RRB NTPC (UG) CBT-I Official Paper (Held On 13 Jun, 2026 Shift 3) (Previous Year Paper)

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

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MATHEMATICS

Q1. A family consumes 12 units of electricity per day. Cost per unit is Rs. 8. How much do they pay for a 31-day month?

(a) Rs. 2,996
(b) Rs. 2,976
(c) Rs. 2,796
(d) Rs. 2,769

Q2. If 45% of a number exceeds 20% of it by 48, then the number is:

(a) 232
(b) 172
(c) 192
(d) 212

Q3. An investment decreases by 30% in the first year, increases by 30% in the second year, and then increases by 20% in the third year. What is the overall percentage change from the initial value?

(a) 10.2% decrease
(b) 9.2% decrease
(c) 10.2 % increase
(d) 9.2% increase

Q4. There are 400 multiple choice questions in a test. 4 marks are allotted for a correct answer and 1 mark is deducted for a wrong answer or unattempted question from total score of correct answers. If a candidate has scored 1280 marks in the test, how many questions did the candidate answer correctly?

(a) 346
(b) 322
(c) 336
(d) 315

Q5. If the amount payable after 2 years is 1.1025 times of the sum invested, at compound interest (compounded annually), what is the rate of interest per annum?

(a) 3.5%
(b) 5%
(c) 10%
(d) 2%

Q6. In an apartment complex, the monthly electricity consumption (in units) for five flats is 320, 400, 360, 340, and 380. If the residents want to know the average monthly consumption (in units) per flat by using the direct method, what value will they obtain?

(a) 365
(b) 350
(c) 360

(d) 355

Q7. A trader initially marks all his goods 60% above the cost price. He sells half of the goods at a discount of 25% on the marked price. For the remaining half, he revises the marked price to 80% above the cost price and then offers a discount of 30%. Find the overall profit percentage earned by the trader.

(a) 22%
(b) 21%
(c) 23%
(d) 20%

Q8. An article is sold at a loss of 12% on its cost price. If the same article were sold for Rs. 84 more than its original selling price, the seller would make a profit of 8% on the same cost price. What is the cost price of the article?

(a) Rs. 400
(b) Rs. 420
(c) Rs. 430
(d) Rs. 410

Q9. The volume of a cylinder having height 27 cm and radius 7 cm is:

(π=22/7)

(a) 4146 cm^3
(b) 4068 cm^3
(c) 4187 cm^3
(d) 4158 cm^3

Q10. Simplify:

$(3^5 \times 6^4 \times 4^3)/(3^2 \times 6^2 \times 4^1)$

(a) 15552
(b) 15558
(c) 15554
(d) 15559

Q11. Find the value of m which satisfies

$(23/8)^{12} \times (8/23)^{(15)} \times (23/8)^9 = (8/23)^{(8m+8)}$

(a) -9/8
(b) -24/8
(c) -10/8
(d) -7/4

Q12. A and B can do a piece of work in 12 days and 33 days, respectively. Both work for 4 days and then A leaves. How long (in days) will B take to complete the remaining work?

(a) 19
(b) 17
(c) 20
(d) 18

Q13. A merchant buys tea at Rs. 100 per kg and sells it using a 800 g weight as 1 kg, after marking the price up by 25% and giving a discount of 20%. What is his profit per kg?

(a) Rs. 25
(b) Rs. 20
(c) Rs. 10
(d) Rs. 15

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Q14. A rectangular garden has a length of 16 meters and a width of x meters. If the width is the mean proportional between 4 meters and 64 meters, what is the value of x?

(a) 12
(b) 24
(c) 8
(d) 16

Q15. Four prime numbers are listed in order. If the product of the first three is 105 and the product of the last three is 385, what is the largest prime number?

(a) 17
(b) 7
(c) 11
(d) 13

Q16. A recipe requires sugar and flour in the ratio 7:11. If you have 154 grams of sugar and want to maintain the same proportion, how much flour should you use?

(a) 242 grams
(b) 220 grams
(c) 264 grams
(d) 198 grams

Q17. If $\sin\theta + \cos\theta = \sqrt{2}\cos\theta$, where, $0 < \theta < 90°$ then the value of $\tan\theta$ is:

(a) 1
(b) $1/\sqrt{3}$
(c) $\sqrt{2}-1$
(d) $\sqrt{3}$

Q18. A group consists of 25% boys, 55% girls, and the rest are teachers. Their average weights are 50 kg, 55 kg, and 65 kg, respectively. What is the average weight (in kg) of the group?

(a) 52.14 kg
(b) 58.43 kg
(c) 55.75 kg
(d) 62.34 kg

Q19. Pipes:

A and B fill a tank in 20 and 30 minutes, respectively. If both are opened together, after how many minutes will the tank be 2/3 full?

(a) 16 minutes
(b) 8 minutes
(c) 12 minutes
(d) 10 minutes

Q20. A landscape architect is designing a garden in the shape of a quadrilateral where the diagonals intersect at right angles but are not equal in length. If the diagonals are 12 meters and 16 meters, what is the area of the garden?

(a) 96 square meters
(b) 48 square meters
(c) 192 square meters
(d) 64 square meters

Q21. The sum of two positive numbers is 51 and their product is 230. The positive difference between them is:

(a) 41
(b) 61
(c) 32
(d) 52

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Q22. Seven years ago Ramu was five times as old as his son. The present age difference between Ramu and his son is 28 years. Find the sum of their present ages.

(a) 30 years
(b) 56 years
(c) 73 years
(d) 28 years

Q23. The fourth proportional to three positive numbers is 120. If the first number is twice the second, and the third number is five times the first, then find the sum of all the three numbers.

(a) 336
(b) 312
(c) 288
(d) 300

Q24. A train travels at a speed of 54 km/h for 20 minutes. What distance does it cover?

(a) 12 km
(b) 15 km
(c) 18 km
(d) 20 km

Q25. Let p and q be distinct positive prime numbers such that $p > q$ and $p^2 - q^2 = 45$. What is the value of $p + q$?

(a) 12
(b) 10
(c) 13
(d) 9

Q26. A shopkeeper offers a fixed discount of 15% on rice and 100 gm rice free with every purchase of 1.9 kg rice. Find the overall discount percent offered by him on rice.

(a) 19.25%
(b) 20.00%
(c) 19.10%
(d) 19.50%

Q27. To earn Rs. 15,000 as simple interest in 5 months at 12% per annum, what should be the invested amount?

(a) Rs. 3,00,000
(b) Rs. 3,50,000
(c) Rs. 2,50,000
(d) Rs. 2,00,000

Q28. If the consecutive angles of a parallelogram are in the ratio 2:3, what is the measure of the smaller angle?

(a) 72°
(b) 76°
(c) 74°
(d) 70°

Q29. Two trains of lengths 250 m and 300 m run in opposite directions at 72 km/hr and 108 km/hr. In how many seconds will they completely cross each other?

(a) 11 seconds
(b) 12 seconds
(c) 14 seconds
(d) 15 seconds

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Q30. If the ratio of two numbers is 8 : 3, and their HCF is 8, then their LCM is:

(a) 186
(b) 192
(c) 229
(d) 200

GENERAL AWARENESS

Q31. The commercial unit of electrical energy is kilowatt hour (kWh) and 1 kW h is equal to _____.

(a) 3.6 × 10^8 watt second
(b) 3.6 × 10^6 watt second
(c) 3.6 × 10^7 watt second
(d) 3.6 × 10^9 watt second

Q32. Which of the following was a major goal of liberalisation under the 1991 economic reforms?

(a) Ban foreign companies
(b) Remove barriers to trade and industry
(c) Promote public sector dominance
(d) Increase government control over industries

Q33. Which factors are responsible for the increase in metallic character down a group in the periodic table?

(a) Increasing atomic size and constant ionization energy
(b) Decreasing ionization energy and increasing atomic size
(c) Increasing ionization energy and decreasing atomic size
(d) Constant ionization energy and decreasing atomic size

Q34. Which statement about Application Software is True or False?

(i) Application Software depends on System Software like the OS to be loaded and access hardware.
(ii) The failure of one application always causes the OS to crash.

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

Q35. Which of the following types of natural vegetation is also called ‘taiga’?

(a) Mediterranean Vegetation
(b) Coniferous Forests
(c) Tropical Grasslands
(d) Temperate Deciduous Forests

Q36. In 2025, India’s ranking in the Climate Change Performance Index (CCPI) was:

(a) 18th
(b) 12th
(c) 10th
(d) 15th

Q37. What was the main purpose of the Commission of Inquiry, appointed by the Janata Party government in May 1977?

(a) To evaluate the effectiveness of the Janata Party government
(b) To investigate the economic policies of the previous government
(c) To assess the impact of the Emergency on civil liberties
(d) To examine allegations of abuse of authority during the Emergency

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Q38. The IMD World Competitiveness Ranking 2025 listed which of the following among the top 3 most competitive economies?

(a) Brazil, Russia, South Africa
(b) Switzerland, Singapore, Hong Kong
(c) Germany, Japan, Canada
(d) USA, China, India

Q39. The Western Ghats are highest in which region?

(a) Karnataka
(b) Tamil Nadu
(c) Goa
(d) Kerala

Q40. What is the term of an elected MLA in Indian State Legislatures, unless dissolved prematurely?

(a) 5 years
(b) 4 years
(c) 6 years
(d) 3 years

Q41. Which law governs the relationship between the pressure and volume of a fixed amount of gas at constant temperature?

(a) Boyle's Law
(b) Avogadro's Law
(c) Charles's Law
(d) Gay-Lussac's Law

Q42. Who among the following won the Laureus World Sportsman of the Year Award in 2025?

(a) Serena Williams
(b) Mondo Duplantis
(c) Novak Djokovic
(d) Tom Pidcock

Q43. What was the Untouchability (Offences) Act, 1955, renamed as in 1976?

(a) Civil Rights Enforcement Act
(b) Protection of Civil Rights Act, 1955
(c) Fundamental Rights Protection Act
(d) Social Justice Act

Q44. Which Census of India is known for transforming the Census Organisation into a major Cultural Repository through extensive studies on rural crafts, fairs, festivals, and ethnographic surveys, and also marked India’s early adoption of mechanical tabulation equipment such as key punches, sorters, and tabulators?

(a) 1971 Census of India
(b) 1951 Census of India
(c) 1961 Census of India
(d) 1981 Census of India

Q45. Which of the following architectural techniques was introduced to India during the Sultanate period?

(a) Slab-and-beam roofing
(b) Barrel vaulting
(c) Arch and dome construction technique
(d) Wooden truss construction

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Q46. What change occurs in the amount of heat produced when the electric current in a conductor is doubled?

(a) Same as before
(b) Half
(c) Double
(d) Four times

Q47. Which latitude experiences the longest daylight during the June solstice?

(a) Equator
(b) 23½° S
(c) 66½° N
(d) 23½° N

Q48. In which of the following years was the Citizenship Act passed by the Indian Parliament?

(a) 1955
(b) 1950
(c) 1953
(d) 1952

Q49. Which platform successfully completed in-orbit testing of an environmentally friendly green propulsion system?

(a) Chandrayaan lander
(b) Geosynchronous satellite
(c) PSLV payload module from TDF
(d) GSLV upper stage

Q50. Which memory is fastest and located inside the CPU?

(a) Registers
(b) Hard disk
(c) Cache L3
(d) RAM

Q51. Under the Viksit Bharat – Guarantee for Rozgar and Ajeevika Mission (Gramin) (VB-G RAM G) Act, 2025, rural households are guaranteed a minimum of how many days of wage employment per year?

(a) 100 days
(b) 125 days
(c) 75 days
(d) 50 days

Q52. Which of the following is NOT a style of Hindustani classical music?

(a) Dhrupad
(b) Tappa
(c) Khyal
(d) Varnam

Q53. Which component of the Central Processing Unit (CPU) is responsible for performing calculations and logical comparisons?

(a) Arithmetic Logic Unit (ALU)
(b) Register
(c) Control Unit (CU)
(d) Main Memory (RAM)

Q54. The International Monetary Fund AlUla Conference on Emerging Market Economies 2025 focuses on:

(a) Strategies for developed economies to combat inflation
(b) Policy challenges and opportunities for emerging markets in a shifting economic landscape
(c) The role of artificial intelligence in stock market predictions
(d) The impact of cryptocurrency on global trade

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Q55. Which of the following is a percussion instrument commonly used in Indian classical music?

(a) Flute
(b) Santoor
(c) Veena
(d) Mridangam

Q56. Which of the following is the funding ratio shared by the Central and State Governments under the 'Paramparagat Krishi Vikas Yojana' in the North-eastern and Himalayan States?

(a) 90 : 10
(b) 50 : 50
(c) 60 : 40
(d) 80 : 20

Q57. What was the primary objective of the Vernacular Press Act (1878)?

(a) Encouraging regional newspapers to defend imperial policies against opponents.
(b) Promoting bilingual journalism to support cultural unity in colonial territories.
(c) Restricting non-English publications to prevent criticism of British political actions.
(d) Removing censorship rules to allow free expression in vernacular print outlets.

Q58. In which field are computers used for tasks like weather forecasting, simulation, and research?

(a) Agriculture
(b) Space and Meteorology
(c) Entertainment
(d) Sports Training

Q59. Which Indian political leader was appointed as the central observer for the Bharatiya Janata Party's legislative-party-leader selection in Bihar in Nov 2025?

(a) Keshav Prasad Maurya
(b) Sadhvi Niranjan Jyoti
(c) Yogi Adityanath
(d) Arjun Ram Meghwal

Q60. Which of the following Fundamental Duties was added in the Constitution by the 86^(th) Constitution Amendment Act, 2002?

(a) To provide opportunities for education to a child or ward between ages six and fourteen
(b) To develop scientific temper
(c) To value and preserve the rich heritage of the country's composite culture
(d) To protect and improve the natural environment

Q61. Chhau, a celebrated dance tradition from Eastern India, has been acknowledged by UNESCO under which cultural recognition category?

(a) Cultural Landscape Heritage
(b) Oral and Literary Heritage
(c) Intangible Cultural Heritage
(d) World Heritage Sites

Q62. Which Indian launch vehicle successfully launched the CMS-03 communication satellite on 2nd November 2025?

(a) PSLV
(b) LVM3
(c) GSLV
(d) Agni

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Q63. Which river system supports Bangladesh's extreme population density?

(a) Nile River Valley
(b) Ganges-Brahmaputra Delta
(c) Amazon River Basin
(d) Mississippi River Plain

Q64. According to the Census 2011, what was the approximate total literacy rate in India?

(a) 64.83%
(b) 78.21%
(c) 70.50%
(d) 74.04%

Q65. Which ministry released the fourth issue of the publication titled "Children in India 2025" on 25 September 2025?

(a) Ministry of Health and Family Welfare
(b) Ministry of Women and Child Development
(c) Ministry of Statistics and Programme Implementation
(d) Ministry of Education

Q66. In Arthashastra, which two types of courts dealt with disputes among citizens and between the state and citizens?

(a) Sangha and Gana
(b) Sabha and Samiti
(c) Dharmasthiya and Kantakashodhana
(d) Mantriparishad and Parishad

Q67. India became a full member of the Shanghai Cooperation Organisation (SCO) in which of the following years?

(a) 2017
(b) 2001
(c) 2005
(d) 2015

Q68. Which inscription expresses Ashoka's remorse after the Kalinga war?

(a) Rock Edict I
(b) Rock Edict VII
(c) Rock Edict XIII
(d) Pillar Edict V

Q69. In which of the following years was Rani Lakshmi Bai killed?

(a) 1857
(b) 1858
(c) 1878
(d) 1854

Q70. What is the primary purpose of a Parliamentary Committee in India?

(a) To examine bills and policies in detail
(b) To supervise elections across the country
(c) To appoint ministers to executive offices
(d) To amend provisions of the Constitution

GENERAL INTELLIGENCE AND REASONING

Q71. What should come in place of the question mark (?) in the given series based on the English alphabetical order?

AVZ BWA CXB DYC ?

(a) LPR
(b) MDP

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(c) WKF
(d) EZD

Q72. Read the given statement(s) 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 statement(s).

Statements:

Some apples are baskets. All baskets are drums.

Conclusions:

(I) Some drums are apples.

(II) No drum is an apple.

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

Q73. What should come in place of the '?' in the given series?

156 180 228 300 ? 516

(a) 402
(b) 396
(c) 382
(d) 376

Q74. 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 is the one that 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) HDG
(b) KGI
(c) NJM
(d) EAD

Q75. Which of the following letter-number clusters will replace the question mark (?) in the given series to make it logically complete?

BHP 16 LRZ 25 VBJ 36 FLT 49 ?

(a) UDN 81
(b) LCS 64
(c) LXE 81
(d) PVD 64

Q76. Read the given statement(s) 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 statement(s).

Statements: All eggs are kings. Some kings are tickets.

Conclusion (I): All tickets are eggs.

Conclusion (II): Some eggs are tickets.

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

Q77. Select the pair which follows the same pattern as that followed by the two sets of pairs given below. Both pairs follow the same pattern.

TNM : XPJ

URL : YTI

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(a) EDO : IFK
(b) LQX : PTU
(c) HMK : LOH
(d) FUS : JWQ

Q78. Refer to the following series and answer the question. (Counting to be done from left to right only.) (All numbers are single-digit numbers only.)

(Left) 7 5 3 1 5 9 6 2 4 1 5 8 9 6 5 2 1 4 2 5 8 7 6 3 2 5 9 8 5 4 1 5 9 6 2 3 6 5 4 8 7 5 9 8 7 4 1 5 9 7 5 2 6 (Right)

How many such even digits are there, each of which is immediately preceded by an odd digit and also immediately followed by an odd digit?

(a) 13
(b) 9
(c) 11
(d) 7

Q79. Which of the following letter-number clusters will replace the question mark (?) in the given series to make it logically complete?

MDG 36, PGK 40, SJO 44, VMS 48, ?

(a) XPV 52
(b) YPW 52
(c) YOW 54
(d) XOV 54

Q80. Seven people F, G, H, L, M, O and Q are sitting around a circular table, facing the centre of the table. G sits to the immediate right of L. Only three people sit between O and M when counted from the left of O. Only three people sit between L and Q when counted from the right of Q. F is an immediate neighbor of Q as well as M. How many people sit between H and O when counted from the right of H?

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

Q81. Seven boxes, G, H, I, J, Q, R and S, are kept one over the other, but not necessarily in the same order.

Only four boxes are kept between S and H. Only Q is kept above S. Only two boxes are kept between J and R. G is kept immediately above I. R is not kept immediately above G.

How many boxes are kept above R?

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

Q82. 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 one out is not based on the number of consonants/vowels or their position in the letter cluster.)

(a) OM-TQ
(b) QO-VS
(c) SQ-XV
(d) MK-RO

Q83. What will come in place of the question mark (?) in the following equation if '+' and '−' are interchanged and '×' and '÷' are interchanged?

28 − 13 + 17 ÷ 43 × 43 = ?

(a) 24
(b) 22
(c) 25

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(d) 26

Q84. If 2 is added to each odd digit and 2 is subtracted from each even digit in the number 621453, what will be the sum of all even digit in the new number thus formed?

(a) 4
(b) 8
(c) 6
(d) 2

Q85. Each vowel in the word MELODIA 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. How many letters will appear exactly twice in the new group of letters thus formed?

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

Q86. 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) OQM
(b) FHE
(c) KMI
(d) TVR

Q87. In a certain code language, ‘FIRE’ is coded as ‘5279’ and ‘FEAR’ is coded as ‘5427’. What is the code for ‘A’ in the given code language?

(a) 4
(b) 5
(c) 2
(d) 7

Q88. 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.)

(24, 11, 266)

(26, 13, 340)

(a) (23, 12, 274)
(b) (13, 8, 104)
(c) (25, 9, 227)
(d) (27, 11, 295)

Q89. Six boxes, Q, R, S, T, U and W, are kept one over the other, but not necessarily in the same order.

Only one box is kept between U and R. Only S is kept above W. No box is kept below R. T is kept at some place below Q.

Which box is kept immediately above T?

(a) R
(b) U
(c) W
(d) Q

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Q90. In a certain code language, ‘FILE’ is coded as ‘4128’ and ‘LIME’ is coded as ‘1268’. What is the code for ‘M’ in the given code language?

(a) 2
(b) 6
(c) 1
(d) 8

Q91. In a certain code language,

J – K means ‘J is the father of K’,

J + K means ‘J is the mother of K’,

J x K means ‘J is the brother of K’ and

J ÷ K means ‘J is the sister of K’.

Based on the above, how is M related to R if ‘M x N ÷ O + P – Q x R’?

(a) Husband's mother's brother
(b) Mother's mother's brother
(c) Father's mother's brother
(d) Husband's father's brother

Q92. Refer to the following letter series and answer the question. (Counting to be done from left to right only.)

(Left) G L Y N J Z U Q M F D E U S A B Y D V X P (Right)

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

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

Q93. Select the pair which follows the same pattern as that followed by the two pairs given below. Both pairs follow the same pattern.

MLJ−LKI

XWU−WVT

(a) FEC−DDA
(b) FEC−EDB
(c) FDA−EDB
(d) FDA−DCA

Q94. Riya starts from Point A and drives 4 km towards the south. She then takes a left turn, drives 8 km, turns left and drives 6 km. She then takes a left turn and drives 9 km. She takes a final left turn, drives 2 km and stops at Point P.

How far (shortest distance) and towards which direction should she drive in order to reach Point A again? (All turns are 90-degree turns only unless specified.)

(a) 2 km to the east
(b) 1 km to the east
(c) 3 km to the west
(d) 4 km to the west

Q95. Seven boxes, A, B, C, D, E, F and G, are kept one over the other but not necessarily in the same order. Only three boxes are kept above C. Only one box is kept between F and C. Only three boxes are kept between F and E. E is kept at some place above C. G is kept immediately below E. B is kept at one of the places above D. A is not kept immediately above or below F.

How many boxes are kept between B and G?

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

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Q96. In a certain code language,

A + B means 'A is the son of B',

A – B means 'A is the brother of B',

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

A ÷ B means 'A is the father of B'.

Based on the above, how is S related to K if 'S – D x F + H ÷ K'?

(a) Wife's father
(b) Brother's wife's brother
(c) Brother's wife's father
(d) Wife's brother

Q97. Seven people, T, E, A, R, I, N and G, are sitting in a row, facing north. Only three people sit to the left of R. Only G sits to the right of E. Only three people sit between E and A. I sits at some place to the left of T but at some place to the right of N.

How many people sit between N and T?

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

Q98. GILF is related to NPSM in a certain way based on the English alphabetical order. In the same way, JLOI is related to QSVP.

To which of the following is MORL related, following the same logic?

(a) TVYS
(b) VTYS
(c) TVSY
(d) VTSY

Q99. What should come in place of the '?' in the given series?

11 29 51 81 123 ?

(a) 190
(b) 195
(c) 181
(d) 185

Q100. If 'P' stands for '÷', 'Q' stands for '×', 'R' stands for '+' and 'D' stands for '−', then what will come in place of the question mark (?) in the following equation?

24 D 32 P 8 R 26 Q 2 D 54 = ?

(a) 6
(b) 48
(c) 24
(d) 18

ANSWER KEY

1	b	2	c	3	d	4	c	5	b	6	c	7	c	8	b	9	d	10	a
11	d	12	d	13	a	14	d	15	c	16	a	17	c	18	c	19	b	20	a
21	a	22	b	23	b	24	c	25	d	26	a	27	a	28	a	29	a	30	b
31	b	32	b	33	b	34	c	35	b	36	c	37	d	38	b	39	d	40	a
41	a	42	b	43	b	44	c	45	c	46	d	47	c	48	a	49	c	50	a
51	b	52	d	53	a	54	b	55	d	56	a	57	c	58	b	59	a	60	a

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61	c	62	b	63	b	64	d	65	c	66	c	67	a	68	c	69	b	70	a
71	d	72	c	73	b	74	b	75	d	76	d	77	c	78	c	79	b	80	c
81	b	82	c	83	a	84	c	85	c	86	b	87	a	88	c	89	b	90	b
91	c	92	b	93	b	94	b	95	d	96	b	97	a	98	a	99	c	100	d

SOLUTIONS

Q1. Answer: (b) Rs. 2,976

Shortcut Trick

Total Monthly Cost = Daily Units × Rate × Number of Days

Total Monthly Cost = 12 × 8 × 31

Total Monthly Cost = 96 × 31 = Rs. 2,976

Therefore The correct answer is Rs. 2,976.

Alternate Method

Given:

Daily consumption of electricity = 12 units

Cost per unit = Rs. 8

Total duration = 31-day month

Formula Used:

Total Payment = (Units per day × Total days) × Rate per unit

=> Total units consumed in 31 days = 12 × 31

=> Total units consumed = 372 units

=> Total payment = 372 × 8

=> Total payment = Rs. 2,976

Therefore The correct answer is Rs. 2,976.

Additional Information

Unitary Method

A technique for solving problems by first finding the value of a single unit, and then finding the necessary value by multiplying the single unit value.

Total Expenditure Formula

Total Expenditure = Price × Consumption. If consumption is given as a daily rate, multiply by the number of days in the specific month.

Electricity Units (kWh)

1 Unit of electricity is equivalent to 1 kiloWatt-hour (kWh). The total bill is the product of Total Units × Slab Rate.

Q2. Answer: (c) 192

Shortcut Trick

Percentage difference between the two values = 45% − 20% = 25%

According to the question, this 25% corresponds to 48.

To find the total number (100%), we multiply by 4:

100% = 48 × 4 = 192

Therefore The correct answer is 192.

Alternate Method

Given:

First percentage of the number = 45%

Second percentage of the same number = 20%

Numerical difference between them = 48

Formula Used:

Number = (Given Difference ÷ Percentage Difference) × 100

Calculations:

=> Let the required number be x.

=> 45% of x − 20% of x = 48

=> (45 − 20)% of x = 48

=> 25% of x = 48

=> (25 ÷ 100) × x = 48

=> x ÷ 4 = 48

=> x = 48 × 4

=> x = 192

Therefore The correct answer is 192.

Additional Information

Percentage to Fraction Conversion

Always remember common fractional equivalents for faster calculation: 20% = 1/5, 25% = 1/4, 40% = 2/5, 50% = 1/2, and 75% = 3/4.

Net Percentage Change

When a number is changed by two successive percentages a% and b%, the net percentage change is given by the formula: (a + b + (a × b) ÷ 100)%.

Base Value Concept

Percentage calculations are always relative to a base value (100%). If the base increases, the absolute value of the percentage also increases proportionally.

Q3. Answer: (d) 9.2% increase

Shortcut Trick

Net percentage change for a decrease of x% followed by an increase of x% is always a decrease of ($x^2/100$)%.

Step 1: Net change for −30% and +30% = $-(30^2/100) = -9\%$.

Step 2: Apply successive change formula for −9% and +20%: a + b + (ab/100).

=> −9 + 20 + (−9 × 20)/100 = 11 − 1.8 = 9.2%.

Since the result is positive, it is an increase.

Therefore The correct answer is 9.2% increase.

Alternate Method

Given: First year decrease = 30%, Second year increase = 30%, Third year increase = 20%.

Formula: Final Value = Initial Value × (1 ± r1/100) × (1 ± r2/100) × (1 ± r3/100)

=> Let the initial value of the investment be 100.

=> Value after the first year = 100 − 30% of 100 = 70.

=> Value after the second year = 70 + 30% of 70 = 70 + 21 = 91.

=> Value after the third year = 91 + 20% of 91 = 91 + 18.2 = 109.2.

=> Overall percentage change = (Final Value − Initial Value) ÷ Initial Value × 100

=> Net change = (109.2 − 100) ÷ 100 × 100 = 9.2%.

Therefore The correct answer is 9.2% increase.

Additional Information

Successive Percentage Formula

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

Fraction Method for Multi-Step Changes

Convert percentages to fractions (e.g., 20% = 1/5). For an increase, multiply by (1 + 1/5) = 6/5; for a decrease, multiply by (1 − 1/5) = 4/5.

Inverse Percentage Change

If a value increases by r%, it must decrease by [r/(100 + r)] × 100% to return to the original value.

Q4. Answer: (c) 336

Shortcut Trick

Assume all 400 questions are correct: 400 × 4 = 1600 marks.

Actual score = 1280 marks; Difference = 1600 − 1280 = 320 marks.

Loss per wrong/unattempted question = 4 (marks not gained) + 1 (penalty) = 5 marks.

Number of wrong/unattempted questions = 320 ÷ 5 = 64.

Number of correct questions = 400 − 64 = 336.

Therefore The correct answer is 336.

Alternate Method

Given:

Total questions = 400

Marks for correct answer = +4

Marks for wrong/unattempted = −1

Total score obtained = 1280

Formula Used:

Total Score = (Number of Correct Answers × Marks per Correct) − (Number of Incorrect Answers × Negative Marks)

Calculations:

Let the number of correctly answered questions be C.

Let the number of wrong or unattempted questions be W.

=> C + W = 400 --- (i)

=> 4C − 1W = 1280 --- (ii)

Adding equations (i) and (ii):

=> (C + W) + (4C − W) = 400 + 1280

=> 5C = 1680

=> C = 1680 ÷ 5

=> C = 336

Therefore The correct answer is 336.

Additional Information

Net Negative Marking Effect

For every wrong answer, the net loss is the sum of the positive marks and the penalty (e.g., 4 + 1 = 5). This is used in the "Assumption Method" to find the total incorrect count.

Accuracy Calculation

Accuracy % = (Number of Correct Answers ÷ Total Questions Attempted) × 100. In this case, since unattempted also carry a penalty, the base is the total 400 questions.

Alligation Method

This can be solved by comparing the average marks per question (1280 ÷ 400 = 3.2) against the individual marks (+4 and −1) to find the ratio of correct to wrong questions.

Q5. Answer: (b) 5%

Shortcut Trick

Multiplying factor for 2 years = Amount ÷ Principal = 1.1025

Multiplying factor for 1 year = √1.1025 = 1.05

Rate of interest = (1.05 − 1) × 100 = 0.05 × 100 = 5%

Therefore The correct answer is 5%.

Alternate Method

Given:

Time (n) = 2 years

Amount (A) = 1.1025 × Principal (P)

Formula Used:

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

Calculations:

=> $1.1025 \times P = P(1 + r/100)^2$

=> $1.1025 = (1 + r/100)^2$

=> $\sqrt{1.1025} = 1 + r/100$

=> 1.05 = 1 + r/100

=> r/100 = 1.05 − 1

=> r/100 = 0.05

=> r = 5%

Therefore The correct answer is 5%.

Additional Information

Successive Percentage Rule

For two years, if the annual rate is r%, the effective rate is given by r + r + (r × r)/100.

Amount for n years

When interest is compounded annually, the total amount after n years is $A = P(1 + r/100)^n$.

Multiplying Factor

If a sum grows by r% every year, it is multiplied by (1 + r/100) each year. For 2 years, the factor is $(1 + r/100)^2$.

Q6. Answer: (c) 360

Shortcut Trick

Assume an Assumed Mean of 360.

Calculate deviations: (320−360), (400−360), (360−360), (340−360), (380−360)

Net Deviation = (−40) + (+40) + (0) + (−20) + (+20) = 0

Average = Assumed Mean + (Net Deviation ÷ Total Flats) = 360 + (0 ÷ 5) = 360

Therefore The correct answer is 360 units.

Alternate Method

Given: Monthly consumption of five flats are 320, 400, 360, 340, and 380 units.

Formula Used: Average = Sum of all observations ÷ Total number of observations

=> Total Consumption = 320 + 400 + 360 + 340 + 380

=> Total Consumption = 1800 units

=> Number of Flats = 5

=> Average = 1800 ÷ 5

=> Average = 360 units

Therefore The correct answer is 360 units.

Additional Information

Arithmetic Mean

It is the most common measure of central tendency, calculated as Σx ÷ n, where Σx is the sum of values and n is the count.

Properties of Mean

The sum of deviations of a set of observations from their arithmetic mean is always zero.

Combined Average

If two groups have sizes n1, n2 and averages a1, a2, then the combined average is (n1a1 + n2a2) ÷ (n1 + n2).

Q7. Answer: (c) 23%

Shortcut Trick

Net profit % on 1^(st) half = 60 − 25 − (60 × 25) ÷ 100 = 20%

Net profit % on 2^(nd) half = 80 − 30 − (80 × 30) ÷ 100 = 26%

Since both halves are equal in quantity, average profit is calculated.

Overall Profit % = (20% + 26%) ÷ 2 = 23%

Therefore The correct answer is 23%.

Alternate Method

Given:

Initial markup percentage = 60%

Revised markup percentage for second half = 80%

Discount on first half = 25% | Discount on second half = 30%

Formula Used:

SP = CP × (100 + Markup %)/100 × (100 − Discount %)/100

Overall Profit % = [(Total SP − Total CP) ÷ Total CP] × 100

Let the total quantity be 2 units and cost price of each unit be 100.

=> Total Cost Price = 2 × 100 = 200

=> Selling Price of 1^(st) unit = 100 × (160/100) × (75/100) = 120

=> Selling Price of 2^(nd) unit = 100 × (180/100) × (70/100) = 126

=> Total Selling Price = 120 + 126 = 246

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=> Total Profit = 246 − 200 = 46

=> Overall Profit Percentage = (46 ÷ 200) × 100 = 23%

Therefore The correct answer is 23%.

Additional Information

Net Percentage Change

When a value changes by x% and then by y%, the net percentage change is given by the formula x + y + (xy ÷ 100). In profit-loss, markup is positive and discount is negative.

CP, MP, and Profit Relationship

The ratio of Marked Price to Cost Price can be directly calculated as MP ÷ CP = (100 + Profit %) ÷ (100 − Discount %).

Successive Discounts

If two successive discounts of d1% and d2% are given, the single equivalent discount is (d1 + d2 − d1d2 ÷ 100)%.

Q8. Answer: (b) Rs. 420

Shortcut Trick

The difference between a 12% Loss and an 8% Profit is 12% + 8% = 20%.

Given that this 20% difference is equal to Rs. 84.

20% of Cost Price (CP) = Rs. 84.

100% (Total CP) = 84 × 5 = Rs. 420.

Therefore The correct answer is Rs. 420.

Alternate Method

Given:

Initial Loss = 12%

New Profit = 8%

Increase in Selling Price (SP) = Rs. 84

Formula Used:

SP = CP × (100 ± Profit/Loss)%

Calculations:

=> Let the Cost Price (CP) be 100 units.

=> Initial Selling Price (SP1) = 100 − 12 = 88 units.

=> New Selling Price (SP2) = 100 + 8 = 108 units.

=> Difference in Selling Price = 108 − 88 = 20 units.

=> 20 units = Rs. 84.

=> 1 unit = 84 ÷ 20 = Rs. 4.2.

=> 100 units (CP) = 4.2 × 100 = Rs. 420.

=> Therefore, the Cost Price of the article is Rs. 420, which corresponds to Option 2.

Therefore The correct answer is Rs. 420.

Additional Information

Profit and Loss on Cost Price

Unless stated otherwise, profit or loss percentage is always calculated on the Cost Price (CP). Formula: Profit % = (Profit ÷ CP) × 100.

Relation between CP and SP

If there is a profit of P%, then SP = CP × (100 + P)/100. If there is a loss of L%, then SP = CP × (100 − L)/100.

Marked Price and Discount

Discount is always calculated on the Marked Price (MP). SP = MP − Discount. MP = CP + Markup.

Q9. Answer: (d) 4158 cm^3

Shortcut Trick

The Volume of a cylinder is calculated using the formula $\pi r^2 h$.

Since π = 22/7, the final result must be a multiple of 11.

Checking the options for divisibility by 11: In 4158, the sum of digits at odd positions (4+5=9) minus the sum of digits at even positions (1+8=9) is 0.

Thus, 4158 is the only option that satisfies the divisibility rule of 11.

Therefore The correct answer is 4158 cm^3.

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Alternate Method

Given:

Radius (r) = 7 cm

Height (h) = 27 cm

π = 22/7

Formula Used:

Volume of a Cylinder = π × r² × h

Calculations:

=> Volume = (22/7) × 7 × 7 × 27

=> Volume = 22 × 7 × 27

=> Volume = 154 × 27

=> Volume = 4158 cm³

Therefore The correct answer is 4158 cm³.

Additional Information

Curved Surface Area (CSA) of a Cylinder

The area of the curved surface only, excluding the top and bottom circles, is given by 2πrh.

Total Surface Area (TSA) of a Cylinder

The total area including the two circular bases and the curved surface: 2πr(h + r).

Volume of a Cone

If a cone has the same base radius and height as the cylinder, its volume is exactly one-third: (1/3)πr²h.

Q10. Answer: (a) 15552

Given:

((3^5 × 6^4 × 4³) ÷ (3² × 6² × 4¹))

Formula used:

The Law of Exponents for division states: a^m ÷ aⁿ = a^(m−n)

Calculation:

Subtracting the powers of the terms with the same base:

=> 3^(5−2) × 6^(4−2) × 4^(3−1)

=> 3³ × 6² × 4²

Evaluating the exponential values:

=> 27 × 36 × 16

=> 972 × 16

=> 15552

Therefore The correct answer is option (1).

Q11. Answer: (d) -7/4

Given:

((23/8))¹² × ((8/23))^(15) × ((23/8))^9 = ((8/23))^(8m + 8)

Formula used:

(a/b)ⁿ = (b/a)^(−n)

a^x × a^y × a^z = a^((x + y + z))

If a^p = a^q, then p = q

Calculations:

The given equation is:

((23/8))¹² × ((8/23))^(15) × ((23/8))^9 = ((8/23))^(8m + 8)

Convert all terms to a common base (8/23):

=> ((8/23))^(−12) × ((8/23))^(15) × ((8/23))^(−9) = ((8/23))^(8m + 8)

Combine the exponents on the left side:

=> ((8/23))^((−12 + 15 − 9)) = ((8/23))^(8m + 8)

=> ((8/23))^(−6) = ((8/23))^(8m + 8)

Compare the exponents of the same base:

=> −6 = 8m + 8

=> 8m = −6 − 8

=> 8m = −14

=> m = −14/8

=> m = −7/4

Therefore The correct answer is option (4).

Q12. Answer: (d) 18

Shortcut Trick

Total Work (LCM of 12 and 33) = 132 units.

Efficiency of A = 11, B = 4. Combined = 15 units/day.

Work done by A and B in 4 days = 15 × 4 = 60 units.

Remaining Work = 132 − 60 = 72 units.

Time taken by B to complete remaining work = 72 ÷ 4 = 18 days.

Therefore The correct answer is 18 days.

Alternate Method

Given:

Time taken by A = 12 days

Time taken by B = 33 days

Time for which both worked = 4 days

Formula Used:

Total Work = LCM of time taken | Efficiency = Work ÷ Time

Person	Days	Total Work	Efficiency
A	12	132	11
B	33	4	

Calculations:

=> Total Work = LCM(12, 33) = 132 units.

=> Efficiency of A = 132 ÷ 12 = 11 units/day.

=> Efficiency of B = 132 ÷ 33 = 4 units/day.

=> Total work done by (A + B) in 4 days = (11 + 4) × 4 = 60 units.

=> Remaining work = 132 − 60 = 72 units.

=> Time taken by B for remaining work = 72 ÷ 4 = 18 days.

Therefore The correct answer is 18 days.

Additional Information

Work and Efficiency Relationship

The Efficiency of a person is inversely proportional to the Time taken to complete the work. Efficiency = Work ÷ Time.

Total Work by LCM Method

For multiple workers, taking the LCM of their individual time periods as the Total Work simplifies fractional calculations into whole numbers.

Combined Work Equation

If multiple people work together, their Total Efficiency is the sum of their individual efficiencies: E_(total) = E1 + E2 + ... + E_n.

Q13. Answer: (a) Rs. 25

Shortcut Trick

Use the effective price factor method: Profit Factor = (1 + Markup%) × (1 − Discount%) × (True Weight ÷ Faulty Weight).

Net Selling Price Factor = 1.25 × 0.80 × (1000 ÷ 800) = 1 × 1.25 = 1.25.

Effective Selling Price per kg = 1.25 × Rs. 100 = Rs. 125.

Profit per kg = Rs. 125 − Rs. 100 = Rs. 25.

Therefore The correct answer is Rs. 25.

Alternate Method

Given:

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Cost Price (CP) of 1 kg = Rs. 100
Markup = 25% | Discount = 20%
Actual Weight sold as 1 kg = 800 g
Formula Used:
Marked Price (MP) = CP × (100 + Markup%) ÷ 100
Selling Price (SP) = MP × (100 − Discount%) ÷ 100
Profit = Final Revenue − Initial Investment
Calculations:
=> Marked Price (MP) per kg = 100 + (25% of 100) = Rs. 125
=> Selling Price (SP) for a claimed kg = 125 − (20% of 125) = 125 − 25 = Rs. 100
=> In reality, the Merchant receives Rs. 100 for selling only 800 g of tea.
=> Total Revenue from selling 1000 g = (100 ÷ 800) × 1000 = Rs. 125
=> Profit per kg = Total Revenue − Total Cost Price = 125 − 100 = Rs. 25
Therefore The correct answer is Rs. 25.
Additional Information
Dishonest Dealer Profit
When a dealer uses a faulty weight, Profit% = [Error ÷ (True Value − Error)] × 100.
Successive Percentage Change
The net change for markup and discount is given by [M − D − (MD ÷ 100)]%.
Relation between CP and MP
MP ÷ CP = (100 + Profit%) ÷ (100 − Discount%). This is used to find markup directly when profit and discount are known.

Q14. Answer: (d) 16

Shortcut Trick
The mean proportional of two numbers a and b is calculated as √(a × b).
Here, a = 4 and b = 64.
Value of x = √(4 × 64) = √256 = 16.
Therefore The correct answer is 16.
Alternate Method
Given:
Length of the rectangular garden = 16 m
Width of the rectangular garden = x m
Numbers for mean proportional = 4 m and 64 m
Formula Used:
If x is the mean proportional between a and b, then a : x :: x : b
=> a/x = x/b
=> $x^2 = a \times b$
Calculations:
=> $x^2 = 4 \times 64$
=> $x^2 = 256$
=> x = √256
=> x = 16
Therefore The correct answer is 16.
Additional Information
Mean Proportional
The mean proportional between two numbers a and b is the square root of their product: x = √(a × b).
Third Proportional
If a, b, and c are in continued proportion (a : b :: b : c), then c is the third proportional: $c = b^2 \div a$.
Fourth Proportional
If four numbers a, b, c, and d are in proportion (a : b :: c : d), then d is the fourth proportional: d = (b × c) ÷ a.

Q15. Answer: (c) 11

Shortcut Trick

Ratio of products = (p1 × p2 × p3) ÷ (p2 × p3 × p4) = 105 ÷ 385.

Common factors p2 and p3 cancel out, leaving p1 ÷ p4 = 105 ÷ 385.

Simplifying the fraction: 105 ÷ 385 = 21 ÷ 77 = 3 ÷ 11.

Since the numbers are prime numbers listed in order, we have p1 = 3 and p4 = 11.

The largest prime number is p4 = 11.

Therefore The correct answer is 11.

Alternate Method

Given:

Product of the first three prime numbers = 105

Product of the last three prime numbers = 385

Calculations:

=> Let the four prime numbers be p1, p2, p3, and p4.

=> Step 1: Factorise 105 into prime numbers => 105 = 3 × 5 × 7.

=> Step 2: Factorise 385 into prime numbers => 385 = 5 × 7 × 11.

=> Step 3: By comparing the two sets of factors, the common primes are 5 and 7.

=> The unique prime from the first set is 3, and the unique prime from the last set is 11.

=> The sequence of four prime numbers is 3, 5, 7, 11.

=> The largest prime number is 11.

Therefore The correct answer is 11.

Additional Information

Prime Numbers

A natural number greater than 1 that has exactly two distinct positive divisors: 1 and itself (e.g., 2, 3, 5, 7, 11...).

Fundamental Theorem of Arithmetic

Every composite number can be expressed as a unique product of prime numbers, regardless of the order of factors.

Co-prime Numbers

Two numbers are called co-prime if their Highest Common Factor (HCF) is 1. All distinct prime numbers are co-prime to each other.

Q16. Answer: (a) 242 grams

Shortcut Trick

The ratio of sugar to flour is 7 : 11.

Given sugar = 154 g => 7 units = 154 g.

1 unit = 154 ÷ 7 = 22 g.

Flour required = 11 units = 11 × 22 = 242 g.

Therefore The correct answer is 242 g.

Alternate Method

Given:

Sugar : Flour = 7 : 11

Amount of sugar = 154 g

Let the amount of sugar be 7x and the amount of flour be 11x.

=> 7x = 154

=> x = 154 ÷ 7

=> x = 22

=> Quantity of flour = 11x

=> 11 × 22 = 242 g

Therefore The correct answer is 242 g.

Additional Information

Direct Proportion

When two quantities increase or decrease in the same ratio, they are in direct proportion. Formula: x1/y1 = x2/y2.

Property of Ratios

Multiplying or dividing both terms of a ratio by the same non-zero number does not change the ratio (a : b = ka : kb).

Unitary Method

Finding the value of a single unit first and then multiplying it by the required number of units to find the total value.

Q17. Answer: (c) √2-1

Shortcut Trick

Divide the whole equation sin θ + cos θ = √2 cos θ by cos θ.

(sin θ ÷ cos θ) + (cos θ ÷ cos θ) = √2 (cos θ ÷ cos θ)

tan θ + 1 = √2

tan θ = √2 − 1

Therefore The correct answer is √2 − 1.

Alternate Method

Given: sin θ + cos θ = √2 cos θ

Formula Used: tan θ = sin θ ÷ cos θ

Calculations:

=> sin θ + cos θ = √2 cos θ

=> sin θ = √2 cos θ − cos θ

=> sin θ = cos θ × (√2 − 1)

=> sin θ ÷ cos θ = √2 − 1

=> tan θ = √2 − 1

Therefore The correct answer is √2 − 1.

Additional Information

Trigonometric Ratio Definition

The tan θ ratio represents the slope of the hypotenuse and is calculated as Opposite ÷ Adjacent.

Relationship between Ratios

For any angle θ, tan θ = sin θ ÷ cos θ and cot θ = cos θ ÷ sin θ.

Complementary Angles

In a right triangle, the ratios of complementary angles are related such that tan(90° − θ) = cot θ.

Q18. Answer: (c) 55.75 kg

Shortcut Trick

Ratio of Boys : Girls : Teachers = 25 : 55 : (100 − 25 − 55) = 25 : 55 : 20 = 5 : 11 : 4.

Use Weighted Average method: Average = Σ(Ratio × Value) ÷ ΣRatio

Average weight = (5 × 50 + 11 × 55 + 4 × 65) ÷ (5 + 11 + 4) = (250 + 605 + 260) ÷ 20

Average weight = 1115 ÷ 20 = 55.75 kg.

Therefore The correct answer is 55.75 kg.

Alternate Method

Given:

Percentage of Boys = 25% | Average weight = 50 kg

Percentage of Girls = 55% | Average weight = 55 kg

Percentage of Teachers = 100% − (25% + 55%) = 20% | Average weight = 65 kg

Calculations:

=> Let the total number of people in the group = 100.

=> Total weight of Boys = 25 × 50 = 1250 kg.

=> Total weight of Girls = 55 × 55 = 3025 kg.

=> Total weight of Teachers = 20 × 65 = 1300 kg.

=> Sum of all weights = 1250 + 3025 + 1300 = 5575 kg.

=> Average weight of the group = Total weight ÷ Total number

=> Average weight = 5575 ÷ 100 = 55.75 kg.

Therefore The correct answer is 55.75 kg.

Additional Information

Weighted Average Formula

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When a group is divided into subgroups, the overall average is given by (n1w1 + n2w2 + ... + n_kw_k) ÷ (n1 + n2 + ... + n_k).

Combined Average Shortcut

Instead of using actual numbers, you can use the simplest ratio of the quantities to calculate the combined average weight without changing the final result.

Deviation Method

Assume a base average (e.g., 55) and calculate net deviation as Σ(Ratio × Difference from base) ÷ Total Ratio to find the adjustment to the assumed average.

Q19. Answer: (b) 8 minutes

Shortcut Trick

Combined efficiency of Pipe A and Pipe B = 1/20 + 1/30 = 5/60 = 1/12 part per min.

Time taken to fill the full tank = 12 min.

Time taken to fill 2/3 of the tank = 12 × 2/3 = 8 min.

Therefore The correct answer is 8 min.

Alternate Method

Given:

Time taken by Pipe A = 20 min

Time taken by Pipe B = 30 min

Formula Used:

Efficiency = Total Work ÷ Time

Person/Pipe	Days/Time	Total Work (LCM)	Efficiency
Pipe A	20 min	60 units	60 ÷ 20 = 3
Pipe B	30 min	60 ÷ 30 = 2	

Calculations:

=> Total capacity (LCM of 20, 30) = 60 units

=> Target volume to fill = 2/3 of total capacity = 2/3 × 60 = 40 units

=> Combined efficiency of (A + B) = 3 + 2 = 5 units/min

=> Time required to fill 40 units = 40 ÷ 5 = 8 min

Therefore The correct answer is 8 min.

Additional Information

Pipes and Cisterns Logic

Filling pipes are considered to have positive efficiency, while emptying pipes (leaks) are considered to have negative efficiency.

Net Efficiency

The net work done per unit time is the algebraic sum of the efficiencies of all pipes operating simultaneously.

Time and Work Relation

Total Work = Efficiency × Time. If work is constant, Time is inversely proportional to Efficiency.

Q20. Answer: (a) 96 square meters

Shortcut Trick

The Area of any Quadrilateral whose diagonals intersect at right angles (90°) is given by the formula:

Area = 1/2 × d1 × d2

Given diagonals are 12 m and 16 m.

=> Area = 1/2 × 12 × 16 = 6 × 16 = 96 m².

Therefore The correct answer is 96 m².

Alternate Method

Given:

Length of first diagonal (d1) = 12 m

Length of second diagonal (d2) = 16 m

Angle of intersection = 90°

Formula Used:

Area of an orthodiagonal quadrilateral = (1/2) × Product of diagonals

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Calculations:

=> Area = 1/2 × d1 × d2

=> Area = 1/2 × 12 × 16

=> Area = 6 × 16

=> Area = 96 m²

Therefore The correct answer is 96 m².

Additional Information

Orthodiagonal Quadrilateral

Any quadrilateral where diagonals cross at right angles is called orthodiagonal. Common examples include the rhombus, square, and kite.

Area of a Rhombus

Since a rhombus is a special type of orthodiagonal quadrilateral, its area is also 1/2 × d1 × d2, where d1 and d2 are the perpendicular diagonals.

Sides and Diagonals Relationship

In an orthodiagonal quadrilateral, the sum of the squares of opposite sides is equal: $a^2 + c^2 = b^2 + d^2$.

Area of a General Quadrilateral

If the angle θ between diagonals is not 90°, Area = 1/2 × d1 × d2 × sin(θ).

Q21. Answer: (a) 41

Shortcut Trick

Using the direct identity: (Difference)² = (Sum)² − 4 × Product

Given: Sum = 51 and Product = 230

(Difference)² = 51² − 4 × 230

(Difference)² = 2601 − 920 = 1681

Difference = √1681 = 41

Therefore The correct answer is 41.

Alternate Method

Given: Sum of two numbers = 51, Product = 230.

Formula Used: Quadratic equation $x^2 - (\text{Sum})x + \text{Product} = 0$.

=> Let the numbers be x and y.

=> $x^2 - 51x + 230 = 0$

=> $x^2 - 46x - 5x + 230 = 0$

=> $x(x - 46) - 5(x - 46) = 0$

=> $(x - 46)(x - 5) = 0$

=> The numbers are 46 and 5.

=> Positive difference = 46 − 5 = 41.

Therefore The correct answer is 41.

Additional Information

Algebraic Identity for Difference

The square of the difference is related to the sum and product by $(a - b)^2 = (a + b)^2 - 4ab$.

Sum and Product of Roots

For a quadratic equation $ax^2 + bx + c = 0$, the sum of roots is −b/a and the product of roots is c/a.

Symmetry in Numbers

If two numbers have a fixed sum, their product is maximum when the numbers are equal (difference is zero).

Q22. Answer: (b) 56 years

Shortcut Trick

Age difference remains constant: 28 years.

Ratio 7 years ago = 5 : 1. Difference = 4 units.

4 units = 28 years => 1 unit = 7 years.

Total units 7 years ago = 5 + 1 = 6 units.

Sum 7 years ago = 6 × 7 = 42 years.

Present sum = 42 + (2 × 7) = 56 years.

Therefore The correct answer is 56 years.
Alternate Method
Given: Present age difference = 28 years. Ratio 7 years ago = 5 : 1.
Let the present age of the son be S years.
Then, the present age of Ramu = S + 28 years.
According to the condition (7 years ago):
=> (S + 28 − 7) = 5 × (S − 7)
=> S + 21 = 5S − 35
=> 5S − S = 21 + 35
=> 4S = 56
=> S = 14 years
Ramu's age = 14 + 28 = 42 years.
=> Sum of their ages = 42 + 14 = 56 years.
Therefore The correct answer is 56 years.
Additional Information
Constant Age Difference
The numerical difference between the ages of two people always remains the same, regardless of how many years pass.
Ratio of Ages
If the ratio of ages is x : y and the difference is D, then (x − y) units = D. This helps in finding actual values quickly.
Sum of Ages Change
If there are 'n' people, the sum of their ages increases by (n × t) after 't' years.

Q23. Answer: (b) 312

Shortcut Trick
Ratio of first to second number (a:b) = 2 : 1.
For fourth proportional, a/b = c/d => 2/1 = c/120 => third number (c) = 240.
Since c = 5a, then first number (a) = 240 ÷ 5 = 48.
Since a = 2b, then second number (b) = 48 ÷ 2 = 24.
Total Sum = 48 + 24 + 240 = 312.
Therefore The correct answer is 312.
Alternate Method
Given:
Let the three numbers be a, b, and c.
First number (a) = 2 × Second number (b)
Third number (c) = 5 × First number (a)
Fourth proportional (d) = 120
Formula Used:
If four numbers a, b, c, and d are in proportion, then a/b = c/d.
Calculations:
=> Let the second number b = x.
=> First number a = 2x.
=> Third number c = 5 × (2x) = 10x.
=> According to the proportion rule: a/b = c/d
=> (2x) / x = (10x) / 120
=> 2 = 10x / 120
=> 2 × 120 = 10x
=> 240 = 10x => x = 24
=> a = 2 × 24 = 48
=> b = 24
=> c = 10 × 24 = 240
=> Sum of all three numbers = a + b + c = 48 + 24 + 240 = 312.
Therefore The correct answer is 312.

Additional Information

Fourth Proportional

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

Mean Proportional

The mean proportional between two numbers a and b is the square root of their product, given by √(a × b).

Third Proportional

For two numbers a and b, the third proportional c satisfies the relation a/b = b/c, which implies c = b² ÷ a.

Continued Proportion

Numbers a, b, c, d... are in continued proportion if a/b = b/c = c/d and so on.

Q24. Answer: (c) 18 km

Shortcut Trick

Speed of 54 km/h means covering 54 km in 60 minutes.

Given Time = 20 minutes, which is exactly 1/3 of an hour (60 ÷ 3 = 20).

Therefore, Distance covered = 1/3 of the hourly speed.

Distance = 54 ÷ 3 = 18 km.

Therefore The correct answer is 18 km.

Alternate Method

Given:

Speed (S) = 54 km/h

Time (T) = 20 minutes

Formula Used:

Distance (D) = Speed × Time

=> Convert Time from minutes to hours:

=> Time = 20 ÷ 60 hr = 1/3 hr

=> Now, substitute values in the formula:

=> Distance = 54 × (1/3)

=> Distance = 18 km

Therefore The correct answer is 18 km.

Additional Information

Unit Conversion Rules

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

Average Speed Formula

If a journey is covered at different speeds, Average Speed = Total Distance ÷ Total Time. For two equal distances with speeds x and y, Average Speed = 2xy ÷ (x + y).

Relative Speed

When two objects move in the same direction, Relative Speed = S1 − S2. In opposite directions, Relative Speed = S1 + S2.

Q25. Answer: (d) 9

Shortcut Trick

The equation $p^2 - q^2 = 45$ can be factored as $(p + q)(p - q) = 45$.

Since p and q are prime numbers, we test factor pairs of 45: (9, 5), (15, 3), and (45, 1).

For the pair (9, 5): $p + q = 9$ and $p - q = 5$.

Solving these: $2p = 14$ => $p = 7$; $2q = 4$ => $q = 2$.

Since both 7 and 2 are distinct positive prime numbers, $p + q = 9$.

Therefore The correct answer is 9.

Alternate Method

Given: p and q are distinct positive prime numbers such that $p > q$ and $p^2 - q^2 = 45$.

Formula Used: Algebraic Identity $a^2 - b^2 = (a + b)(a - b)$.

=> $p^2 - q^2 = 45$

=> $(p + q)(p - q) = 45$

=> Possible factor pairs $(p + q, p - q)$ where $(p + q) > (p - q)$:

=> 1) p + q = 45, p − q = 1 => 2p = 46 => p = 23, q = 22 (22 is not prime)

=> 2) p + q = 15, p − q = 3 => 2p = 18 => p = 9 (9 is not prime)

=> 3) p + q = 9, p − q = 5 => 2p = 14 => p = 7, q = 2 (Both are prime)

=> The values p = 7 and q = 2 satisfy the condition of being distinct primes.

=> Therefore, p + q = 7 + 2 = 9.

Therefore The correct answer is 9.

Additional Information

Prime Numbers

A prime number is a natural number greater than 1 that has no positive divisors other than 1 and itself. The only even prime number is 2.

Difference of Squares

The algebraic identity $a^2 - b^2 = (a - b)(a + b)$ is used to factorize the difference of two squared terms into the product of their sum and difference.

Factors of 45

The integer factors of 45 are 1, 3, 5, 9, 15, and 45. In problems involving prime variables, testing these factor pairs is the most efficient method.

Q26. Answer: (a) 19.25%

Shortcut Trick

Cash discount = 15%.

Quantity discount for getting 100 gm free on 1.9 kg = [100 / (1900 + 100)] × 100 = 5%.

Using successive discount formula: Net Discount = d1 + d2 − (d1 × d2 / 100).

Net Discount = 15 + 5 − (15 × 5 / 100) = 20 − 0.75 = 19.25%.

Therefore The correct answer is 19.25%.

Alternate Method

Given: Discount on rice = 15%, Purchase quantity = 1.9 kg, Free quantity = 100 gm.

Formula Used: Overall Discount % = (Total Discount Value / Total Marked Price) × 100.

Let the Marked Price (MP) of 1 kg rice be Rs. 1000.

=> Total rice received by customer = 1.9 kg + 0.1 kg = 2.0 kg.

=> Total Marked Price of 2.0 kg rice = 2 × 1000 = Rs. 2000.

=> Price of 1.9 kg rice = 1.9 × 1000 = Rs. 1900.

=> Selling Price (SP) after 15% discount = 1900 × (100 − 15) / 100 = 1900 × 0.85 = Rs. 1615.

=> Total Discount offered = Total MP − SP = 2000 − 1615 = Rs. 385.

=> Overall Discount Percentage = (385 / 2000) × 100 = 19.25%.

Therefore The correct answer is 19.25%.

Additional Information

Successive Discounts

When two discounts a% and b% are applied one after another, the single equivalent discount is calculated as [a + b − (ab / 100)]%.

Buy X Get Y Free

In a 'Buy X Get Y Free' scheme, the discount percentage is calculated using the formula: [Y / (X + Y)] × 100.

Marked Price and Selling Price Relationship

The Selling Price is always calculated on the Marked Price: SP = MP × (100 − Discount%) / 100.

Q27. Answer: (a) Rs. 3,00,000

Shortcut Trick

Calculate the effective interest rate for the given 5-month period.

Monthly Interest Rate = 12% ÷ 12 = 1% per month.

Total Effective Rate for 5 months = 1% × 5 = 5%.

Since 5% of the Principal corresponds to Rs. 15,000.

Invested Amount (100%) = (15,000 ÷ 5) × 100 = Rs. 3,00,000.

Therefore The correct answer is Rs. 3,00,000.

Alternate Method

Given: Simple Interest (SI) = Rs. 15,000, Rate of Interest (R) = 12% per annum, Time (T) = 5 months.
Formula Used: SI = (P × R × T) ÷ 100
=> Time in years (T) = 5 ÷ 12 years
=> 15,000 = (P × 12 × 5/12) ÷ 100
=> 15,000 = (P × 5) ÷ 100
=> 15,000 = P ÷ 20
=> P = 15,000 × 20
=> P = Rs. 3,00,000
Therefore The correct answer is Rs. 3,00,000.
Additional Information
Simple Interest Formula
SI = (P × R × T) ÷ 100, where P is Principal, R is Rate per annum, and T is Time in years.
Total Amount (A)
The total sum returned after the time period is A = P + SI = P(1 + RT/100).
Time Conversion
Always convert time into years if the rate is per annum (Months ÷ 12, Days ÷ 365).

Q28. Answer: (a) 72°

Shortcut Trick
The sum of the ratio parts is 2 + 3 = 5.
Since consecutive angles of a parallelogram are supplementary, their sum is 180°.
=> 5 units = 180°
=> 1 unit = 36°
=> Smaller angle = 2 units = 2 × 36° = 72°.
Therefore The correct answer is 72°.
Alternate Method
Given:
Ratio of consecutive angles = 2 : 3
Formula Used:
Sum of consecutive interior angles of a parallelogram = 180°
Calculations:
Let the two consecutive angles be 2x and 3x.
=> 2x + 3x = 180°
=> 5x = 180°
=> x = 180° ÷ 5
=> x = 36°
=> Smaller angle = 2x = 2 × 36°
=> Smaller angle = 72°
=> Larger angle = 3x = 3 × 36° = 108°
Therefore The correct answer is 72°.
Additional Information
Opposite Angles Property
In any parallelogram, opposite angles are always equal. If one angle is 72°, its opposite angle is also 72°.
Sum of Interior Angles
The sum of all four interior angles of a parallelogram (or any quadrilateral) is always 360°.
Parallel Lines and Transversals
Consecutive angles in a parallelogram are co-interior angles formed by a transversal intersecting two parallel lines, which are always supplementary (sum to 180°).

Q29. Answer: (a) 11 seconds

Shortcut Trick
Total Distance to cover = Sum of lengths = 250 + 300 = 550 m

Relative Speed (Opposite) = 72 + 108 = 180 km/hr

Convert Speed to m/s: 180 × 5/18 = 50 m/s

Time = Total Distance ÷ Relative Speed = 550 ÷ 50 = 11 sec

Therefore The correct answer is 11 sec.

Alternate Method

Given:

Length of first train (L1) = 250 m

Length of second train (L2) = 300 m

Speed of first train (S1) = 72 km/hr

Speed of second train (S2) = 108 km/hr

Formula Used:

Time (t) = (L1 + L2) ÷ (Relative Speed)

Calculations:

=> Total Distance = L1 + L2 = 250 + 300 = 550 m

=> Relative Speed = S1 + S2 = 72 + 108 = 180 km/hr

=> Conversion to m/s = 180 × (5/18) m/s

=> Relative Speed = 10 × 5 = 50 m/s

=> Time to cross = 550 ÷ 50

=> Time = 11 seconds

Therefore The correct answer is 11 sec.

Additional Information

Relative Speed Rules

When two objects move in the opposite direction, Relative Speed = S1 + S2. When they move in the same direction, Relative Speed = |S1 − S2|.

Unit Conversion

To convert speed from km/hr to m/s, multiply by 5/18. To convert from m/s to km/hr, multiply by 18/5.

Crossing Distance

When a train crosses another train (stationary or moving), the total distance to be covered is always the sum of the lengths of both trains.

Q30. Answer: (b) 192

Shortcut Trick

If the ratio of two numbers is a : b and their HCF is H, then their LCM is given by the formula: LCM = H × a × b (provided a and b are co-prime).

Given Ratio = 8 : 3 and HCF = 8.

Since 8 and 3 are co-prime (their common factor is 1):

=> LCM = 8 × 8 × 3 = 192.

Therefore The correct answer is 192.

Alternate Method

Given:

Ratio of two numbers = 8 : 3

Highest Common Factor (HCF) = 8

Formula Used:

Number = Ratio part × HCF

LCM × HCF = Product of the two numbers

=> Let the two numbers be 8x and 3x.

=> The HCF of 8x and 3x is x (since 8 and 3 have no common factors).

=> According to the question, x = 8.

=> First number = 8 × 8 = 64

=> Second number = 3 × 8 = 24

=> Using the product rule: LCM × HCF = 64 × 24

=> LCM × 8 = 1536

=> LCM = 1536 ÷ 8 = 192

Therefore The correct answer is 192.

Additional Information

Product Rule of 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).

Co-prime Numbers

Two numbers are said to be co-prime if their HCF is 1. For co-prime numbers, their LCM is simply the product of the two numbers.

HCF and LCM of Fractions

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

Q31. Answer: (b) 3.6 × 10^6 watt second

The correct answer is 3.6 times 10^6 watt sec.

Key Points

• Electrical energy is the total work done by an electric current in a given time, and its commercial unit is the kilowatt-hour (kWh), often referred to as a unit in utility bills.

• The relationship between energy, power, and time is expressed by the formula Energy = Power × Time.

• To convert 1 kilowatt-hour into watt-seconds (which is equivalent to Joules), we must convert each component into its base SI units.

• 1 Kilowatt (kW) is equal to 1000 Watts (W), representing the rate of energy consumption.

• 1 Hour (h) consists of 60 minutes, and each minute has 60 seconds, totaling 3600 seconds (s).

• By multiplying these values: 1 kWh = 1000 W × 3600 s = 3,600,000 Watt-seconds.

• In scientific notation, 3,600,000 is expressed as 3.6 × 10^6. Therefore, 1 kWh = 3.6 × 10^6 watt sec.

Additional Information

• Watt (W):

• It is the SI unit of power, named after James Watt.

• One Watt is defined as the consumption of one Joule of energy per second (1 W = 1 J/s).

• Joule (J):

• The standard unit of energy in the International System of Units.

• 1 Watt-second is exactly equal to 1 Joule; thus, 1 kWh is also 3.6 × 10^6 Joules or 3.6 Megajoules (MJ).

• Electric Power:

• Defined as the rate at which electrical work is done or the rate at which electrical energy is transferred by an electric circuit.

• Commonly calculated using the product of Voltage (V) and Current (I), represented as P = V × I.

Q32. Answer: (b) Remove barriers to trade and industry

The correct answer is Remove barriers to trade and industry.

Key Points

• Liberalisation in the context of the 1991 Economic Reforms refers to the relaxation of government restrictions on economic activities to provide more freedom to private enterprises.

• A primary objective was the dismantling of the License Raj, a system of elaborate licenses and regulations that hindered the entry and growth of businesses in India.

• The reforms aimed to integrate the Indian economy with the global market by reducing import duties, removing quantitative restrictions (quotas) on trade, and simplifying foreign exchange regulations.

• By removing these barriers, the government sought to encourage competition, improve industrial efficiency, and attract Foreign Direct Investment (FDI) to modernize the domestic production base.

• The policy shift was triggered by a severe Balance of Payments (BoP) crisis in 1991, necessitating a move away from the inward-looking, protectionist policies of the previous decades.

Additional Information

• The New Economic Policy (NEP) was built on the pillars of Liberalisation, Privatisation, and Globalisation (LPG):

• Privatisation: Involved reducing the role of the Public Sector by selling government equity in Public Sector Undertakings (PSUs), contrary to the pre-1991 goal of public sector dominance.

• Globalisation: Focused on increasing the international reach of the economy, which included encouraging rather than banning foreign companies.

• Deregulation: The MRTP Act (Monopolies and Restrictive Trade Practices Act) was amended to remove the requirement for

large companies to seek prior government approval for expansion, thereby decreasing government control.

• Key Figures: These historic reforms were initiated under the leadership of Prime Minister P.V. Narasimha Rao and then Finance Minister Dr. Manmohan Singh.

Q33. Answer: (b) Decreasing ionization energy and increasing atomic size

The correct answer is Decreasing ionization energy and increasing atomic size.

Key Points

• Metallic character represents the level of reactivity of a metal and its ability to lose valence electrons to form positive ions (cations).

• As we move down a group in the modern periodic table, the number of energy shells increases progressively with each period.

• This addition of shells leads to a significant increase in atomic size (atomic radius), which places the outermost electrons further away from the positively charged nucleus.

• The shielding effect of inner-shell electrons also increases down the group, further reducing the effective nuclear charge exerted on the valence electrons.

• Due to the increased distance and reduced attraction, the ionization energy—the energy required to remove the most loosely bound electron—decreases down the group.

• Since electrons are lost more easily when ionization energy is low, the tendency to exhibit electropositive behavior grows, resulting in an increase in metallic character.

Additional Information

• Trends across a Period:

• Across a period from left to right, the metallic character decreases because the atomic size decreases and the nuclear charge increases, making it harder to lose electrons.

• Elements on the extreme left of the periodic table (Alkali Metals) possess the highest metallic character in their respective periods.

• Electronegativity:

• Metals generally have low electronegativity and low electron affinity compared to non-metals.

• The increase in metallic character is accompanied by a decrease in non-metallic character and oxidizing power.

• Chemical Reactivity:

• For metals, chemical reactivity increases down a group as it becomes easier to form ions, whereas for non-metals, reactivity typically decreases down a group.

Q34. Answer: (c) (i) True, (ii) False

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

Key Points

• Statement (i) explains the structural dependency of software. Application Software is designed to perform specific tasks for the user but lacks the low-level instructions to manage hardware components directly. It relies on System Software, specifically the Operating System (OS), to act as an intermediary for resource allocation, memory management, and hardware communication. Hence, statement (i) is correct.

• Statement (ii) discusses the robustness of modern computing environments. Modern Operating Systems implement Process Isolation and Protected Memory architectures. Each application runs in a separate memory space, which prevents the failure or crash of a single application from affecting the OS Kernel or other active processes. Users can typically close the failed application without rebooting the entire system. Hence, statement (ii) is incorrect.

Additional Information

• Application Software

• Function: Performs specific end-user tasks such as document creation, data analysis, or entertainment.

• Types: Includes General Purpose (Word Processors), Specialized (Accounting Software), and Custom-built solutions.

• Examples: Microsoft Office, Adobe Photoshop, and Web Browsers like Chrome or Firefox.

• System Software

• Function: Coordinates hardware operations and provides a platform for application execution.

• Components: Includes the Operating System, BIOS/UEFI, Device Drivers, and Utility Programs.

• Key Roles: Responsible for Process Management, File System control, and ensuring System Security.

Q35. Answer: (b) Coniferous Forests

The correct answer is Coniferous Forests.

Key Points

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• Coniferous Forests are found in the higher latitudes of the Northern Hemisphere (typically between 50°N to 70°N) and are also known by the Russian term Taiga, which means pure or untouched.

• These forests consist of tall, softwood evergreen trees that are highly valued for their commercial utility.

• The wood from these trees is extensively used for manufacturing pulp, which is the primary raw material for making paper and newsprint.

• Common species found in this biome include Chir, Pine, and Cedar, which are also used for making matchboxes and packing boxes.

• The typical wildlife found in the Taiga region includes animals like the Silver fox, Mink, and Polar bear.

Additional Information

• Mediterranean Vegetation:

• Found mostly in the areas around the Mediterranean Sea, as well as parts of California and South Africa.

• Famous for citrus fruits such as oranges, figs, olives, and grapes due to hot dry summers and mild rainy winters.

• Tropical Grasslands:

• Also known as Savannahs, these occur on either side of the equator and extend to the tropics.

• The grass can grow very tall, reaching about 3 to 4 meters in height.

• Temperate Deciduous Forests:

• Found in higher latitudes like the USA, China, New Zealand, and Chile.

• Trees shed their leaves in the dry season to conserve moisture, and common species include Oak, Ash, and Beech.

Q36. Answer: (c) 10th

The correct answer is 10th.

Key Points

• India has been ranked 10th in the Climate Change Performance Index (CCPI) 2025, which was released in November 2024 during the COP29 climate summit held in Baku, Azerbaijan.

• The index is published annually by Germanwatch, the New Climate Institute, and the Climate Action Network (CAN) International to track the climate protection performance of 63 countries and the European Union.

• India's performance is categorized as 'High', although it dropped three positions from its previous rank of 7th in the 2024 report.

• The ranking is based on four key categories: Greenhouse Gas (GHG) Emissions (40% weightage), Renewable Energy (20%), Energy Use (20%), and Climate Policy (20%).

• India maintains its position as one of the top performers among the G20 nations, second only to the United Kingdom (ranked 6th) within the group.

• The report highlights that India’s per capita emissions remain relatively low compared to other major economies, contributing significantly to its overall high score.

Additional Information

• Structure of CCPI 2025:

• The first three ranks (1st, 2nd, and 3rd) remain vacant because no country has performed well enough across all categories to be consistent with the 1.5°C global warming limit.

• Denmark secured the 4th position, making it the highest-ranked country, followed by the Netherlands at 5th and the United Kingdom at 6th.

• Countries like the United States, Russia, and Saudi Arabia were among the lowest-performing nations in the index.

• India's specific category performance:

• GHG Emissions: Ranked High.

• Energy Use: Ranked High.

• Renewable Energy: Ranked Medium.

• Climate Policy: Ranked Medium.

• The CCPI serves as an important tool for enhancing transparency in international climate politics and enables comparison of climate protection efforts and progress made by individual countries.

Q37. Answer: (d) To examine allegations of abuse of authority during the Emergency

The correct answer is To examine allegations of abuse of authority during the Emergency.

Key Points

• The Janata Party government, which came to power after the landmark 1977 General Elections, appointed the Shah Commission of Inquiry on May 28, 1977.

• The commission was headed by Justice J.C. Shah, a retired Chief Justice of the Supreme Court of India, to ensures an independent and judicial investigation.

• The primary objective of the commission was to inquire into several aspects of excesses, malpractices, and the abuse of authority committed by the government and various individuals during the National Emergency (1975−1977).

• It was mandated to investigate the specific circumstances that led to the declaration of the Emergency, the subsequent censorship of the press, and the mass preventive detentions conducted under the Maintenance of Internal Security Act (MISA).

• The commission extensively documented testimonies regarding police atrocities, the demolition of houses in areas like Turkman Gate, and the implementation of aggressive sterilization programs.

Additional Information

• Reports of the Shah Commission:

• The commission submitted three detailed reports that outlined the breakdown of constitutional governance and the rise of extra-constitutional authorities.

• It highlighted how state machinery and intelligence agencies were misused for political ends and to silence opposition voices.

• Constitutional Impact:

• The findings of the commission were instrumental in the drafting of the 44th Constitutional Amendment Act of 1978, which aimed to prevent such future occurrences.

• This amendment introduced the term armed rebellion to replace internal disturbance and mandated that a proclamation of Emergency could only be issued on the written advice of the Union Cabinet.

• It also ensured that the right to life and liberty under Article 21 could not be suspended even during an Emergency.

Q38. Answer: (b) Switzerland, Singapore, Hong Kong

The correct answer is Switzerland, Singapore, Hong Kong.

Key Points

• The IMD World Competitiveness Ranking 2025, released in June 2025, evaluates global economies based on their capacity to foster an environment that sustains enterprise competitiveness.

• Switzerland reclaimed the first rank globally, benefiting from unparalleled institutional stability, high-quality Infrastructure, and superior Government Efficiency.

• Singapore secured the second position, demonstrating immense strength in Business Efficiency, a robust healthcare system, and highly competitive labor market dynamics.

• Hong Kong SAR achieved the third position, highlighting its recovery as a leading financial hub with advancements in International Investment and favorable Tax Policy.

• The 2025 edition assessed 69 global economies, reflecting a landscape defined by digital readiness and geopolitical agility.

Additional Information

• Four Pillars of IMD Ranking:

• Economic Performance: Assesses domestic economy, international trade, international investment, employment, and cost/price indices.

• Government Efficiency: Evaluates public finance, tax policy, regulatory frameworks, business legislation, and societal stability.

• Business Efficiency: Measures overall productivity, labor market flexibility, financial sector quality, management practices, and values.

• Infrastructure: Quantifies basic, technological, scientific, environmental, health, and education infrastructure.

• Performance of Key Economies in 2025:

• India was ranked 41st globally in 2025, experiencing a minor decline from 39th in 2024 due to challenges in infrastructure and governance.

• The USA and China ranked outside the top ten, while countries like Canada and Germany showed noteworthy improvements in the top 20.

• The IMD World Competitiveness Center, based in Lausanne, Switzerland, has published this annual report since 1989.

Q39. Answer: (d) Kerala

The correct answer is Kerala.

Key Points

• The Western Ghats, also known as the Sahyadri, are a continuous mountain range that runs parallel to the western coast of the Indian peninsula, spanning approximately 1,600 kilometers.

• A primary geographical feature of the Western Ghats is that their average elevation increases significantly from the north towards the south.

• The highest peak of the entire Western Ghats (and all of South India) is Anamudi, which reaches an altitude of 2,695 meters (8,842 feet) above sea level.

• Anamudi is located in the Idukki district of Kerala, specifically within the Eravikulam National Park in the Anamalai Hills.

• Because the highest massifs and the absolute highest peak of the range are situated within its borders, Kerala is the region where the Western Ghats are at their highest elevation.

Additional Information

• Karnataka:

• The highest peak in this state is Mullayanagiri, located in the Chikkamagaluru district.

• It has an elevation of approximately 1,930 meters, making it the highest point in Karnataka but significantly lower than the peaks in Kerala.

• Tamil Nadu:

• This region is home to the Nilgiri Mountains, where the highest peak is Doddabetta at 2,637 meters.

• While it is the second-highest peak in the Western Ghats, it does not surpass the elevation found in the Kerala section of the range.

• Goa:

• The Western Ghats in Goa are part of the Sahyadri range but are much lower in height compared to the southern states.

• The highest point is Sonsogor, which stands at an elevation of about 1,027 meters.

• Ecological Importance:

• The Western Ghats are a UNESCO World Heritage Site and are recognized as one of the world's eight biodiversity hotspots.

• They play a crucial role in the Indian monsoon system by acting as a barrier to the moisture-laden Southwest Monsoon winds.

Q40. Answer: (a) 5 years

The correct answer is 5 years.

Key Points

• As per Article 172 of the Constitution of India, the normal tenure of the Legislative Assembly (Vidhan Sabha) of every state is 5 years.

• The duration of this five-year term is calculated from the date appointed for the first meeting of the assembly after the general elections are concluded.

• An MLA (Member of the Legislative Assembly) is a representative directly elected by the adult voters of a specific electoral constituency to represent them in the state legislature.

• The Legislative Assembly stands automatically dissolved at the end of the five-year period; however, the Governor of the state has the executive power to dissolve the assembly prematurely under specific constitutional circumstances, such as a No-Confidence Motion or a breakdown of constitutional machinery.

• During this term, MLAs participate in the legislative process, including the introduction and passage of bills, and they hold the executive accountable through various parliamentary devices.

Additional Information

• Legislative Council (Vidhan Parishad):

• In states with a Bicameral Legislature, the Legislative Council serves as the upper house and is a permanent body that is not subject to dissolution.

• The term of an individual member of the Legislative Council (MLC) is 6 years, with one-third of its members retiring every second year.

• Constitutional Amendments:

• The 42nd Amendment Act, 1976, passed during the Emergency, briefly increased the term of the State Legislative Assemblies to 6 years.

• The 44th Amendment Act, 1978, subsequently repealed this change and restored the original duration of 5 years.

• Extension during Emergency:

• Under Article 352, while a Proclamation of Emergency is in effect, Parliament may extend the term of the Legislative Assembly by law for a period not exceeding one year at a time.

• This extension cannot, in any case, continue beyond a period of six months after the emergency proclamation has ceased to operate.

• Qualifications for MLA:

• According to Article 173, a person must be a citizen of India and at least 25 years of age to be eligible for election as an MLA.

Q41. Answer: (a) Boyle's Law

The correct answer is Boyle's Law.

Key Points

• Boyle's Law, named after the physicist Robert Boyle who published it in 1662, describes the isothermal relationship in gases.

• It states that the absolute pressure exerted by a given mass of an ideal gas is inversely proportional to the volume it occupies,

provided the temperature and amount of gas remain constant within a closed system.

• Mathematically, the law is expressed as P prop. to 1/V, which means the product of pressure (P) and volume (V) is a constant (k): PV = k.

• When comparing a gas under two different sets of conditions at the same temperature, the formula P1V1 = P2V2 is utilized to calculate unknown variables.

• According to the kinetic molecular theory, as volume decreases, the gas molecules are crowded into a smaller space, increasing the frequency of collisions with the container walls, which results in higher pressure.

• A graphical representation of this law on a pressure-volume graph produces a curve known as an isotherm, which is a rectangular hyperbola.

Additional Information

• Charles's Law:

• Formulated by Jacques Charles, it states that the volume of a fixed mass of gas is directly proportional to its absolute temperature (in Kelvin) when the pressure is kept constant.

• The mathematical relation is V/T = k or V1/T1 = V2/T2.

• Gay-Lussac's Law:

• Developed by Joseph Louis Gay-Lussac, it establishes that the pressure of a gas is directly proportional to its absolute temperature when the volume remains constant.

• The formula is P/T = k or P1/T1 = P2/T2.

• Avogadro's Law:

• Proposed by Amedeo Avogadro, it states that equal volumes of all gases, at the same temperature and pressure, contain the same number of molecules (or moles).

• This indicates that the volume is directly proportional to the number of moles (n), expressed as V/n = k.

Q42. Answer: (b) Mondo Duplantis

The correct answer is Mondo Duplantis.

Key Points

• Mondo Duplantis, the Swedish-American pole vault sensation, was honored with the Laureus World Sportsman of the Year Award in 2025.

• The award recognized his unparalleled dominance during the 2024 season, where he successfully defended his Olympic Gold Medal at the Paris 2024 Games.

• During the eligibility period, Duplantis broke the world record multiple times, including a historic clearance of 6.26 meters at the Silesia Diamond League in August 2024.

• The Laureus World Sports Awards are prestigious international honors established in 1999 to celebrate the greatest sporting achievements of the previous year.

• By winning this accolade, Duplantis joined an elite group of athletes, highlighting the global impact of track and field on the world stage.

Additional Information

• Novak Djokovic:

• A legendary Serbian tennis player who previously won the Laureus Sportsman of the Year in 2024.

• He holds the record for the most Grand Slam titles in men's tennis history and has spent the most weeks as the world No. 1.

• Serena Williams:

• An American former professional tennis player who has won 23 Grand Slam singles titles.

• She has been a multiple-time recipient of the Laureus World Sportswoman of the Year award throughout her illustrious career.

• Tom Pidcock:

• A versatile British cyclist known for competing in road racing, mountain biking, and cyclo-cross.

• He secured back-to-back Olympic Gold Medals in the mountain bike event at Tokyo 2020 and Paris 2024.

Q43. Answer: (b) Protection of Civil Rights Act, 1955

The correct answer is Protection of Civil Rights Act, 1955.

Key Points

• The Untouchability (Offences) Act, 1955 was enacted by the Parliament of India to prescribe punishments for the practice of untouchability, fulfilling the mandate of Article 17 of the Constitution.

• In 1976, based on the recommendations of the Elayaperumal Committee (1965), the act was comprehensively amended to make its provisions more stringent and effective.

• The amendment officially changed the title of the legislation to the Protection of Civil Rights Act, 1955, shifting the focus from

merely penalizing offences to actively protecting the civil rights of marginalized communities.

• Under this act, Civil Right is defined as any right accruing to a person by reason of the abolition of untouchability by Article 17 of the Constitution of India.

• The act is applicable to the whole of India and covers discriminatory practices in public places such as temples, hotels, hospitals, and educational institutions.

Additional Information

• Article 17 of the Indian Constitution:

• It explicitly abolishes untouchability and forbids its practice in any form.

• The enforcement of any disability arising out of Untouchability is considered an offence punishable in accordance with the law.

• Article 35:

• This article empowers the Parliament (and not the State Legislatures) to make laws that prescribe punishment for acts declared as offences under the Fundamental Rights chapter.

• Nature of Offences:

• Offences under the Protection of Civil Rights Act, 1955 are cognizable and non-compoundable.

• A person convicted under this act becomes ineligible for election to the Parliament or the State Legislature under the Representation of the People Act, 1951.

Q44. Answer: (c) 1961 Census of India

The correct answer is 1961 Census of India.

Key Points

• The 1961 Census of India was conducted under the leadership of Asok Mitra, the then Registrar General and Census Commissioner. He is widely credited with broadening the horizon of the census from a mere head-count to a massive socio-economic and cultural document.

• Under this census, the Census Organisation was transformed into a Cultural Repository by undertaking extensive village surveys (over 500 villages), documenting nearly 300 traditional crafts, and creating detailed inventories of fairs and festivals across India.

• This operation involved meticulous ethnographic surveys of Scheduled Castes and Scheduled Tribes, which provided critical scientific data on tribal social structures and community life, filling a gap that had existed since pre-independence era reports.

• The 1961 Census marked a significant technological shift in Indian demographic history by introducing mechanical tabulation equipment. This included the use of key punches, sorters, and tabulators (such as IBM 101 electronic statistical machines) to handle and process the vast data of the growing population.

• It also emphasized housing data by introducing a separate Houselist and Housing Census, which became a permanent feature of subsequent census operations.

Additional Information

• 1951 Census of India

• This was the first census of independent India and was conducted under the Census Act of 1948.

• Its primary focus was on assessing the demographic changes caused by the Partition of India and the resulting mass migration of people.

• 1971 Census of India

• Known as the Centenary Census, it celebrated 100 years of systematic census-taking in the country.

• It introduced the Individual Slip for data collection and introduced a clearer distinction between Main Workers and Marginal Workers to better measure economic activity.

• 1981 Census of India

• Marked the adoption of advanced computer systems like the Sperry Univac for data processing, significantly speeding up the release of reports compared to previous decades.

Q45. Answer: (c) Arch and dome construction technique

The correct answer is Arch and dome construction technique.

Key Points

• The arrival of the Delhi Sultanate in the 13th century introduced the Arcuate style of architecture, which prominently featured the Arch and dome construction technique.

• Prior to this period, Indian architecture primarily followed the Trabeate style, which relied on horizontal beams supported by vertical columns (slab-and-beam).

• The true arch was a major structural innovation that utilized a central keystone to distribute the weight of the roof outwards and downwards to the pillars, rather than relying on the strength of a single horizontal stone.

• The Dome allowed for the creation of massive, column-free internal spaces, which were aesthetically grand and functional for congregational prayers in mosques.

• These large-scale constructions were supported by the introduction of high-quality lime mortar as a binding agent, which offered superior strength and durability compared to the mud or dry masonry used in earlier periods.

Additional Information

• Slab-and-beam roofing:

• This is also known as the Trabeate style and was the traditional method for constructing Hindu, Buddhist, and Jain temples.

• It was limited by the tensile strength of the materials, meaning large rooms required many supporting pillars.

• Key Architectural Examples:

• The Alai Darwaza, built by Alauddin Khilji in 1311 AD, is the first building in India to employ the true arch and scientific dome principles perfectly.

• The Quwwat-ul-Islam Mosque and the Qutub Minar complex showcase the transition from corbelled arches (made by local craftsmen using older techniques) to the fully developed Arcuate forms.

• Other features introduced during this period include the use of minarets, calligraphy for decoration, and arabesque patterns.

Q46. Answer: (d) Four times

The correct answer is Four times.

Key Points

• The relationship between the heat generated in a conductor and the electric current flowing through it is defined by Joule's Law of Heating.

• According to this physical law, the heat produced (H) in a resistor is directly proportional to the square of the electric current (I) passing through it, provided the resistance (R) and time (t) remain constant.

• The fundamental formula for calculating the thermal energy is $H = I^2Rt$.

• When the electric current is doubled, the new current (I') becomes 2I.

• Substituting the value of the new current into the formula gives the new heat output (H') as: $H' = (2I)^2 \times R \times t$.

• Simplifying the expression results in $H' = 4 \times I^2Rt$, which indicates that the heat produced is exactly four times the initial amount.

Additional Information

• Core Factors of Joule Heating:

• Resistance (R): Measured in Ohms, it represents the opposition to electron flow. Increasing resistance while keeping current constant results in a linear increase in heat.

• Current (I): Measured in Amperes, it has the most significant impact on heat because of the squared relationship in the formula.

• Time (t): Measured in seconds, the total thermal energy is directly proportional to the duration of the current flow.

• Industrial and Domestic Applications:

• Heating Elements: Devices like electric heaters and geysers use high-resistance alloys like Nichrome to maximize heat production.

• Safety Mechanisms: An electric fuse is designed to melt and break the circuit if the current becomes dangerously high, preventing fires caused by excessive heating.

• Incandescent Bulbs: The Tungsten filament is heated to a very high temperature to emit light, demonstrating the practical conversion of electrical energy into thermal and radiant energy.

Q47. Answer: (c) 66½° N

The correct answer is 66½degree N.

Key Points

• The June solstice, also known as the Summer Solstice in the Northern Hemisphere, occurs around June 21 each year when the Earth's North Pole is tilted at its maximum angle of approximately 23.5 degrees toward the Sun.

• During this event, the Sun's rays are perpendicular to the Tropic of Cancer (23½degree N), resulting in the longest day of the year for the Northern Hemisphere.

• The duration of daylight increases as one moves further north from the Equator during the June solstice; while the Equator receives about 12 hours of light, latitudes further north experience significantly longer periods.

• At the Arctic Circle, located at 66½degree N, the Sun does not set at all for a full 24-hour period, a phenomenon famously known as the Midnight Sun.

• Consequently, among the given options, the latitude at 66½degree N experiences the maximum possible daylight duration (24 hours), making it the longest compared to lower northern latitudes or any southern latitudes.

Additional Information

• Equator (0 degree):

• Experiences nearly equal day and night (approximately 12 hours each) throughout the year regardless of the solstice.

• Tropic of Cancer (23½degree N):

• Receives overhead sunlight at noon during the June solstice.

• Daylight lasts approximately 13.5 hours, which is long but significantly less than the 24 hours at the Arctic Circle.

• Tropic of Capricorn (23½degree S):

• Experiences the Winter Solstice during June.

• It has the shortest day of the year in the Southern Hemisphere, with daylight lasting roughly 10.5 hours.

Q48. Answer: (a) 1955

The correct answer is 1955.

Key Points

• The Citizenship Act, 1955 was enacted by the Indian Parliament to provide for the acquisition and determination of Indian citizenship after the commencement of the Constitution.

• While Articles 5 to 10 of the Constitution of India dealt with citizenship at the time of its commencement, Article 11 specifically empowered the Parliament to regulate the right of citizenship by law.

• The Act outlines five distinct methods to acquire Indian citizenship: By Birth, By Descent, By Registration, By Naturalization, and By Incorporation of Territory (e.g., when Pondicherry became part of India).

• It also defines three specific ways through which citizenship can be lost: Renunciation (voluntary giving up), Termination (automatic loss upon acquiring another country's citizenship), and Deprivation (compulsory termination by the government for fraud or disloyalty).

Additional Information

• The Constitution of India does not provide for Dual Citizenship; it only recognizes Single Citizenship for the entire country to promote national integration.

• The Citizenship Act, 1955 has undergone several significant amendments to adapt to evolving socio-political requirements:

• Citizenship (Amendment) Act, 1986: Implemented stricter criteria for citizenship by birth to curb illegal immigration, particularly in Assam.

• Citizenship (Amendment) Act, 2003: Introduced the concept of Overseas Citizenship of India (OCI) for Persons of Indian Origin (PIOs) in certain countries and defined 'illegal migrants'.

• Citizenship (Amendment) Act, 2019: Provided a pathway to Indian citizenship for persecuted religious minorities (Hindus, Sikhs, Buddhists, Jains, Parsis, and Christians) from Afghanistan, Bangladesh, and Pakistan who entered India on or before December 31, 2014.

• Citizenship falls under the Union List in the Seventh Schedule of the Constitution, meaning only the Central Government (Ministry of Home Affairs) has the jurisdiction to legislate on it.

Q49. Answer: (c) PSLV payload module from TDF

The correct answer is PSLV payload module from TDF.

Key Points

• The Indian Space Research Organisation (ISRO) successfully demonstrated a high-performance Green Propulsion System during the PSLV-C58 mission launched on January 1, 2024.

• The testing was conducted on the POEM-3 (PSLV Orbital Experimental Module-3), which utilized the spent fourth stage (PS4) of the launch vehicle as an orbital platform for hosted payloads.

• This environmentally friendly propulsion technology was developed by the Bengaluru-based startup Bellatrix Aerospace, which was supported and mentored through the Technology Development Fund (TDF) scheme of the Defence Research and Development Organisation (DRDO).

• The system uses a non-toxic, high-performance propellant, specifically a monopropellant based on Hydroxylammonium Nitrate (HAN), which is safer to handle compared to traditional hazardous fuels.

• The in-orbit demonstration involved the successful firing of a 1N (Newton) Thruster, validating the propellant storage, thermal management, and feed system in the vacuum of space.

Additional Information

• Green Propulsion Technology:

• Traditional space propellants, particularly Hydrazine, are highly toxic, corrosive, and carcinogenic, requiring rigorous safety protocols and expensive handling.

• Green propellants offer reduced environmental impact and higher specific impulse, potentially increasing the efficiency and lifespan of satellite missions.

• POEM (PSLV Orbital Experimental Module):

• This is a unique cost-effective platform developed by ISRO that converts the spent PS4 stage of the PSLV into a stabilized orbital laboratory.

• It features its own Navigation, Guidance, and Control (NGC) system and generates power via solar panels and a Li-ion battery.

• DRDO TDF (Technology Development Fund):

• Managed by the Ministry of Defence, it aims to encourage MSMEs and startups to develop niche technologies for the Indian Armed Forces and Space sector.

Q50. Answer: (a) Registers

The correct answer is Registers.

Key Points

• Registers are the smallest and fastest storage units in a computer system, directly integrated into the Central Processing Unit (CPU).

• They operate at the same speed as the processor clock, providing near-instantaneous access to data for arithmetic, logical, and control operations.

• Located inside the CPU core, they hold specific items like the Program Counter (PC), Instruction Register (IR), and Accumulator, facilitating the fetch-decode-execute cycle.

• Because they are part of the internal ALU (Arithmetic Logic Unit) and Control Unit circuitry, they have the lowest latency of any memory type in the memory hierarchy.

Additional Information

• Hard Disk:

• It is a secondary storage device used for high-capacity, non-volatile data storage.

• It is significantly slower than internal CPU memory because it connects via external interfaces like SATA and may involve mechanical movement.

• Cache L3:

• Level 3 (L3) Cache is a specialized high-speed memory that acts as a buffer between RAM and L1/L2 caches.

• While it is typically located on the CPU die, it is shared across multiple cores and is slower than the dedicated Registers and L1 Cache.

• RAM (Random Access Memory):

• Commonly known as main memory, it is a volatile storage area that holds the OS and active applications.

• It is located on the motherboard and communicates with the CPU via the Memory Controller and System Bus, resulting in higher latency than on-chip caches or registers.

Q51. Answer: (b) 125 days

The correct answer is 125 days.

Key Points

• The Viksit Bharat - Guarantee for Rozgar and Ajeevika Mission (Gramin) (VB-G RAM G) Act, 2025 provides a statutory guarantee of 125 days of wage employment per financial year to every eligible rural household.

• This legislation is a significant enhancement over the previous framework, which provided a guarantee of 100 days under the MGNREGA.

• The Act aims to secure the right to work for adult members of rural households who volunteer to do unskilled manual work.

• It is designed to align rural development with the national vision of Viksit Bharat @2047, focusing on the creation of durable assets and sustainable livelihoods.

• The mission emphasizes saturation-based delivery, ensuring that no eligible rural worker remains without work when demanded.

Additional Information

• Legislative Transition:

• The VB-G RAM G Act, 2025 received the Presidential assent on December 21, 2025, and officially came into force on July 1, 2026.

• Upon its commencement, the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), 2005, stood repealed.

• Financial and Wage Structure:

• The Act mandates a minimum base wage of Rs. 300 across all states, with the national average notified wage rising to Rs. 327.4 per day.

• It operates as a Centrally Sponsored Scheme with a funding ratio of 60:40 between the Centre and States (90:10 for North-Eastern and Himalayan States).

• Implementation and Transparency:

• Planning is conducted at the Gram Panchayat level through the Viksit Gram Panchayat Plan.

• The Act utilizes the Viksit Bharat National Rural Infrastructure Stack for digitally integrated planning and biometric verification for transparency.

• If work is not provided within 15 days of application, the household is entitled to a daily unemployment allowance.

Q52. Answer: (d) Varnam

The correct answer is Varnam.

Key Points

• Dhrupad is the oldest and most traditional form of Hindustani classical music, characterized by its spiritual nature, austere structure, and use of the Pakhawaj. Hence, statement 1 is incorrect.

• Tappa is a style of Hindustani semi-classical music that features quick, complex, and rolling melodic patterns, originally derived from the folk songs of camel riders in the Punjab region. Hence, statement 2 is incorrect.

• Khyal is the modern and most popular genre of Hindustani vocal music, allowing for significant improvisational freedom and ornamentation within its Gharana traditions. Hence, statement 3 is incorrect.

• Varnam is a foundational and complex musical form belonging exclusively to Carnatic music, the classical music tradition of South India, and is typically performed at the start of a concert. Hence, statement 4 is correct.

Additional Information

• Dhrupad:

• It reached its zenith in the court of Emperor Akbar with legendary musicians like Tansen.

• The performance usually begins with a long, slow Alap followed by rhythmic sections called Jor and Jhala.

• Khyal:

• The term originates from Persian, meaning imagination or thought.

• It is categorized into Bada Khyal (slow tempo) and Chhota Khyal (fast tempo), focusing on the Gayaki of specific Gharanas like Gwalior and Kirana.

• Tappa:

• It was refined and popularized by Shori Mian in the late 18th century.

• The style is known for its Zamzama or rapid clusters of notes that require immense vocal control.

• Varnam:

• It acts as a complete guide to a Raga, containing its essential movements and phrases.

• Structural parts include the Pallavi, Anupallavi, Mukthayi Swara, and Charanam.

Q53. Answer: (a) Arithmetic Logic Unit (ALU)

The correct answer is Arithmetic Logic Unit (ALU).

Key Points

• The Arithmetic Logic Unit (ALU) is the primary subsystem of the Central Processing Unit (CPU) that performs all fundamental mathematical calculations and logical evaluations.

• Arithmetic operations handled by the ALU include addition, subtraction, multiplication (×), and division, which are processed using complex circuits like binary adders and accumulators.

• Logical operations involve Boolean logic and comparisons such as AND, OR, NOT, and XOR, as well as relational operations like equal to, greater than, or less than to facilitate branching in programming.

• The ALU operates on data retrieved from Internal Registers, and its output is typically stored back into an accumulator or general-purpose register before being sent to Main Memory.

• Functionally, the ALU uses a series of logic gates (transistors) to manipulate binary digits (bits) at nanosecond speeds, allowing modern processors to perform billions of operations per second (FLOPS).

Additional Information

• Control Unit (CU):

• Serves as the manager of the processor, directing the timing and sequence of operations.

• It performs the Fetch-Decode-Execute cycle, retrieving instructions from memory and signaling the ALU on which operation to perform.

• Register:

• A high-speed, on-chip storage location that holds tiny amounts of data, such as instruction pointers or intermediate calculation results.

• Common types include the Program Counter (PC), Instruction Register (IR), and Memory Address Register (MAR).

• Main Memory (RAM):

• Known as Random Access Memory, it is a volatile storage medium located outside the CPU die.

• It stores the operating system, active software applications, and data currently required by the system, acting as a bridge between the Hard Drive and the CPU cache.

Q54. Answer: (b) Policy challenges and opportunities for emerging markets in a shifting economic landscape

The correct answer is Policy challenges and opportunities for emerging markets in a shifting economic landscape.

Key Points

• The International Monetary Fund (IMF) AlUla Conference on Emerging Market Economies, scheduled for 2025, is organized in collaboration with the Ministry of Finance of Saudi Arabia. It serves as a premier platform for global policymakers, central bank governors, and financial experts to discuss the unique economic position of Emerging Market Economies (EMEs).

• The central theme focuses on navigating the shifting economic landscape, which is characterized by geoeconomic fragmentation, volatile commodity prices, and the transition toward a decarbonized global economy.

• The conference addresses critical policy challenges such as maintaining fiscal sustainability, managing external debt, and calibrating monetary policy to combat inflation while supporting growth in a high-interest-rate environment.

• It also highlights opportunities for EMEs to harness digital transformation, improve labor productivity, and attract Foreign Direct Investment (FDI) through robust structural reforms.

Additional Information

• International Monetary Fund (IMF)

• Established in 1944 at the Bretton Woods Conference, it is headquartered in Washington, D.C.

• Its core mission is to ensure the stability of the international monetary system, facilitate international trade, and provide financial assistance to member countries facing balance-of-payments problems.

• AlUla and Saudi Vision 2030

• Hosting such high-level dialogues in AlUla aligns with Saudi Arabia's Vision 2030, which aims to diversify the kingdom's economy and establish it as a global hub for investment and culture.

• AlUla is a historic UNESCO World Heritage site, symbolizing the bridge between ancient trade routes and modern economic cooperation.

• Emerging Market Economies (EMEs)

• EMEs are nations that are transitioning from developing to developed status, often characterized by rapid industrialization and high GDP growth rates.

• Key members of this group include nations from the G20, such as India, Brazil, Indonesia, and South Africa, which are increasingly influential in global governance.

Q55. Answer: (d) Mridangam

The correct answer is Mridangam.

Key Points

• The Mridangam is a double-headed percussion instrument of ancient origin, widely regarded as the primary rhythmic accompaniment in Carnatic classical music.

• It is classified under the Avanaddha Vadya category (membranophones) according to the Natya Shastra, which includes instruments where sound is produced by striking a stretched membrane.

• The body of the instrument is traditionally carved from a single block of jackfruit wood, and its two rhythmic heads are made of layers of skin connected by leather thongs.

• A unique feature of the Mridangam is the Soru (or Karanai), a permanent black paste applied to the center of the right head, which allows for the production of distinct harmonic overtones and precise pitching.

• In Indian mythology, the Mridangam is often depicted as the instrument of choice for Lord Ganesha and Nandi, the bull of Lord Shiva.

Additional Information

• Flute:

• It is a Sushira Vadya (wind instrument) made from bamboo.

• In Indian music, it is known as the Bansuri in the Hindustani tradition and the Venu in the Carnatic tradition.

• Sound is generated by the vibration of air within the hollow tube when the player blows across the embouchure hole.

• Santoor:

• It is a Tata Vadya (string instrument), specifically a hammered dulcimer.

• Originating from Kashmir, it typically features 72 to 100 strings stretched over a trapezoidal wooden box.

• The player strikes the strings using a pair of lightweight wooden mallets known as Kalam.

• Veena:

• It is a prominent Tata Vadya (plucked string instrument) with several variations such as the Saraswati Veena and Rudra Veena.

• It is one of the oldest Indian instruments and is iconographically associated with Saraswati, the goddess of arts and knowledge.

Q56. Answer: (a) 90 : 10

The correct answer is 90 : 10.

Key Points

• The Paramparagat Krishi Vikas Yojana (PKVY) is a flagship centrally sponsored scheme launched in 2015 to promote organic farming across India.

• It is implemented as a sub-component of the Soil Health Management (SHM) project under the National Mission on Sustainable Agriculture (NMSA).

• The funding pattern for the scheme is structured based on regional classification: for North-eastern States and the Himalayan States (including Himachal Pradesh, Uttarakhand, and the Union Territory of Jammu and Kashmir), the financial assistance is shared in a ratio of 90 : 10 between the Central Government and the State Government.

• The scheme adopts a cluster-based approach to encourage farmers to adopt organic practices. Each cluster comprises 50 or more farmers possessing a minimum of 50 acres of land.

• Under PKVY, farmers are provided financial assistance of 50,000 rupees per hectare for a 3-year period. A significant portion of this (31,000 rupees) is dedicated to organic inputs such as seeds, bio-fertilizers, and bio-pesticides through Direct Benefit Transfer (DBT).

• The primary objective of the program is to produce chemical-free agricultural products by eliminating the use of synthetic fertilizers and pesticides, thereby improving soil health and long-term sustainability.

Additional Information

• 60 : 40 Funding Ratio:

• For all other states in India (General Category States), the financial assistance for PKVY is shared between the Center and the State in a 60 : 40 ratio.

• This follows the general fiscal sharing mechanism for Centrally Sponsored Schemes (CSS) implemented by the Ministry of Agriculture and Farmers Welfare.

• Participatory Guarantee System (PGS):

• Certification of organic products under PKVY is handled through the PGS-India system, which is a decentralized organic quality assurance tool.

• It involves peer-group certification, making it cost-effective for small and marginal farmers compared to expensive third-party export certifications.

• Union Territories:

• In the case of Union Territories (without legislature), the Government of India provides 100% financial assistance to ensure the complete adoption of organic agricultural techniques.

Q57. Answer: (c) Restricting non-English publications to prevent criticism of British political actions.

The correct answer is Restricting non-English publications to prevent criticism of British political actions.

Key Points

• The Vernacular Press Act was enacted in 1878 under the administration of Viceroy Lord Lytton to curtail the freedom of the Indian-language press.

• The primary objective of this act was to suppress the growing anti-colonial sentiment and nationalist propaganda that was being published in regional languages (vernaculars) across India.

• The British Government was particularly concerned about the harsh criticism regarding its handling of the Great Famine of 1876-1878 and the heavy expenditures incurred during the Second Anglo-Afghan War.

• The law empowered District Magistrates to require publishers to sign a bond promising not to publish anything likely to incite disaffection against the government or cause communal disharmony.

• This legislation was highly discriminatory as it provided no provision for judicial appeal and specifically exempted English-language newspapers from its stringent censorship requirements.

Additional Information

• Lord Lytton (1876–1880):

• Apart from the Press Act, he passed the Indian Arms Act (1878), which made it a criminal offense for Indians to carry arms without a license.

• His tenure is often associated with reactionary policies that accelerated the Indian National Movement.

• Amrita Bazar Patrika:

• To escape the draconian provisions of the Act, this Bengali newspaper famously converted into an English weekly overnight.

• Repeal by Lord Ripon:

• The Act was eventually repealed in 1882 by Lord Ripon, who is remembered as a more liberal Viceroy who supported freedom of the press and local self-government.

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Q58. Answer: (b) Space and Meteorology

The correct answer is Space and Meteorology.

Key Points

• Meteorology is the branch of science concerned with the processes and phenomena of the atmosphere, where supercomputers are indispensable for weather forecasting by processing massive datasets from satellites and weather stations.

• Computers in this field utilize Numerical Weather Prediction (NWP) models, which solve complex mathematical equations based on physics and fluid dynamics to predict changes in the atmosphere.

• In the Space sector, high-performance computing systems are used for orbital mechanics, controlling satellite operations, and conducting simulations for spacecraft landings and atmospheric re-entry.

• Scientific research in these domains relies on High-Performance Computing (HPC) to analyze astronomical data, model the formation of galaxies, and study long-term climate change patterns.

• Simulation techniques allow scientists to create digital twins of environmental systems, enabling the prediction of natural disasters like cyclones, hurricanes, and floods with high accuracy.

Additional Information

• Agriculture:

• Uses computers for Precision Farming, monitoring soil health via IoT sensors, and utilizing Geographic Information Systems (GIS) for crop yield mapping.

• Entertainment:

• Focuses on the use of computers for Visual Effects (VFX), 3D animation, digital gaming, and high-speed video streaming platforms.

• Sports Training:

• Employs computing technology for biomechanical analysis, tracking player performance using wearable technology, and strategic data analytics for match preparation.

Q59. Answer: (a) Keshav Prasad Maurya

The correct answer is Keshav Prasad Maurya.

Key Points

• Following the conclusion of the 2025 Bihar Legislative Assembly Elections, the Bharatiya Janata Party (BJP) high command initiated the protocol to elect the leader of its legislative party in the state.

• Keshav Prasad Maurya, the Deputy Chief Minister of Uttar Pradesh, was officially appointed as the Central Observer for Bihar in November 2025 to facilitate this transition.

• The BJP Parliamentary Board designated him to oversee the meeting of newly elected MLAs and ensure a consensus-based selection for the position of Legislative Party Leader and potential Deputy Chief Ministerial candidates.

• As a senior OBC (Other Backward Classes) leader with extensive organizational experience, Keshav Prasad Maurya was chosen to represent the central leadership and manage the regional political dynamics between Uttar Pradesh and Bihar.

• The process involved detailed consultations with the state unit to align the Bihar leadership with the national BJP strategy, maintaining stability within the National Democratic Alliance (NDA) coalition.

Additional Information

• Arjun Ram Meghwal:

• He is a senior leader from Rajasthan and serves as the Union Minister of Law and Justice in the Government of India.

• In November 2025, he was appointed as the Co-observer alongside Keshav Prasad Maurya to assist in the Bihar legislative party leader selection process.

• Yogi Adityanath:

• He is the Chief Minister of Uttar Pradesh and a member of the powerful BJP Parliamentary Board.

• While he was a Star Campaigner during the election, his role was focused on electoral mobilization rather than the administrative role of a central observer for the post-poll meeting.

• Sadhvi Niranjan Jyoti:

• She is a prominent BJP leader and former Union Minister who represents the Nishad community.

• Her political influence is primarily concentrated in the Bundelkhand region of Uttar Pradesh, and she did not serve as an observer for the 2025 Bihar leadership selection.

Q60. Answer: (a) To provide opportunities for education to a child or ward between ages six and fourteen

The correct answer is To provide opportunities for education to a child or ward between ages six and fourteen.

Key Points

• Fundamental Duties are incorporated in Part IV-A of the Indian Constitution under Article 51A, following the recommendations of

the Swaran Singh Committee.

• The 86th Constitutional Amendment Act, 2002, introduced a significant change by adding the 11th Fundamental Duty to the existing ten duties established earlier.

• This specific duty, listed under Article 51A(k), mandates that a parent or guardian must provide opportunities for education to their child or ward between the ages of six and fourteen years.

• This amendment was a pivotal legislative step that coincided with the insertion of Article 21A, which transformed the Right to Education into a Fundamental Right for children in the same age group.

Additional Information

• 42nd Constitutional Amendment Act, 1976:

• This act originally added ten Fundamental Duties to the Constitution during the period of National Emergency.

• Scientific Temper: Under Article 51A(h), citizens are encouraged to develop scientific temper, humanism, and the spirit of inquiry and reform.

• Composite Culture: Article 51A(f) requires citizens to value and preserve the rich heritage of the nation's composite culture.

• Natural Environment: Article 51A(g) mandates the protection and improvement of the natural environment, including forests, lakes, rivers, and wildlife.

Q61. Answer: (c) Intangible Cultural Heritage

The correct answer is Intangible Cultural Heritage.

Key Points

• Chhau dance is a vibrant tradition from Eastern India that was officially inscribed on the UNESCO Representative List of the Intangible Cultural Heritage of Humanity in 2010.

• It is predominantly practiced in three distinct sub-styles named after their geographic origins: Seraikella Chhau in Jharkhand, Purulia Chhau in West Bengal, and Mayurbhanj Chhau in Odisha.

• The dance is a unique blend of martial arts, acrobatics, and storytelling, often depicting episodes from great Indian epics such as the Ramayana and the Mahabharata, as well as abstract themes like the cycle of seasons.

• While the Seraikella and Purulia styles are known for the use of elaborate masks that represent the characters, the Mayurbhanj style is performed without masks, relying instead on facial expressions and body movements.

• The performance is traditionally accompanied by rhythmic music played on folk instruments such as the Mohuri (reed instrument) and various drums like the Dhol, Dhumsa, and Nagada.

Additional Information

• Understanding Cultural Recognitions

• Intangible Cultural Heritage (ICH):

• This category refers to the practices, representations, expressions, knowledge, and skills that communities recognize as part of their cultural heritage.

• It was established by the UNESCO 2003 Convention to safeguard living heritage such as Vedic Chanting, Kumbh Mela, and Yoga.

• World Heritage Sites:

• Governed by the 1972 Convention, this category recognizes tangible locations like monuments, buildings, or natural sites of outstanding universal value.

• Examples include the Ajanta Caves, Sun Temple Konark, and Western Ghats.

• Cultural Landscape Heritage:

• A sub-classification under World Heritage Sites that focuses on the human-nature interaction and the evolution of human society under the influence of physical constraints or opportunities of their natural environment.

Q62. Answer: (b) LVM3

The correct answer is LVM3.

Key Points

• The LVM3 (Launch Vehicle Mark 3), formerly known as GSLV Mk III, is the heaviest and most powerful launch vehicle in the ISRO (Indian Space Research Organisation) fleet.

• On 2nd November 2025, the LVM3 was utilized to successfully place the CMS-03 communication satellite into its designated Geosynchronous Transfer Orbit (GTO).

• CMS-03 is a dedicated communication satellite designed to provide services in the extended C-band of the frequency spectrum, covering the Indian mainland and island territories.

• The LVM3 is a three-stage vehicle consisting of two S200 solid strap-on motors, an L110 liquid core stage, and a C25 cryogenic upper stage, enabling it to carry payloads up to 4,000 kg to GTO.

• This mission represents a critical step in strengthening India's self-reliance in launching heavy communication satellites, reducing

dependence on foreign launch providers like Arianespace.

Additional Information

• PSLV (Polar Satellite Launch Vehicle):

• Often referred to as the Workhorse of ISRO, it is primarily used for launching Earth Observation and Remote Sensing satellites into Sun-Synchronous Polar Orbits.

• While it launched CMS-01, it generally lacks the lift capacity for the heavier satellites in the CMS series designed for high-altitude orbits.

• GSLV (Geosynchronous Satellite Launch Vehicle):

• A three-stage vehicle designed for placing medium-weight satellites into GTO, utilizing an indigenous Cryogenic Upper Stage (CUS).

• Although capable of GTO missions, the LVM3 is preferred for the CMS-03 class of satellites due to its higher reliability and superior payload capacity.

• Agni:

• Agni is a family of medium to intercontinental-range Ballistic Missiles developed by DRDO (Defence Research and Development Organisation) under the Integrated Guided Missile Development Programme (IGMDP).

• It is a weapon system for national defense and is not used for civilian satellite launches or commercial space missions.

Q63. Answer: (b) Ganges-Brahmaputra Delta

The correct answer is Ganges-Brahmaputra Delta.

Key Points

• The Ganges-Brahmaputra Delta, also known as the Ganges Delta or the Bengal Delta, is the largest river delta in the world, spanning approximately 105,000 square kilometers.

• It is formed by the confluence of three major rivers: the Ganges (known as the Padma in Bangladesh), the Brahmaputra (known as the Jamuna), and the Meghna, which empty into the Bay of Bengal.

• The delta is composed of highly fertile alluvial soil. Annual monsoon flooding deposits nutrient-rich silt across the plains, creating some of the most productive agricultural land on Earth.

• This immense agricultural productivity, particularly for rice and jute, provides the food security necessary to support Bangladesh's extreme population density, which exceeds 1,200 persons per square kilometer.

• Approximately two-thirds of the delta lies within Bangladesh, making the country almost entirely dependent on this river system for its economy, transport, and water supply.

Additional Information

• Nile River Valley:

• Located in Northeast Africa, it supports the majority of Egypt's population.

• While it historically facilitated high population concentrations, it is geologically distinct and unrelated to the geography of South Asia.

• Amazon River Basin:

• Located in South America, it is the largest drainage basin in the world by discharge volume.

• Despite its size, it remains one of the most sparsely populated regions due to the dense Amazon Rainforest and leached, acidic soils.

• Mississippi River Plain:

• Located in the United States, it serves as a critical agricultural hub for North America.

• It utilizes high-tech industrial farming rather than the high-density subsistence and intensive labor farming seen in the Ganges Delta.

Q64. Answer: (d) 74.04%

The correct answer is 74.04%.

Key Points

• According to the official data released by the Office of the Registrar General and Census Commissioner for the 2011 Census, the overall literacy rate in India stood at 74.04%.

• This marked a notable growth from the previous 2001 Census, which recorded a literacy rate of 64.83%.

• For the purpose of the Census, a person aged seven years and above who can read and write with understanding in any language is counted as literate.

Additional Information

• Gender-wise Literacy Breakdown:

• The male literacy rate was recorded at 82.14%.

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• The female literacy rate was recorded at 65.46%.

• The gender gap in literacy narrowed from 21.59 percentage points in 2001 to 16.68 percentage points in 2011.

• State-wise Distribution:

• Kerala maintained its position as the state with the highest literacy rate in India at 94.00%, followed by the Union Territory of Lakshadweep at 91.85%.

• Bihar registered the lowest literacy rate at 61.80%, preceded by Arunachal Pradesh at 65.38% and Rajasthan at 66.11%.

• Historical Background:

• During the first census of independent India in 1951, the overall literacy rate was a mere 18.33%, indicating significant strides in educational progress over successive decades.

Q65. Answer: (c) Ministry of Statistics and Programme Implementation

The correct answer is Ministry of Statistics and Programme Implementation.

Key Points

• The Ministry of Statistics and Programme Implementation (MoSPI) released the fourth issue of its specialized publication titled 'Children in India 2025' on 25 September 2025.

• This publication is meticulously compiled by the Social Statistics Division (SSD) of the National Statistical Office (NSO), which functions as the primary statistical wing of MoSPI.

• The report provides a multi-dimensional perspective on the status of children in the country, focusing on four core thematic areas: Survival, Development, Protection, and Participation, aligning with the National Policy for Children (NPC) 2013.

• It serves as a comprehensive data repository, integrating statistics from the National Family Health Survey (NFHS), Sample Registration System (SRS), and various National Sample Surveys (NSS) to assist policymakers in monitoring child-centric indicators.

• The 2025 edition specifically evaluates India's progress toward achieving the United Nations Sustainable Development Goals (SDGs), particularly SDG 3 (Good Health and Well-being) and SDG 4 (Quality Education), as they relate to the younger population.

Additional Information

• Ministry of Women and Child Development (MWCD):

• It is the nodal ministry for formulating plans, policies, and programs for the development of women and children.

• Key initiatives include Mission Vatsalya for child protection and the POSHAN Abhiyaan to improve nutritional outcomes.

• Ministry of Health and Family Welfare (MoHFW):

• Responsible for healthcare delivery, including child immunization under Mission Indradhanush and monitoring the Infant Mortality Rate (IMR).

• It manages the National Rural Health Mission (NRHM) and the Janani Shishu Suraksha Karyakram.

• Ministry of Education:

• Focuses on improving the Gross Enrolment Ratio (GER) and learning outcomes through the Samagra Shiksha Abhiyan.

• It is the implementing body for the National Education Policy (NEP) 2020 and the PM POSHAN (Mid-Day Meal) scheme.

Q66. Answer: (c) Dharmasthiya and Kantakashodhana

The correct answer is Dharmasthiya and Kantakashodhana.

Key Points

• The Arthashastra, written by Kautilya (Chanakya), provides a detailed blueprint of the Mauryan administration, including a specialized two-tier judicial system.

• Dharmasthiya courts were essentially civil courts that adjudicated disputes related to Vyavahara (legal procedures), covering matters like marriage, inheritance, debt, deposits, and labor disputes among citizens.

• The Kantakashodhana courts, meaning removal of thorns, functioned as criminal and administrative courts to protect the state and society from anti-social elements and bureaucratic corruption.

• The Dharmasthiya courts were presided over by three Dharmasthas (experts in sacred law), while Kantakashodhana courts were managed by three Pradeshtris (commissioners) who dealt with crimes such as theft, murder, and treason.

• These courts were established at various administrative levels, including the Sangrahana, Dronamukha, Sthaniya, and Janapada Sandhi, ensuring justice was accessible throughout the Mauryan Empire.

Additional Information

• Sabha and Samiti:

• These were representative assemblies of the Vedic Period. The Sabha was an elite council of elders, while the Samiti was a broader assembly of the common people (Vis).

• Sangha and Gana:

• These terms refer to republican or oligarchic polities (Gana-Sanghas) that existed in ancient India, such as the Vrijji or Shakyas, where governance was shared among multiple chiefs.

• Mantriparishad:

• This was the Council of Ministers in the Mauryan state, which assisted the King in executive duties and policy implementation, as specified in Kautilya's administrative structure.

Therefore, the correct option is 3.

Q67. Answer: (a) 2017

The correct answer is 2017.

Key Points

• India officially became a full member of the Shanghai Cooperation Organisation (SCO) on 9 June 2017.

• The induction took place during the Astana Summit held in Kazakhstan, where both India and Pakistan were admitted as the seventh and eighth full members of the group.

• Before becoming a full member, India maintained an observer status within the organization for 12 years, starting from the 2005 Astana Summit.

• The SCO is a significant Eurasian political, economic, and security alliance, and India’s membership was aimed at enhancing its strategic reach in Central Asia and addressing regional security concerns like terrorism.

Additional Information

• Origins and Foundation:

• The SCO was founded on 15 June 2001 in Shanghai, China.

• The founding members included China, Russia, Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan.

• It evolved from the Shanghai Five mechanism, which was established in 1996 to resolve border disputes between China and its neighbors.

• Core Objectives and Organs:

• The organization focuses on the Three Evils: terrorism, separatism, and extremism.

• The Regional Anti-Terrorist Structure (RATS), based in Tashkent, is a permanent organ dedicated to security cooperation.

• The Heads of State Council (HSC) is the highest decision-making body that meets annually to discuss organizational priorities.

• Recent Expansions:

• Following the 2017 expansion, Iran became the ninth full member in July 2023 under India’s presidency.

• Belarus recently joined as the tenth full member during the 2024 Astana Summit.

Q68. Answer: (c) Rock Edict XIII

The correct answer is Rock Edict XIII.

Key Points

• Rock Edict XIII is considered the most significant and the longest of the fourteen Major Rock Edicts issued by Emperor Ashoka of the Maurya Dynasty.

• This edict provides a detailed account of the Kalinga War, which occurred in the 8th year of Ashoka's coronation, approximately in 261 BCE.

• It records the profound remorse (anutapa) and repentance felt by the Emperor after witnessing the massive scale of destruction, where 100,000 people were killed and 150,000 were deported.

• The inscription describes how the suffering of Brahmins, Shramanas, and householders moved Ashoka to abandon Sastra-vijaya (conquest by force) in favor of Dhamma-vijaya (conquest by righteousness).

• It is historically vital as it mentions five Greek (Yona) kings: Antiochus II of Syria, Ptolemy II of Egypt, Antigonus Gonatas of Macedonia, Magas of Cyrene, and Alexander of Epirus, confirming the international reach of Ashoka's Dhamma.

• The edict concludes with an appeal to his successors to forgo further military conquests and instead focus on the spread of moral conduct and piety.

Additional Information

• Other Major Edicts:

• Rock Edict I: Primarily focuses on the prohibition of animal sacrifices and festive gatherings; it mentions that the slaughter of animals in the royal kitchen was significantly reduced.

• Rock Edict VII: Emphasizes religious tolerance and harmony among all sects, stating that all religions desire self-control and purity of mind.

• Pillar Edict V: Also known as the Delhi-Topra Pillar Edict, it provides a comprehensive list of animals, birds, and fish that were granted protection from killing on specific days.

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Q69. Answer: (b) 1858

The correct answer is 1858.

Key Points

• Rani Lakshmi Bai, originally named Manikarnika Tambe, was the queen of the Maratha-ruled princely state of Jhansi.

• She became a legendary figure in Indian history for her pivotal role in the Indian Rebellion of 1857, resisting British colonial rule.

• The conflict between the Rani and the British intensified after the death of her husband, Maharaja Gangadhar Rao, when the British refused to recognize her adopted son, Damodar Rao, as the legitimate heir.

• Following the siege of Jhansi Fort by British forces in early 1858, she made a daring escape and joined forces with other rebel leaders, including Tatya Tope.

• The Rani and her troops successfully captured the Gwalior Fort from the Scindias, who were British allies, making it a major stronghold for the rebels.

• She was killed in battle on June 18, 1858, while fighting the British 8th Hussars at Kotah-ki-Serai near Gwalior.

• The British commander, Sir Hugh Rose, who led the campaign against her, remarkably praised her as the 'bravest and best military leader' of the rebellion.

Additional Information

• Doctrine of Lapse:

• An annexation policy devised by Lord Dalhousie, the Governor-General of India between 1848 and 1856.

• Under this policy, any princely state under the direct or indirect (paramount) control of the British East India Company where the ruler did not have a legal male heir would be annexed by the company.

• Sir Hugh Rose:

• The senior British Army officer who commanded the Central India Field Force.

• He was responsible for the suppression of the revolt in central India, including the capture of Jhansi and Gwalior.

• Gwalior Campaign:

• The final major phase of the 1857 Revolt in Central India where the Rani died, leading to the eventual restoration of British control over the region.

Q70. Answer: (a) To examine bills and policies in detail

The correct answer is To examine bills and policies in detail.

Key Points

• Parliamentary Committees are established because the Indian Parliament is a large body with a vast workload and limited time, making it impossible to discuss every Bill or Policy in exhaustive detail on the floor of the House.

• These committees function as 'mini-parliaments' where members from different political parties deliberate in a non-partisan environment to provide Legislative Oversight over the Executive.

• The primary purpose is to undertake a technical and detailed scrutiny of legislative proposals, budgetary allocations, and departmental expenditures to ensure efficiency and accountability.

• They derive their authority from Article 105 (privileges of members) and Article 118 (power of each House to make rules for regulating its procedure) of the Constitution of India.

• Committees have the power to summon Government Officials, experts, and stakeholders to gather evidence, which helps in refining Public Policy before it is finalized.

Additional Information

• Types of Committees:

• Standing Committees: These are permanent committees constituted annually. Examples include Financial Committees like the Public Accounts Committee, Estimates Committee, and Committee on Public Undertakings.

• Departmentally Related Standing Committees (DRSCs): There are 24 such committees (16 for Lok Sabha and 8 for Rajya Sabha) that examine the Demands for Grants of various ministries.

• Ad-hoc Committees: Temporary committees created for a specific task, such as a Select Committee or a Joint Parliamentary Committee (JPC), which dissolve after submitting their report.

• Election Supervision: This is the mandate of the Election Commission of India, an independent constitutional body established under Article 324, not a parliamentary committee.

• Ministerial Appointments: Ministers are appointed by the President of India on the advice of the Prime Minister under Article 75; committees play no role in executive appointments.

• Constitutional Amendments: The power to amend the Constitution lies with the Parliament (Lok Sabha and Rajya Sabha) through the process defined in Article 368, requiring specific majorities.

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Q71. Answer: (d) EZD

The logic follows here,

The pattern observed is: (Each letter positional value) + 1.

Following this pattern, the next term in the series AVZ, BWA, CXB, DYC is EZD.

Hence, the correct answer is "Option 4"

Q72. Answer: (c) Only conclusion (I) follows

The least possible Venn diagram for the given statements is:

(I) Some drums are apples - Follows (Some apples are basket all basket are drum. Hence, some drums are apples is true)

(II) No drum is an apple - Don't follow (Some drum is an apple. Hence, it is false.)

Therefore, only conclusion (I) follows.

Hence, the correct answer is "Option 3".

Q73. Answer: (b) 396

The logic follows here,

Logic: The numbers are increasing by consecutive multiples of 24.

• 156 + 24 = 180

• 180 + 48 = 228

• 228 + 72 = 300

• 300 + 96 = 396

• 396 + 120 = 516

Hence, the correct answer is "option 2"

Q74. Answer: (b) KGI

The logic follows here,

Logic: 1st letter − 4 = 2nd letter; 2nd letter + 3 = 3rd letter.

HDG,

KGI,

NJM

EAD,

Therefore, the letter-cluster that is different from the others is KGI.

Hence, the correct answer is 'Option 2'.

Q75. Answer: (d) PVD 64

Thee logic follows here,

The resulting cluster is PVD 64.

Hence, the correct answer is "option 4".

Q76. Answer: (d) Neither conclusion (I) nor (II) follows

The least possible Venn diagram for the given statements is:

(I) All tickets are eggs - Doesn't follows (Some ticket are king and their is no direct relation between egg and ticket. All tickets are egg is possible but not definite. Hence, it is false)

(II) Some eggs are tickets - Doesn't follows (Some ticket are eggs and their is no direct relation between egg and ticket. Hence, it is false)

Neither conclusion (I) nor (II) follows

Hence, the correct answer is "Option 4".

Q77. Answer: (c) HMK : LOH

The logic followed in this pattern is based on alphabetical shifts of the positional values of the letters.

For 'TNM' related to 'XPJ':

T(20)	N(14)	M(13)
+4 ↓	+2 ↓	−3 ↓
X(24)	P(16)	J(10)

For 'URL' related to 'YTI':

U(21)	R(18)	L(12)
+4 ↓	+2 ↓	−3 ↓
Y(25)	T(20)	I(9)

Applying the same logic to the pair 'HMK : LOH':

H(8)	M(13)	K(11)
+4 ↓	+2 ↓	−3 ↓
L(12)	O(15)	H(8)

Thus, the pair HMK : LOH follows the same pattern as given in the question.

Hence, the correct answer is 'Option 3'.

Q78. Answer: (c) 11

Given: 7 5 3 1 5 9 6 2 4 1 5 8 9 6 5 2 1 4 2 5 8 7 6 3 2 5 9 8 5 4 1 5 9 6 2 3 6 5 4 8 7 5 9 8 7 4 1 5 9 7 5 2 6

Required Conditions: Odd digit - Even digit - Odd digit.

(Left) 7 5 3 1 5 9 6 2 4 1 5 8 9 6 5 2 1 4 2 5 8 7 6 3 2 5 9 8 5 4 1 5 9 6 2 3 6 5 4 8 7 5 9 8 7 4 1 5 9 7 5 2 6 (Right)

The total number of such even digits is: 11.

So, the final count of even digits satisfying the given condition is:11.

Hence, the correct answer is 'Option 3'.

Q79. Answer: (b) YPW 52

The logic follows here is.

Combining all the elements, the next cluster in the series is YPW 52.

Hence, the correct answer is "Option 2"

Q80. Answer: (c) 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. G sits to the immediate right of L.
2. Only three people sit between O and M when counted from the left of O.
3. Only three people sit between L and Q when counted from the right of Q.
4. F is an immediate neighbor of Q as well as M.

The Final Arrangement is,

There are two people (L and G) sitting between them.

Hence, the correct answer is 'Two'.

Q81. Answer: (b) Five

Given:Seven boxes, G, H, I, J, Q, R and S, are kept one over the other, but not necessarily in the same order.

1. Only Q is kept above S.
2. Only four boxes are kept between S and H.

Position	Box
7	Q
6	S
5	
4	
3	
2	
1	H

1. Only two boxes are kept between J and R.

2. G is kept immediately above I.

3. R is not kept immediately above G.

Final Arrangement:

7	Q
6	S
5	J
4	G
3	I
2	R
1	H

Thus, there are five boxes kept above R.

Hence, the correct answer is "Option 2"

Q82. Answer: (c) SQ-XV

The logic follows here,

Logic: First letter of the 2nd cluster = First letter of the 1st cluster + 5; Second letter of the 2nd cluster = Second letter of the 1st cluster + 4.

For OM-TQ,

For QO-VS,

For SQ-XV,

For MK-RO,

Therefore, the letter-cluster pair that is different from the others is SQ-XV.

Hence, the correct answer is 'Option 3'.

Q83. Answer: (a) 24

BODMAS

Sign Interchange Table:

Original Sign	New Sign
•	–
–	•
× (times)	÷ (div)
÷ (div)	× (times)

Equation after interchanging signs and applying BODMAS rule

= 28 + 13 − 17 × 43 ÷ 43

= 28 + 13 − 17 × 1

= 28 + 13 − 17

= 41 − 17

= 24

Hence, the correct answer is "option 1"

Q84. Answer: (c) 6

Given number: 621453

According to the question,if 2 is added to each odd digit and 2 is subtracted from each even digit in the number,

• The new number thus formed is: 403275

• Now, identify the even digits in this new number: 4, 0, and 2.

• So, the sum of all even digits is: 4 + 0 + 2 = 6.

Hence, the correct answer is 'Option 3'.

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Q85. Answer: (c) Zero

The logic follows here,

Given: MELODIA

According to information,

M	E	L	O	D	I	A
−1	+1	−1	+1	−1	+1	+1
L	F	K	P	C	J	B

• The new group of letters formed is: L, F, K, P, C, J, B

• There are no letters that appear exactly twice in the new group.

• Therefore, the number of letters appearing exactly twice is Zero.

Hence, the correct answer is "Option 3"

Q86. Answer: (b) FHE

The logic follows here,

Logic: Second letter = First letter + 2; Third letter = Second letter − 4.

For OQM,

For FHE,

For KMI,

For TVR,

Therefore, the letter cluster that is different from the others is FHE.

Hence, the correct answer is 'Option 2'.

Q87. Answer: (a) 4

The logic follows here,

By comparing the words and their codes, we can determine the code for individual letters.

Thus, the code for A is 4.

Hence, the correct answer is "option 1"

Q88. Answer: (c) (25, 9, 227)

The logic followed here is:

Logic: (First Number × Second Number) + 2 = Third Number

For the first set (24, 11, 266)

=> (24 × 11) + 2

=> 264 + 2 = 266.

For the second set (26, 13, 340)

=> (26 × 13) + 2

=> 338 + 2 = 340.

Applying the same logic to the third set

(25, 9, 227)

=> (25 × 9) + 2

=> 225 + 2 = 227.

Hence, the correct answer is 'Option 3'.

Q89. Answer: (b) U

Given: Six boxes, Q, R, S, T, U and W, are kept one over the other, but not necessarily in the same order.

1. Only S is kept above W.

2. No box is kept below R.

3. Only one box is kept between U and R.

Position	Box
6	S
5	W

4	
3	U
2	
1	R

1. T is kept at some place below Q.

Final Arrangement:

6	**S**
5	W
4	Q
3	U
2	T
1	R

Thus, the box kept immediately above T is U.

Hence, the correct answer is 'Option 2'.

Q90. Answer: (b) 6

The logic follows here,

The logic followed here is the comparison of common letters and their corresponding digits in the given words.

Therefore, the code for the letter M must be 6.

Hence, the correct answer is "Option 2"

Q91. Answer: (c) Father's mother's brother

Family Chart:

Symbol	**−**	**•**	**×**	**÷**
Meaning	Father	Mother	Brother	Sister

Given : M × N ÷ O + P − Q × R

The family tree diagram is,

Therefore, M is the Father's mother's brother of R.

Hence, the correct answer is 'Option 3'.

Q92. Answer: (b) One

Given: G L Y N J Z U Q M F D E U S A B Y D V X P

Required Conditions: Vowel - Consonant - Vowel

Left G L Y N J Z U Q M F D E U S A B Y D V X P Right

The only segment that follows the vowel → consonant → vowel pattern is U S A.

There is only one such consonant (S) in the series.

Hence, the correct answer is "Option2".

Q93. Answer: (b) FEC−EDB

The logic follows here,

Logic: Each letter in the first term of the pair is shifted one position backward (positional value − 1) in the English alphabetical series to obtain the corresponding letter in the second term.

For MLJ : LKI

For XWU : WVT

Applying same logic FEC : EDB,

Hence, the correct answer is "Option 2"

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Q94. Answer: (b) 1 km to the east

Given:

1. Riya starts from Point A and drives 4 km towards the south. She then takes a left turn, drives 8 km, turns left and drives 6 km.
2. She then takes a left turn and drives 9 km.
3. She takes a final left turn, drives 2 km and stops at Point P.

The Final Diagram is,

Drive 1 km to the east in order to reach Point A again

Hence, the correct answer is "option 2"

Q95. Answer: (d) 1

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. Only three boxes are kept above C.
2. Only one box is kept between F and C.
3. Only three boxes are kept between F and E.
4. E is kept at some place above C.
5. G is kept immediately below E.

Position	Box
7	
6	E
5	G
4	C
3	
2	F
1	

1. A is not kept immediately above or below F.
2. B is kept at one of the places above D.

Final Arrangement:

Position	Box
7	A
6	E
5	G
4	C
3	B
2	F
1	D

Thus, the number of boxes kept between B and G is 1.

Hence, the correct answer is 'Option 4'.

Q96. Answer: (b) Brother's wife's brother

Family Chart:

Symbol	•	−	×	÷
Meaning	Son	Brother	Wife	Father

Given: S − D × F + H ÷ K

Therefore, S is the brother of D, who is the wife of F (the brother of K - S is the Brother's wife's brother of K.

Hence, the correct answer is "Option 2".

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Q97. Answer: (a) Three

Given: Seven people, T, E, A, R, I, N and G, are sitting in a row, facing north

1. Only three people sit to the left of R.
2. Only G sits to the right of E.
3. Only three people sit between E and A.
4. I sits at some place to the left of T but at some place to the right of N

Final Seating Arrangement:

• The people sitting between N (position 1) and T (position 5) are A, I, and R.

• Number of people sitting between them is three.

Hence, the correct answer is "option 1"

Q98. Answer: (a) TVYS

The logic followed in this pattern is a consistent alphabetical shift where each letter is moved forward by 7 positions in the English alphabetical order.

For 'GILF' related to 'NPSM':

G(7)	**I(9)**	**L(12)**	**F(6)**
+7 ↓	+7 ↓	+7 ↓	+7 ↓
N(14)	P(16)	S(19)	M(13)

For 'JLOI' related to 'QSVP':

J(10)	**L(12)**	**O(15)**	**I(9)**
+7 ↓	+7 ↓	+7 ↓	+7 ↓
Q(17)	S(19)	V(22)	P(16)

Applying the same logic to 'MORL':

M(13)	**O(15)**	**R(18)**	**L(12)**
+7 ↓	+7 ↓	+7 ↓	+7 ↓
T(20)	V(22)	Y(25)	S(19)

Thus, MORL is related to TVYS.

Hence, the correct answer is 'Option 1'.

Q99. Answer: (c) 181

The logic follows here,

• 11 + 18 = 29

• 29 + 22 = 51

• 51 + 30 = 81

• 81 + 42 = 123

• 123 + 58 = 181

Thus, the missing term in the series is 181.

Hence, the correct answer is 'Option 3';

Q100. Answer: (d) 18

The logic follows here,

Symbol Meaning:

P	**Q**	**R**	**D**
÷	×	•	–

Given Equation: 24 D 32 P 8 R 26 Q 2 D 54 = ?

Replacing the letters with signs and applying BODMAS rule,

= 24 − 32 ÷ 8 + 26 × 2 − 54

= 24 − 4 + 26 × 2 − 54

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= 24 − 4 + 52 − 54
= 24 + 52 − 54 − 4
= 76 - 58
= 18
Hence, the correct answer is "Option 4"

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