For MJ – IF,
For RK – OG,
For RF – NB,
Therefore, the letter-cluster pair that is different from the others is RK − OG.
Hence, the correct answer is 'Option 3'.

Q76. Answer: (d) mb

Th logic followed here is,
Thus, the code for the word ‘stop’ is ‘mb’.
Hence, the correct answer is "option 4"

Q77. Answer: (a) Two

The logic followed here is:
Required Condition: Consonant - Consonant - Vowel
(Left) O E D F F B G F G I Y U I L V U Y T S V T (Right)
FGI and LVU
Hence, the correct answer is "option 1"

Q78. Answer: (b) 6

The logic followed here ,is
The code for I is 6.
Hence, the correct answer is "option 2"

Q79. Answer: (d) M

Given Word: CONTAIN:

C	O	N	T	A	I	N
−1	+1	−1	−1	+1	+1	−1
B	P	M	S	B	J	M

The new group of letters formed is: B P M S B J M
Left B P M S B J M Right
Third from left: M
Hence, the correct answer is "Option 4"

Q80. Answer: (c) MPIE

The logic followed here is,
For TWQM,
For CFZV,
For MPIE,
For KNHD,
Therefore, the letter-cluster that is different from the others is MPIE.
Hence, the correct answer is 'Option 3'.

Q81. Answer: (b) OW202

The logic follows here,
Combining the results, the cluster that replaces the question mark is OW202.
Hence, the correct answer is "option 2"

Q82. Answer: (a) 55

The logic followed here is,
BODMAS Table:

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P	Q	R	S
×	÷	−	•

Given expression: 78 Q 3 S (55 Q 5) P 4 R 16 P 5 S 65

After replacing the letters with their respective signs and following the BODMAS rule,

= 78 ÷ 3 + (55 ÷ 5) × 4 − 16 × 5 + 65

= 78 ÷ 3 + 11 × 4 − 16 × 5 + 65

= 26 + 11 × 4 − 16 × 5 + 65

= 26 + 44 + 65 − 80

= 135 − 80

= 55

Hence, the correct answer is "option 1"

Q83. Answer: (a) South-west

Given:

• Town X is to the south of Town Y.

• Town Z is to the west of Town X.

• Town P is to the north of Town Z.

• Town Q is to the east of Town P.

• Town Y is to the north-west of Town Q

The Final Diagram,

Town X is South - West respect to Town Q

Hence, the correct answer is "option 1"

Q84. Answer: (c) 30

BODMAS Table:

Sign Interchange:

Original Sign	New Sign
•	−
× (times)	÷ (div)

Given Equation:43 − 85 × 5 + 10 ÷ 3 = ?

After interchanging the signs, and follows BODMAS rule

= 43 + 85 ÷ 5 − 10 × 3

= 43 + 17 − 10 × 3

= 43 + 17 − 30

= 60 − 30

= 30

Hence, the correct answer is "option 3"

Q85. Answer: (b) Wife's brother

BODMAS Table:

Let us first decode the given symbols and then draw a family tree.

Symbol	#	@	!	&
Meaning	Daughter	Brother	Wife	Father

Given : N @ K # S & R ! V

Therefore, N is the brother of R, who is the wife of V. N is the Wife's brother of V.

Hence, the correct answer is "Option 2".

Q86. Answer: (a) 99, 200

The logic followed here is:

Logic: Second Number = (First Number × 2) + 2

For the first set (91, 184)

=> (91 × 2) + 2

=> 182 + 2 = 184.

For the second set (88, 178)

=> (88 × 2) + 2

=> 176 + 2 = 178.

Applying the same logic to the options:

For Option 1: (99, 200)

=> (99 × 2) + 2

=> 198 + 2 = 200.

Hence, the correct answer is 'Option 1'.

Q87. Answer: (b) Only conclusion (I) follows

Statements:

Some stones are minerals.

All minerals are elements.

Conclusions:

(I) Some elements are stones.

(II) All stones are minerals.

The least possible Venn diagram for the given statements is:

(I) Some elements are stones — True

Since all minerals are elements and some stones are minerals, the shared region between stones and minerals must reside within the elements set.

(II) All stones are minerals — False

The statement only establishes that a portion of stones is minerals; there is no requirement for the entire set of stones to be contained within minerals.

Only conclusion (I) follows

Q88. Answer: (d) 224

The logic followed here is:

19 + 17 = 36

36 + 23 = 59

59 + 35 = 94

94 + 53 = 147

147 + 77 = 224

Thus, the missing term in the series is 224.

Hence, the correct answer is 'Option 4';

Q89. Answer: (c) 7^(th)

The logic followed here is,

Total number of people in the row = 35

Position of Geeta from the right end = 15^(th)

Nalini sits 14^(th) to the left of Geeta.

Position of Nalini from the right end = Position of Geeta from the right end + 14

= 15 + 14

= 29^(th) from the right end

Position from the left end = (Total number of people − Position from the right end) + 1

= (35 − 29) + 1

= 6 + 1

= 7^(th)

Hence, the correct answer is "option 3"

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Q90. Answer: (b) 148

The logic followed here is:

The sequence of first differences is 5, 11, 17, 23, 29, 35.

The second difference is a constant 6.

• 28 + 5 = 33

• 33 + 11 = 44

• 44 + 17 = 61

• 61 + 23 = 84

• 84 + 29 = 113

• 113 + 35 = 148

Therefore, the missing term is 113 + 35 = 148.

Hence, the correct answer is 'Option 2';

Q91. Answer: (d) YAD

The logic followed here is,

Logic: The letter clusters are formed by adding specific values to the positional values of the letters in the English alphabetical order.

For GHL,

For EFJ,

For FGK,

For YAD,

The pattern followed is +2, +3, which is different from the others.

Hence, the correct answer is " Option 4"

Q92. Answer: (b) TYHI

The logic followed in this pattern is the subtraction of 3 from the positional values of each letter according to the English alphabetical order.

For 'RWFG' related to 'OTCD':

R(18)	**W(23)**	**F(6)**	**G(7)**
−3 ↓	−3 ↓	−3 ↓	−3 ↓
O(15)	T(20)	C(3)	D(4)

For 'FKTU' related to 'CHQR':

F(6)	**K(11)**	**T(20)**	**U(21)**
−3 ↓	−3 ↓	−3 ↓	−3 ↓
C(3)	H(8)	Q(17)	R(18)

Applying the same logic to 'WBKL':

W(23)	**B(2)**	**K(11)**	**L(12)**
−3 ↓	−3 ↓	−3 ↓	−3 ↓
T(20)	Y(25)	H(8)	I(9)

Thus, WBKL is related to TYHI.

Hence, the correct answer is 'Option 2'.

Q93. Answer: (d) MPR

The logic followed here is:

The missing term in the series is MPR.

Hence, the correct answer is "option 4"

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Q94. Answer: (c) A

Given:Seven boxes A, B, C, D, E, F and G are kept one over the other but not necessarily in the same order

1. C is kept at the bottommost position.
2. Only one box is kept below F, so F is kept at Position 2.

Position	Box
7	
6	
5	
4	
3	
2	F
1 (Bottom)	C

1. Box G is kept immediately above E.
2. Exactly two boxes are kept between E and B, and B is kept on one of the positions above E.
3. Exactly two boxes are kept between D and G.
4. The remaining box A is kept at Position 5.

Final Arrangement:

7	D
6	B
5	A
4	G
3	E
2	F
1	C

Thus, the box immediately below B is A.

Hence, the correct answer is 'Option 3 '.

Q95. Answer: (d) J

The logic followed here is.

Given word: PREDIAL

P	R	E	D	I	A	L
↓+1	↓+1	↓+1	↓+1	↓+1	↓+1	↓+1
Q	S	F	E	J	B	M

New Word Formed : Q, S, F, E, J, B, M

Left Q, S, F, E, J, B, M Right

The letter fourth from the right in the new group is J.

Hence, the correct answer is "option 4"

Q96. Answer: (a) Three

Given :Aj, Bv, Cu, Dq, Em, Fh and Gt are sitting around a circular table, facing the centre.

1. Gt sits third to the left of Fh.
2. Em sits second to the left of Fh.
3. Bv sits third to the right of Em.
4. Aj is the immediate neighbour of Cu and Gt.

The Final Diagram,

The people in between are Cu, Bv, and Fh, making a total of three people.

Hence, the correct answer is 'Option 1'.

Q97. Answer: (c) 47

BODMAS Table:

Interchanging the signs:

• + ↔ −

• × ↔ ÷

The given equation is 12 − 50 div 2 times 2 + 15 →

After interchanging the signs as per the rules and follow BODMAS rule, the new equation becomes:

=> 12 + 50 × (2 ÷ 2) − 15

=> 12 + 50 × 1 − 15

=> 12 + (50 × 1) − 15

=> 12 + 50 − 15

=> 62 − 15

=> 47

Hence, the correct answer is " Option 3"

Q98. Answer: (a) JMQN

The logic followed in this pattern is based on a forward shift in the English alphabetical order.

For 'ORVS' related to 'QTXU':

O(15)	**R(18)**	**V(22)**	**S(19)**
+2 ↓	+2 ↓	+2 ↓	+2 ↓
Q(17)	T(20)	X(24)	U(21)

For 'PSWT' related to 'RUYV':

P(16)	**S(19)**	**W(23)**	**T(20)**
+2 ↓	+2 ↓	+2 ↓	+2 ↓
R(18)	U(21)	Y(25)	V(22)

Applying the same logic to 'HKOL':

H(8)	**K(11)**	**O(15)**	**L(12)**
+2 ↓	+2 ↓	+2 ↓	+2 ↓
J(10)	M(13)	Q(17)	N(14)

Thus, HKOL is related to JMQN.

Hence, the correct answer is 'Option 1'.

Q99. Answer: (d) 24

The logic followed here is:

Position of Sima from the top = 12^(th)

Position of Sima from the bottom = 13^(th)

To find the total number of students in the class, the formula used is:

Total number of students = (Position from the top + Position from the bottom) − 1

Total number of students = (12 + 13) − 1

= 25 − 1

= 24

So, there are 24 students in Sima's class.

Hence, the correct answer is 'Option 4'.

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Q100. Answer: (d) Two

Given: Seven people F, G, H, L, M, O and Q are sitting around a circular table, facing the centre of the table.

1. Only three people sit between G and F when counted from the right of F.
2. Q sits to the immediate right of G.
3. Only three people sit between Q and M when counted from the left of Q.
4. O sits to the immediate right of H.

The Final Diagram,

There are exactly two people M and F sitting between them.

Hence, the correct answer is 'Option 4'.

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