RRB NTPC (UG) CBT-I Official Paper (Held On 15 Jun, 2026 Shift 2) (Previous Year Paper)

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

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MATHEMATICS

Q1. Find the value of √((169)² ×(2.56)² ×(0.25)²)/((13)^4 ×(1.6)^4 ×(0.5)²)

(a) 0.5
(b) 1.05
(c) 1.5
(d) 0.05

Q2. If 40% of a number exceeds 25% of it by 42, then the number is:

(a) 280
(b) 320
(c) 260
(d) 300

Q3. The largest four-digit number which when divided by 11, 7 and 14 leaves the remainder 2 in each case, is:

(a) 9972
(b) 9901
(c) 9435
(d) 9858

Q4. A recipe requires 0.75 cups of sugar and 1 1/4 cups of flour. What is the total amount (in cups) of ingredients used, expressed as a decimal?

(a) 2.05
(b) 2.5
(c) 1.95
(d) 2.0

Q5. Ramu is 8 years older than Keeran. Seven years ago, Ramu's age was three times Keeran's age. Find the present age of Ramu.

(a) 25 years
(b) 23 years
(c) 19 years
(d) 16 years

Q6. A and B invest Rs. 12,000 and Rs. 8,000, respectively, in a business. If the total profit is Rs. 10,000, what is A’s share of profit?

(a) Rs. 6,000
(b) Rs. 4,000
(c) Rs. 7,000
(d) Rs. 5,000

Q7. Evaluate $23^3 + (-19)^3 + (-4)^3$

(a) 5089
(b) 5244
(c) 4958
(d) 4998

Q8. A and B can do a piece of work in 12 days and 30 days, respectively. Both work for 4 days and then A leaves. How long (in days) will B take to complete the remaining work?

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

Q9. The simplified value of the expression 0.5 × 0.125 ÷ 8^(-2) is ____.

(a) 2
(b) 1
(c) 4
(d) 8

Q10. A trader marks his goods such that even after allowing a discount of 25%, he makes a profit of 10%. If he gives only 10% discount, then find the profit percentage.

(a) 35%
(b) 28%
(c) 32%
(d) 30%

Q11. A company has two departments, 'A' and 'B', with employees in the ratio 5:7, respectively. If 28 employees are transferred from department 'B' to 'A', the ratio becomes 1:1. How many employees does each department have originally?

(a) 140 in A, 84 in B
(b) 150 in A, 84 in B
(c) 140 in A, 96 in B
(d) 140 in A, 196 in B

Q12. Which formula correctly calculates simple interest when the principal, rate, and time are known?

(a) Simple Interest = Principal × Rate / Time
(b) Simple Interest = (Principal × Rate × Time) / 100
(c) Simple Interest = Principal × Time / Rate
(d) Simple Interest = Principal + Rate + Time

Q13. A retailer has fixed the price of an article at 20% above the cost price. If he offers a discount of Rs. 2 for a purchase of Rs. 30, what is his gain or loss percentage?

(a) 16% gain
(b) 12% gain
(c) 11% loss
(d) 14% gain

Q14. Find the smallest number which when divided by 9, 12 and 15 leaves a remainder 3 in each case.

(a) 123
(b) 183
(c) 723
(d) 363

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Q15. What is the mode of the following data?

43, 40, 41, 53, 50, 41, 44, 45, 43, 46, 48, 46, 51, 55, 52, 42, 46, 45

(a) 46
(b) 43
(c) 41
(d) 40

Q16. The cost of five tables and seven chairs is Rs. 7040. If a table costs Rs. 400 more than a chair, find the cost of a table.

(a) Rs. 420
(b) Rs. 820
(c) Rs. 700
(d) Rs. 800

Q17. The median of the given distribution is 28.5. Find the missing frequency x.

Class	0-10	10-20	20-30	30-40	40-50	50-60
Frequency	5	x	20	15	7	5

(a) 10
(b) 8
(c) 3
(d) 5

Q18. Venu invested a certain sum of money at 10% per annum. After 2 years, he received Rs. 136.50 as compound interest, compounded annually. Find the corresponding simple interest (in Rs.) for 2 years at the same rate.

(a) 115
(b) 130
(c) 120
(d) 125

Q19. The marked price of a cooker is the same at four shops I, II, III and IV. Shop I allows two successive discounts of 87% and 37%, shop II allows successive discounts of 81% and 37%, shop III allows successive discounts of 57% and 54% and shop IV allows successive discounts of 91%, 25%, and 59% on the marked price of the cooker. Which shop is selling the cooker at the lowest price?

(a) III
(b) IV
(c) II
(d) I

Q20. If 4^x - 4^(x-1) = 48, then the value of (2x-1)/(2x+3) is:

(a) 5/8
(b) 5/9
(c) 5/11
(d) 5/4

Q21. The difference between the measure of an interior angle and an exterior angle of a regular polygon is 100°. What is the number of sides of the polygon?

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

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Q22. An article is sold at a profit of 21%. If the cost price is increased by Rs. 50 and the selling price is reduced by Rs. 69, then the profit would be 13.6%. What is the original cost price (in Rs.) of the article?

(a) 2,000
(b) 1,700
(c) 1,500
(d) 1,400

Q23. What smallest positive number should be subtracted from 3 and 5 so that 8 is the third proportional to them?

(a) 2
(b) -2
(c) -1
(d) 1

Q24. Eduardo, Abraham and Xavier can finish a certain piece of work in 6, 34 and 36 days, respectively. All three of them started the work together. Eduardo left the work after 2 days and Abraham left just 3 days before the work was completed. Find the total number of days taken for the work to be completed.

(a) 13.2
(b) 14.6
(c) 15.2
(d) 11.7

Q25. Patna Express leaves Delhi at 10:00 AM and reaches Patna at 7:00 PM the same day. Delhi Express leaves Patna at 2:00 PM and reaches Delhi at 1:00 AM on the next day. Both trains travel on the same route in opposite directions. At what time do they meet?

(a) 04:30PM
(b) 04:15PM
(c) 04:45PM
(d) 03:45PM

Q26. A man walks 6 km at a speed of 6 km/h and then runs 18 km at a speed of 9 km/h. What is his average speed (in km/h) for the entire distance?

(a) 9
(b) 7
(c) 8
(d) 10

Q27. A spherical tank has a diameter of 28 cm. What is the total surface area of the tank? (Use $\pi = 22/7$)

(a) 2458 cm^2
(b) 2464 cm^2
(c) 2456 cm^2
(d) 2460 cm^2

Q28. Given that $\tan\theta = 2$ and θ is in the first quadrant, what is the value of $\sec\theta$?

(a) $\sqrt{2}$
(b) $\sqrt{3}$
(c) $\sqrt{5}$
(d) 2

Q29. By selling lemons at 5 for a rupee, a man loses 34%. To gain 10% how many must he sell for a rupee?

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

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Q30. A water pipe is in the shape of a hollow cylinder with an outer radius of 10 cm and an inner radius of 8 cm. If the length of the pipe is 2 m, what is the total surface area (including both ends and the inner and outer curved surfaces) of the pipe in square centimeters? (Use π = 22/7)

(a) 22854.85
(b) 22650.50
(c) 22940.25
(d) 22780.75

GENERAL AWARENESS

Q31. Which among the following measures was introduced by Muhammad bin Tughlaq to address the shortage of silver?

(a) Garrison towns
(b) Land revenue reforms
(c) Prohibition of wine
(d) Token currency

Q32. The Constitution (88^(th)) Amendment Act, 2003, is related to which tax?

(a) Property Tax
(b) Service Tax
(c) Goods and Services Tax
(d) Wealth Tax

Q33. Seleucus sent his ambassador Megasthenes to the court of which Mauryan ruler at Pataliputra?

(a) Bindusara
(b) Brihadratha
(c) Ashoka
(d) Chandragupta Maurya

Q34. What was the theme of the 10th National Consultation conducted on 11-12 October 2025?

(a) Protecting Child Labourers
(b) Education for All
(c) Safeguarding the Girl Child
(d) Digital Future for Children

Q35. The dominant sights at Lothal are the _____, which have helped make this place so important to international archaeology.

(a) Great Baths
(b) Citadels
(c) Granaries
(d) Dockyards

Q36. When was national Agriculture policy launched in India?

(a) 2005
(b) 2007
(c) 2000
(d) 2002

Q37. Which historical policy skewed China’s gender ratio at birth?

(a) Universal Healthcare Act
(b) Gender Equity Law
(c) One-Child Policy
(d) Rural Migration Ban

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Q38. Which Article of the Constitution of India grants the “Right to Constitutional Remedies,” empowering individuals to move the Supreme Court for enforcement of Fundamental Rights?

(a) Article 226
(b) Article 21
(c) Article 19
(d) Article 32

Q39. Which of the following Articles of the Indian Constitution provides free legal aid to the poor and weaker sections of the society?

(a) Article 29
(b) Article 51 A
(c) Article 39 A
(d) Article 78

Q40. Ustad Bismillah Khan was most closely associated with which musical instrument?

(a) Tabla
(b) Sarod
(c) Shehnai
(d) Sitar

Q41. Which region in India is best known for slash-and-burn agriculture (jhum)?

(a) North-Eastern Hills
(b) Deccan Plateau
(c) Indo-Gangetic Plain
(d) Western Ghats

Q42. Which of the following states has high population density due to early human settlement and development?

(a) Rajasthan
(b) Uttar Pradesh
(c) Meghalaya
(d) Sikkim

Q43. In October 2025, India and Spain signed a Memorandum of Understanding (MoU) to develop a world-class convention center in which Indian state?

(a) Gujarat
(b) Maharashtra
(c) Tamil Nadu
(d) Madhya Pradesh

Q44. Which part of the small intestine in the human digestive system receives bile from the gall bladder and pancreatic juice from the pancreas through a common bile duct?

(a) Colon
(b) Jejunum
(c) Ileum
(d) Duodenum

Q45. The Wahabi Movement primarily originated in which region of India?

(a) Bihar
(b) Delhi
(c) Punjab
(d) Bengal

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Q46. Which of the following cricket players was awarded the Sir Garfield Sobers Award for ICC Men's Cricketer of the Year 2024?

(a) Mitchell Starc
(b) Joe Root
(c) Jasprit Bumrah
(d) Travis Head

Q47. In a laboratory, copper sulphate solution reacts with iron filings, causing a colour change and the deposition of a new metal. Which statement correctly explains the reason for this reaction?

(a) Copper is more reactive than iron
(b) Iron and copper sulphate have similar reactivity
(c) Iron and copper belong to the same group
(d) Iron is more reactive than copper

Q48. During which edition of the BIMSTEC Summit was the "Bangkok Vision 2030" approved?

(a) Eighth
(b) Third
(c) Sixth
(d) Fifth

Q49. Which Constitutional Article was primarily referenced by the Supreme Court in the declaration of maternity leave being a constitutional right even for a third child, in May 2025?

(a) Article 19
(b) Article 21
(c) Article 27
(d) Article 14

Q50. Which report, released in 2025, gives a perception-based safety score of urban women across 31 Indian cities?

(a) NARI 2025 Index
(b) Urban Women Index 2025
(c) Women Safety Report 2025
(d) Safe City Report 2025

Q51. Which mountain range in India is one of the oldest fold mountains in the world?

(a) Himalayas
(b) Aravalli Range
(c) Karakoram Range
(d) Eastern Ghats

Q52. When you choose 'Shut down' in Windows, what happens?

(a) The PC enters a low-power state but keeps apps in memory
(b) All apps and data are closed and the PC powers off completely
(c) The PC goes into stand-by mode
(d) The PC saves the session to the disk and then powers off

Q53. The Munda languages of India belong to which language family?

(a) Austroasiatic
(b) Indo-Aryan
(c) Dravidian
(d) Sino-Tibetan

Q54. Who among the following presided over the first session of the Indian National Congress held in 1885?

(a) Womesh Chandra Bonnerjee
(b) Allan Octavian Hume
(c) Dinshaw Wacha

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(d) Dadabhai Naoroji

Q55. Which of the following was officially named the Host City for the 2030 Centenary edition, following approval at the 2025 Commonwealth Sport General Assembly in Glasgow (UK)?

(a) Ahmedabad
(b) New Delhi
(c) Pune
(d) Bhopal

Q56. Which of the following statements is NOT correct regarding the Indian Desert (Thar Desert)?

(a) To the northwest of the Aravali hills lies the Great Indian desert
(b) This region receives low rainfall below 15 mm per year
(c) During the Mesozoic era, this region is believed to have been under the sea.
(d) It has an arid climate with low vegetation cover

Q57. The process of growth and healing in the body is supported by which food component?

(a) Vitamins
(b) Minerals
(c) Fats
(d) Proteins

Q58. The speed at which a Central Processing Unit (CPU) executes instructions is primarily determined by its clock rate, which is typically measured in gigahertz (GHz). If a CPU has a clock rate of 3.5 GHz, approximately how many clock cycles occur every second?

(a) 350 cycles per second
(b) 3.5 million cycles per second
(c) 3.5 thousand cycles per second
(d) 3.5 billion cycles per second

Q59. Women's Reservation (The Constitution One Hundred Twenty-Eighth Amendment) Bill 2023 passed by the Parliament provides one-third reservation of all seats for women in Lok Sabha, state legislative assemblies and the Legislative Assembly of the National Capital Territory of Delhi for an initial period of how many years?

(a) 5 Years
(b) 20 Years
(c) 10 Years
(d) 15 Years

Q60. The discovery of the atomic nucleus by bombarding a thin gold foil with alpha particles is associated with which of the following scientists?

(a) Dmitri Mendeleev
(b) John Dalton
(c) Robert Boyle
(d) Ernest Rutherford

Q61. The asthenosphere plays an important role in plate movements because:

(a) It forms the Earth’s magnetic field
(b) It is made of water bodies
(c) It is partially molten and allows plates to move
(d) It is perfectly solid and rigid

Q62. Rashtriya Avishkar Abhiyan, introduced in 2015, focuses on encouraging school students to develop interest in:

(a) Arts and cultural activities
(b) Sports and physical education
(c) Science and mathematics learning
(d) Environmental awareness programmes

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Q63. The Fiscal Responsibility and Budget Management (FRBM) Act was enacted in which year in India?

(a) 2003
(b) 2004
(c) 2001
(d) 2005

Q64. India's Aeronautical Development Agency (ADA) successfully conducted the test launch of the Astra Beyond Visual Range Air-to-Air Missile (BVRAAM) from the LCA Tejas AF MK1 prototype in _____.

(a) Gujarat
(b) Kerala
(c) Odisha
(d) Andhra Pradesh

Q65. The Central Administrative Tribunal (CAT) was established under which law?

(a) Administrative Reforms Act, 1980
(b) Central Services Act, 1985
(c) Administrative Tribunals Act, 1985
(d) Public Service Commission Act, 1986

Q66. Which of the following major battles did Maulvi Ahmadullah Shah participate in during the revolt of 1857?

(a) Battle of Jhansi
(b) Battle of Kanpur
(c) Battle of Plassey
(d) Battle of Chinhat

Q67. How many control characters are included in the original 7-bit ASCII standard?

(a) 33
(b) 16
(c) 32
(d) 64

Q68. In standard Windows Sleep mode on a laptop, where is the current session primarily stored while the machine is idle?

(a) On the system drive only
(b) In the CPU cache only
(c) In RAM, which remains powered with a small amount of electricity
(d) Permanently in the BIOS chip

Q69. Which state, as of December 2025, holds the highest number of UNESCO World Heritage Sites in India with a total of five?

(a) Uttar Pradesh
(b) Maharashtra
(c) Karnataka
(d) Rajasthan

Q70. The President of India’s “pocket veto” refers to:

(a) returning a bill for reconsideration
(b) keeping a bill pending indefinitely
(c) refusing to sign the budget
(d) vetoing a law secretly

GENERAL INTELLIGENCE AND REASONING

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Q71. In a certain code language, ‘MOPS’ is coded as ‘5863’ and ‘POEM’ is coded as ‘8765’.

What is the code for ‘E’ in the given code language?

(a) 6
(b) 7
(c) 8
(d) 5

Q72. Seven boxes, A, B, C, D, E, F and G, are kept one over the other but not necessarily in the same order. Only two boxes are kept above F. Only three boxes are kept below C. B is kept above G but below D. E is kept immediately above F but below A.

How many boxes are kept between A and C?

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

Q73. In a certain code language, ‘FAME’ is coded as ‘8341’ and ‘FEAL’ is coded as ‘6438’.

What is the code for ‘L’ in the given code language?

(a) 6
(b) 4
(c) 3
(d) 8

Q74. 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) AI - ZF
(b) TL - SI
(c) GY - FV
(d) QC - PY

Q75. What should come in place of ‘?’ in the given series?

70 80 ? 106 122 140

(a) 92
(b) 100
(c) 94
(d) 96

Q76. Sitara starts from Point A and drives 23 km towards the west. He then takes a left turn, drives 24 km, turns left and drives 33 km. He then takes a left turn and drives 34 km. He takes a final left turn, drives 10 km and stops at Point P. How far (shortest distance) and towards which direction should he drive in order to reach Point A again? (All turns are 90-degree turns only unless specified.)

(a) 8 km to the south
(b) 9 km to the north
(c) 11 km to the east
(d) 10 km to the south

Q77. What should come in place of the question mark (?) in the given series based on the English alphabetical order?

FOL ZIF TCZ NWT ?

(a) HNJ
(b) HON
(c) HNY
(d) HQN

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Q78. DVUK is related to GZZQ in a certain way based on the English alphabetical order. In the same way, PLOI is related to SPTO. To which of the following options is YXDA related, following the same logic?

(a) BBIG
(b) BGIB
(c) BGIG
(d) GBBI

Q79. What should come in place of the question mark (?) in the given series based on the English alphabetical order?

CIF IOL OUR UAX ?

(a) FYH
(b) MFY
(c) AGD
(d) STH

Q80. 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 cameras are pictures.

Some pictures are monkeys.

Conclusions:

(I) Some cameras are monkeys.

(II) All monkeys are pictures.

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

Q81. In a certain code language,

A ÷ B means ‘A is the son of B’,

A # B means ‘A is the wife of B’,

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

A & B means ‘A is the father of B’.

How is S related to H if ‘S ÷ D & R # Y + H’?

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

Q82. What should come in place of '?' in the given series based on the English alphabetical order?

MAI PEN SIS VMX ?

(a) ZRC
(b) YQC
(c) APD
(d) ZRD

Q83. If + means -, - means ×, × means ÷, and ÷ means +, then what will come in place of the question mark (?) in the following equation?

38 - 25 ÷ 133 + 703 × 19 = ?

(a) 1052
(b) 1156
(c) 1046
(d) 1191

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Q84. The position(s) of how many letters will remain unchanged if each letter in the word COMBINE is arranged in the English alphabetical order?

(a) 2
(b) 0
(c) 1
(d) 3

Q85. What should come in place of '?' in the given series?

486 441 401 366 336 ?

(a) 311
(b) 312
(c) 313
(d) 310

Q86. All 195 people are standing in a row facing north. Rt is 143rd from the left end while Kl is 36th from the right end. How many people are there between Rt and Kl?

(a) 12
(b) 13
(c) 16
(d) 14

Q87. Each vowel in the word 'VOLUNTARY' is changed to the second letter immediately following it in the English alphabetical order and each consonant is changed to the letter immediately preceding it in the English alphabetical order. Which letter will appear exactly twice in the group of letters thus formed?

(a) Q
(b) W
(c) K
(d) M

Q88. 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 kings are buttons. No pants are kings.

Conclusion (I): All buttons are kings.

Conclusion (II): Some buttons are not pants.

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

Q89. Seven boxes L, M, N, O, P, Q and R are kept one over the other but not necessarily in the same order. Only one box is kept between R and O. R is kept on one of the positions above O. Box N is kept immediately below L. Q is placed at the topmost position. Exactly three boxes are kept between P and M. P is kept on one of the positions above M. Box M is kept immediately above O. Which box is kept fourth from the top?

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

Q90. A, B, C, D, S, T and U are sitting around a circular table, facing the centre of the table. Only three people sit between B and C, when counted from the left of B. Only three people sit between U and T, when counted from the right of T. D sits to the immediate right of U. A is an immediate neighbor of T as well as C. Who sits second to the left of S?

(a) U
(b) A
(c) C

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(d) T

Q91. Based on the 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) OLM
(b) CYA
(c) EAC
(d) AWY

Q92. KG 13 is related to IC −2 in a certain way. In the same way, NH 20 is related to LD 5.

To which of the following is NW 24 related, following the same logic?

(a) MS 11
(b) MR 11
(c) LS 9
(d) LR 9

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

QMO−KGI

RNP−LHJ

(a) KGI−DAB
(b) KFG−EAC
(c) KFG−DZB
(d) KGI−EAC

Q94. Refer to the given letter series and answer the question that follows.

(Left) P W I C T G T X W J N L X T D X E S C S Z (Right)

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

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

Q95. Seven people, U, T, E, N, S, I and L, are sitting in a row, facing the north.

Only E sits to the left of N. Only four people sit between E and T. Only U sits between I and L and I is not an immediate neighbor of T.

Who sits at the extreme right of the line?

(a) S
(b) N
(c) L
(d) U

Q96. 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 letter-cluster pair 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) MN - CY
(b) OP - EA
(c) UV - KG
(d) JK - WV

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Q97. 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.)

(2, 11, 31)

(13, 10, 41)

(a) (8, 22, 45)
(b) (10, 20, 50)
(c) (29, 19, 56)
(d) (6, 1, 25)

Q98. If + means −, − means ×, × means ÷, and ÷ means +,

then what will come in place of the question mark (?) in the following equation?

9 − 4 + 45 × 5 ÷ 3 = ?

(a) 20
(b) 35
(c) 25
(d) 30

Q99. In a certain code language,

A × B means ‘A is the mother of B’,

A – B means ‘A is the brother of B’,

A + B means ‘A is the wife of B’ and

A * B means ‘A is the father of B’.

How is H related to J if ‘H – I + O * D × J’?

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

Q100. What will come in place of the question mark (?) in the following equation, if ‘+’ and ‘÷' are interchanged and ‘–’ and ‘×’ are interchanged?

14 − 2 × 48 + 3 ÷ 7 = ?

(a) 23
(b) 19
(c) 14
(d) 7

ANSWER KEY

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

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SOLUTIONS

Q1. Answer: (a) 0.5

Given:

√(169² × 2.56² × 0.25²)/(13^4 × 1.6^4 × 0.5²) = ?

Formula used:

Perfect Squares: 169 = 13², 2.56 = 1.6², and 0.25 = 0.5²

Laws of Indices: (a^m)ⁿ = a^(mn) and a^m ÷ aⁿ = a^(m−n)

Calculations:

Substitute the perfect square values into the expression:

=> √((13²)² × (1.6²)² × (0.5²)²)/(13^4 × 1.6^4 × 0.5²)

=> √(13^4 × 1.6^4 × 0.5^4)/(13^4 × 1.6^4 × 0.5²)

Cancel common terms 13^4 and 1.6^4 from the numerator and denominator:

=> √0.5^((4 − 2))

=> √0.5²

=> 0.5

Therefore The correct answer is option (1).

Q2. Answer: (a) 280

Shortcut Trick

Difference in percentage = 40% − 25% = 15%

Given that 15% of the number corresponds to 42.

Therefore, 1% of the number = 42 ÷ 15 = 2.8

The total number (100%) = 2.8 × 100 = 280.

Therefore The correct answer is 280.

Alternate Method

Given: Let the number be x. The value of 40% of x is 42 more than 25% of x.

Formula Used: Percentage Value = (Percentage ÷ 100) × Number

=> (40 ÷ 100) × x − (25 ÷ 100) × x = 42

=> 0.40x − 0.25x = 42

=> 0.15x = 42

=> x = 42 ÷ 0.15

=> x = (42 × 100) ÷ 15

=> x = 280

Therefore The correct answer is 280.

Additional Information

Basic Percentage Formula

To find p% of a number (N), use the relation: Value = (p × N) ÷ 100.

Percentage Difference Principle

When comparing two percentages of the same base, the difference in their percentage values is directly proportional to the difference in their absolute values.

Fraction Equivalents

Using fractions can speed up calculations: 25% = 1/4, 40% = 2/5, 50% = 1/2, and 75% = 3/4.

Q3. Answer: (d) 9858

Shortcut Trick

The required number must be of the form: LCM(11, 7, 14) × k + 2.

LCM of 11, 7, and 14 = 154.

Largest 4-digit multiple of 154: 154 × 64 = 9856.

Required number = 9856 + 2 = 9858.

Therefore The correct answer is 9858.

Alternate Method

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Given: Divisors = 11, 7, 14; Remainder = 2 in each case; Target = Largest 4-digit number.

Step 1: Calculate the LCM of the given divisors.

=> Prime factorization: $11 = 11^1$, $7 = 7^1$, $14 = 2 \times 7$ => LCM(11, 7, 14) = $11 \times 2 \times 7 = 154$

Step 2: Find the largest 4-digit multiple of 154.

=> Largest 4-digit number = 9999 => $9999 \div 154$ → Quotient = 64, Remainder = 143 => Largest multiple = $9999 - 143 = 9856$

Step 3: Add the common remainder to the multiple.

=> Required number = 9856 + 2 = 9858

Therefore The correct answer is 9858.

Additional Information

General Remainder Theorem

For a number that leaves the same remainder 'r' when divided by a, b, and c, the general form is LCM(a, b, c) × k + r.

Divisibility Rule of 7

Double the last digit and subtract it from the remaining number; if the result is divisible by 7, the original number is also divisible by 7.

Divisibility Rule of 11

A number is divisible by 11 if the difference between the sum of digits at odd places and the sum of digits at even places is 0 or a multiple of 11.

Q4. Answer: (d) 2.0

Given:

Amount of sugar = 0.75 cups

Amount of flour = 1 1/4 cups

Formula used:

Total amount = Amount of sugar + Amount of flour

Calculations:

First, convert the mixed fraction representing the amount of flour into a decimal:

1 1/4 = 1 + (1 ÷ 4)

=> 1 + 0.25 = 1.25 cups

Now, add the quantity of sugar and flour to find the total ingredients used in the recipe:

Total = 0.75 + 1.25

=> Total = 2.0 cups

Therefore The correct answer is option (4).

Q5. Answer: (c) 19 years

Shortcut Trick

The age difference between two people remains constant over time (8 years).

7 years ago, the ratio of Ramu's age to Keeran's age was 3 : 1.

Difference in ratio units = 3 − 1 = 2 units → 8 years.

1 ratio unit = 8 ÷ 2 = 4 years.

Ramu's age 7 years ago = 3 units × 4 = 12 years.

Ramu's present age = 12 + 7 = 19 years.

Therefore The correct answer is 19 years.

Alternate Method

Given:

Difference between Ramu and Keeran = 8 years

Condition: 7 years ago, Ramu was three times as old as Keeran.

Formula Used:

Present Age = Age (n years ago) + n; Age difference is always constant.

Calculations:

=> Let Keeran's present age be K years.

=> Ramu's present age = (K + 8) years.

=> 7 years ago, Keeran's age = (K − 7) and Ramu's age = (K + 8 − 7) = (K + 1).

=> According to the question: (K + 1) = 3 × (K − 7)

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=> K + 1 = 3K − 21

=> 3K − K = 21 + 1

=> 2K = 22

=> K = 11 years

=> Ramu's present age = 11 + 8 = 19 years.

Therefore The correct answer is 19 years.

Additional Information

Constant Age Difference

The numerical difference between the ages of two individuals never changes, regardless of how many years pass or how many years ago the comparison was made.

Ratio Method for Ages

When a ratio is given for a specific time, calculate the difference in ratio units and equate it to the actual constant age difference to find the value of one unit.

Past and Future age Calculation

If the present age is A, then the age 'n' years ago was (A − n) and the age after 'n' years will be (A + n).

Q6. Answer: (a) Rs. 6,000

Shortcut Trick

Ratio of investments A : B = 12,000 : 8,000 = 3 : 2.

Total units = 3 + 2 = 5 units.

5 units = Rs. 10,000 → 1 unit = Rs. 2,000.

A's share = 3 units = 3 × Rs. 2,000 = Rs. 6,000.

Therefore The correct answer is Rs. 6,000.

Alternate Method

Given:

Investment of Partner A = Rs. 12,000

Investment of Partner B = Rs. 8,000

Total profit = Rs. 10,000

Formula Used:

In a partnership, if the time period is constant, the profit is distributed in the ratio of the capitals invested: Profit Ratio = Capital Ratio.

=> Profit ratio (A : B) = 12,000 : 8,000

=> Profit ratio (A : B) = 3 : 2

=> Sum of ratio parts = 3 + 2 = 5 units

=> 5 units = Rs. 10,000

=> A's share of profit = (3 ÷ 5) × 10,000 = Rs. 6,000

Therefore The correct answer is Rs. 6,000.

Additional Information

Basic Partnership

When investments are made for the same duration, the profit share is directly proportional to the capital: P1 : P2 = C1 : C2.

Compound Partnership

When investments are for different durations, profit share depends on both capital and time: P1 : P2 = (C1 × T1) : (C2 × T2).

Working vs. Sleeping Partner

A working partner manages the business and may receive a salary or fixed percentage of profit before the remaining profit is divided.

Q7. Answer: (b) 5244

Shortcut Trick

Check if a + b + c = 0 for the terms 23, −19, and −4.

Since 23 + (−19) + (−4) = 0, apply the Algebraic Identity: $a^3 + b^3 + c^3 = 3abc$.

Calculation → 3 × 23 × (−19) × (−4) = 3 × 23 × 76.

Product → 69 × 76 = 5244.

Therefore The correct answer is 5244.

Alternate Method

Given: a = 23, b = −19, c = −4

Formula Used: $a^3 + b^3 + c^3 - 3abc = (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ca)$

Step-by-step Calculation:

=> First, check the sum: 23 − 19 − 4 = 0.

=> When the sum of three numbers is zero, the sum of their cubes equals three times their product.

=> Result = 3 × (23) × (−19) × (−4)

=> Result = 3 × 23 × 76

=> Result = 69 × 76

=> Result = 5244.

Therefore The correct answer is 5244.

Additional Information

Special Algebraic Identity

The general identity is $a^3 + b^3 + c^3 - 3abc = (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ca)$. If (a + b + c) = 0, the entire right-hand side becomes zero.

Alternative Form

The term $(a^2 + b^2 + c^2 - ab - bc - ca)$ can also be written as $1/2[(a - b)^2 + (b - c)^2 + (c - a)^2]$.

Product Calculation Hint

Multiplying 69 × 76 can be simplified as (70 − 1) × 76 = 5320 − 76 = 5244.

Q8. Answer: (d) 16

Shortcut Trick

Assume Total Work = LCM(12, 30) = 60 units.

Efficiency of A = 5 units/day and Efficiency of B = 2 units/day.

Work done in 4 days by both = (5 + 2) × 4 = 28 units.

Remaining work = 60 − 28 = 32 units.

Time taken by B = 32 ÷ 2 = 16 days.

Therefore The correct answer is 16 days.

Alternate Method

Given: Time taken by A = 12 days, Time taken by B = 30 days, Working together time = 4 days.

Formula: Work = Efficiency × Time

Person	Days	Total Work	Efficiency
A	12	60	5
B	30	2	

=> Total work to be done = LCM of 12 and 30 = 60 units.

=> Daily work (Efficiency) of A = 60 ÷ 12 = 5 units/day.

=> Daily work (Efficiency) of B = 60 ÷ 30 = 2 units/day.

=> Work completed by A and B together in 4 days = (5 + 2) × 4 = 7 × 4 = 28 units.

=> Remaining work = 60 − 28 = 32 units.

=> Time taken by B to complete the remaining work = 32 ÷ 2 = 16 days.

Therefore The correct answer is 16 days.

Additional Information

Total Work Concept

The Total Work is usually taken as the LCM of the individual days to avoid working with complex fractions.

Efficiency and Time

Efficiency is the amount of work done in a single unit of time. It is inversely proportional to the Time taken to complete the task.

Work and Wages

When workers are paid for a job, the wages are distributed in the ratio of the work done by each person, which is the product of Efficiency × Time.

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Q9. Answer: (c) 4

Given:

Mathematical expression = 0.5 × 0.125 ÷ 8^(−2)

Formula used:

Using laws of indices: a^(−n) = 1 / a^n

Calculation:

Convert the decimal values into standard fractions:

=> 0.5 = 1/2

=> 0.125 = 1/8

Substitute these values into the given expression:

=> (1/2) × (1/8) ÷ (1 / 8^2)

=> (1/16) ÷ (1/64)

Applying the division of fractions rule:

=> (1/16) × 64

=> 4

Therefore The correct answer is option (3).

Q10. Answer: (c) 32%

Shortcut Trick

Use the ratio CP : MP = (100 − Discount%) : (100 + Profit%)

Initial Ratio: CP : MP = (100 − 25) : (100 + 10) = 75 : 110

New Selling Price (SP) at 10% discount = 110 − 11 = 99 units

New Profit % = [(99 − 75) ÷ 75] × 100 = 32%

Therefore The correct answer is 32%.

Alternate Method

Given:

Initial Discount = 25% | Initial Profit = 10% | New Discount = 10%

Formula Used:

1. SP = CP × (1 + P/100) | 2. SP = MP × (1 − D/100) | 3. CP/MP = (100 − D)/(100 + P)

Calculations:

=> Let Cost Price (CP) = 100 − 25 = 75 units

=> Marked Price (MP) = 100 + 10 = 110 units

=> New Discount = 10% of MP = 0.10 × 110 = 11 units

=> New Selling Price (SP) = MP − Discount = 110 − 11 = 99 units

=> Profit = SP − CP = 99 − 75 = 24 units

=> Profit % = (Profit ÷ CP) × 100

=> Profit % = (24 ÷ 75) × 100 = 32%

Therefore The correct answer is 32%.

Additional Information

Relationship between CP and MP

The ratio MP ÷ CP = (100 + P%) ÷ (100 − D%) is a direct result of equate SP in both profit and discount scenarios.

Markup Percentage

It is the percentage by which the Cost Price is increased to set the Marked Price. Formula: Markup % = [(MP − CP) ÷ CP] × 100.

Successive Discounts

If two successive discounts of a% and b% are given, the Effective Discount = (a + b − ab/100)%.

Q11. Answer: (d) 140 in A, 196 in B

Shortcut Trick

Since it is an internal transfer, the total number of employees remains constant.

Initial Ratio A : B = 5 : 7 (Total 12 units) | Final Ratio = 1 : 1 = 6 : 6 (Total 12 units).

Shift from Dept B to Dept A = 7 − 6 = 1 unit (or 6 − 5 = 1 unit).

Given, 1 unit = 28 employees.

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Original Dept A = 5 × 28 = 140 | Original Dept B = 7 × 28 = 196.

Therefore The correct answer is 140 in A, 196 in B.

Alternate Method

Given:

Original ratio of employees in A and B = 5 : 7

Number of employees moved from B to A = 28

New ratio after transfer = 1 : 1

Calculations:

Let the original number of employees in Department A be 5x and in Department B be 7x.

=> New count in A = 5x + 28

=> New count in B = 7x − 28

=> (5x + 28) / (7x − 28) = 1 / 1

=> 5x + 28 = 7x − 28

=> 7x − 5x = 28 + 28

=> 2x = 56

=> x = 28

=> Original Dept A = 5 × 28 = 140

=> Original Dept B = 7 × 28 = 196

Therefore The correct answer is 140 in A, 196 in B.

Additional Information

Constant Sum Property

When items are shifted between two groups, the total sum of items across both groups remains unchanged (Initial Sum = Final Sum).

Ratio Balancing

To solve ratio changes involving constant sums, equate the sum of ratio parts by multiplying with suitable constants.

Cross-Multiplication Method

For problems with additions/subtractions in ratios: (a × d) − (b × c) logic can be used to find the value of one ratio unit directly.

Q12. Answer: (b) Simple Interest = (Principal × Rate × Time) / 100

Shortcut Trick

The Simple Interest (SI) is calculated as a constant percentage of the Principal amount for every time period.

By definition, Simple Interest = Principal × Rate (%) × Time.

Converting the percentage Rate into a fraction gives: SI = (Principal × Rate × Time) ÷ 100.

Therefore The correct answer is Simple Interest = (Principal × Rate × Time) / 100.

Alternate Method

Given: Principal (P), Rate of Interest per annum (R), and Time in years (T).

Formula Used: Simple Interest (SI) = (P × R × T) / 100.

=> Simple Interest is defined as the cost of borrowing money, where the interest is calculated only on the original Principal amount.

=> Interest for one year = P × (R / 100)

=> Interest for T years = (P × R / 100) × T

=> Simple Interest (SI) = (Principal × Rate × Time) / 100

Therefore The correct answer is Simple Interest = (Principal × Rate × Time) / 100.

Additional Information

Total Amount (A)

The final value including both Principal and Interest is calculated as A = P + SI, which can also be written as A = P(1 + (R × T)/100).

Time Unit Consistency

The Time (T) must be in the same unit as the Rate (R). If the rate is per annum, time must be in years. (Divide months by 12 or days by 365 if necessary).

Simple vs. Compound Interest

Unlike Simple Interest, Compound Interest is calculated on the principal plus any accumulated interest from previous periods.

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Q13. Answer: (b) 12% gain

Shortcut Trick

The markup percentage is +20% and the discount percentage is (2 ÷ 30) × 100 = 20/3%.

Using the successive percentage formula: Net Change = Markup − Discount − [(Markup × Discount) ÷ 100]

Net Gain % = 20 − 20/3 − [20 × (20/3) ÷ 100] = 20 − 20/3 − 4/3

Net Gain % = 20 − 24/3 = 20 − 8 = 12%.

Therefore The correct answer is 12% gain.

Alternate Method

Given:

The markup on the article is 20% above the cost price.

A discount of Rs. 2 is offered on a purchase of Rs. 30.

Formula Used:

Marked Price (MP) = CP × [1 + (Markup% ÷ 100)]

Selling Price (SP) = MP − Discount

Profit % = [(SP − CP) ÷ CP] × 100

=> Let the cost price (CP) of the article be Rs. 100.

=> The marked price (MP) is 20% above CP: MP = 100 + 20% of 100 = Rs. 120.

=> The discount is Rs. 2 for a purchase of Rs. 30. This means the discount rate = 2 ÷ 30 = 1/15.

=> Total discount on the MP of Rs. 120 = 120 × (1 ÷ 15) = Rs. 8.

=> The selling price (SP) = MP − Discount = 120 − 8 = Rs. 112.

=> Gain = SP − CP = 112 − 100 = Rs. 12.

=> Gain percentage = (12 ÷ 100) × 100 = 12%.

Therefore The correct answer is 12% gain.

Additional Information

Relationship between CP and MP

The ratio of MP to CP can be expressed as MP/CP = (100 + Profit%) ÷ (100 − Discount%).

Successive Discount Formula

If two successive discounts of a% and b% are given, the equivalent single discount is [a + b − (ab/100)]%.

Markup Percentage

Markup % = [(MP − CP) ÷ CP] × 100. It represents how much the retailer has increased the price above the original cost.

Q14. Answer: (b) 183

Shortcut Trick

The smallest number which leaves a remainder r when divided by a, b, and c is given by: LCM(a, b, c) + r

=> Required number = LCM(9, 12, 15) + 3

=> Required number = 180 + 3 = 183

Therefore The correct answer is 183.

Alternate Method

Given:

Divisors = 9, 12, and 15

Common remainder in each case = 3

Formula Used:

Required Number = LCM(divisors) × k + Remainder

For the smallest possible number, we take k = 1.

Calculations:

Find the prime factorization of each divisor to calculate the LCM:

=> $9 = 3^2$

=> $12 = 2^2 \times 3$

=> $15 = 3 \times 5$

The Least Common Multiple (LCM) is the product of the highest powers of all prime factors involved:

=> $LCM(9, 12, 15) = 2^2 \times 3^2 \times 5$

=> $LCM(9, 12, 15) = 4 \times 9 \times 5$

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=> LCM(9, 12, 15) = 180

Now, add the common remainder to obtain the required smallest number:

=> Required number = LCM(9, 12, 15) + 3

=> Required number = 180 + 3 = 183

Therefore The correct answer is 183.

Additional Information

General Form of Such Numbers

Any number that leaves a remainder r when divided by divisors a, b, and c is written in the form: (LCM(a, b, c) × k) + r, where k ≥ 1 is an integer.

LCM with Different Remainders (Constant Difference)

If a number leaves remainders p, q, and r when divided by a, b, and c respectively, such that (a − p) = (b − q) = (c − r) = k (constant difference), then the smallest such number is: LCM(a, b, c) − k.

HCF with Remainders

To find the greatest number that divides x, y, and z leaving remainders p, q, and r respectively, calculate: HCF(x − p, y − q, z − r).

Q15. Answer: (a) 46

Shortcut Trick

Mode is the value that appears most frequently in a given data set.

Frequency of 46 → 3 times (46, 46, 46).

Frequency of 41, 43, and 45 → 2 times each.

Frequency of all other values (40, 42, 44, 48, 50, 51, 52, 53, 55) → 1 time each.

Since 46 has the highest frequency of 3, it is the mode.

Therefore The correct answer is 46.

Alternate Method

Given data: 43, 40, 41, 53, 50, 41, 44, 45, 43, 46, 48, 46, 51, 55, 52, 42, 46, 45

Formula: Mode = Observation with the maximum frequency.

To find the Mode, we construct a frequency distribution table:

=> 40: 1 time

=> 41: 2 times

=> 42: 1 time

=> 43: 2 times

=> 44: 1 time

=> 45: 2 times

=> 46: 3 times

=> 48: 1 time

=> 50, 51, 52, 53, 55: 1 time each

=> The observation with the maximum frequency is 46.

Therefore The correct answer is 46.

Additional Information

Empirical Relation

For a moderately skewed distribution, the relationship is: Mode = 3 × Median − 2 × Mean.

Median

The Median is the middle value when the data is arranged in ascending or descending order.

Bimodal Distribution

If a data set contains two values that share the highest frequency, the distribution is called bimodal.

Q16. Answer: (b) Rs. 820

Shortcut Trick

Subtract the extra cost of tables from the total to equalize all items to chair prices.

Extra cost of 5 tables = 5 × 400 = Rs. 2000.

Remaining total for 12 items (5 + 7) = 7040 − 2000 = Rs. 5040.

Price of 1 chair = 5040 ÷ 12 = Rs. 420.

Price of 1 table = 420 + 400 = Rs. 820.

Therefore The correct answer is Rs. 820.

Alternate Method

Given: Total cost of 5 tables and 7 chairs = Rs. 7040. A table costs Rs. 400 more than a chair.

Let the cost of one chair = Rs. x

Then, the cost of one table = Rs. (x + 400)

=> 5 × (x + 400) + 7 × x = 7040

=> 5x + 2000 + 7x = 7040

=> 12x + 2000 = 7040

=> 12x = 7040 − 2000

=> 12x = 5040

=> x = 5040 ÷ 12

=> x = 420

Cost of one table = x + 400 = 420 + 400 = 820.

Therefore The correct answer is Rs. 820.

Additional Information

Linear Equations in One Variable

A linear equation is an algebraic equation in which each term has an exponent of 1. It is solved by isolating the variable on one side.

Unitary Method

This method involves finding the value of a single unit (like one chair) and then calculating the required value for other units.

Substitution Method

When one variable (Table) is expressed in terms of another (Chair), we use substitution to simplify the equation into a single variable.

Q17. Answer: (b) 8

Shortcut Trick

Since the Median is 28.5, the Median Class is 20−30.

Total frequency N = 52 + x => N/2 = 26 + 0.5x.

Cumulative frequency before median class cf = 5 + x and frequency f = 20.

Applying the simplified relation: 28.5 − 20 = [(26 + 0.5x − 5 − x) ÷ 20] × 10.

8.5 = (21 − 0.5x) ÷ 2 => 17 = 21 − 0.5x => 0.5x = 4 => x = 8.

Therefore The correct answer is 8.

Alternate Method

Given: Median = 28.5, Class Intervals and Frequencies as provided.

Formula Used: Median = L + [((N/2) − cf) ÷ f] × h

Calculations:

=> Total frequency N = 5 + x + 20 + 15 + 7 + 5 = 52 + x

=> Median 28.5 lies in class 20−30, so L = 20, f = 20, h = 10

=> Cumulative frequency of preceding class cf = 5 + x

=> 28.5 = 20 + [((52 + x) ÷ 2 − (5 + x)) ÷ 20] × 10

=> 8.5 = [((52 + x) − 2(5 + x)) ÷ 2] × (1 ÷ 2)

=> 8.5 = (52 + x − 10 − 2x) ÷ 4

=> 8.5 × 4 = 42 − x

=> 34 = 42 − x

=> x = 42 − 34 = 8

Therefore The correct answer is 8.

Additional Information

Median for Grouped Data

It is the value that divides the data into two equal halves. Formula: L + [((N/2) − cf) ÷ f] × h, where cf is the cumulative frequency of the class preceding the median class.

Empirical Formula

The relationship between Mean, Median, and Mode is: 3 × Median = Mode + 2 × Mean.

Mode for Grouped Data

The value with the highest frequency. Formula: L + [(f1 − f0) ÷ (2f1 − f0 − f2)] × h.

Q18. Answer: (b) 130

Shortcut Trick

Effective Compound Interest (CI) rate for 2 years at 10% = 10 + 10 + (10×10)/100 = 21%.

Effective Simple Interest (SI) rate for 2 years at 10% = 10 × 2 = 20%.

Ratio of CI to SI for 2 years = 21 : 20.

Given 21 units = Rs. 136.50 => 1 unit = 136.50 ÷ 21 = Rs. 6.50.

SI (20 units) = 20 × 6.50 = Rs. 130.

Therefore The correct answer is Rs. 130.

Alternate Method

Given:

Rate (R) = 10% per annum

Time (T) = 2 years

Compound Interest (CI) = Rs. 136.50

Formula Used:

CI = P[(1 + R/100)^T − 1]

SI = (P × R × T) ÷ 100

Calculations:

=> 136.50 = P[(1 + 10/100)² − 1]

=> 136.50 = P[(1.1)² − 1]

=> 136.50 = P[1.21 − 1]

=> 136.50 = 0.21 × P

=> P = 136.50 ÷ 0.21 = Rs. 650

Now, calculate Simple Interest:

=> SI = (650 × 10 × 2) ÷ 100

=> SI = 13000 ÷ 100 = Rs. 130

Therefore The correct answer is Rs. 130.

Additional Information

Difference between CI and SI for 2 years

The difference (D) between Compound Interest and Simple Interest for 2 years is given by D = P(R/100)².

Successive Percentage Formula

For a two-year period, the effective compound interest rate can be calculated using the successive change formula: x + y + (xy/100).

CI and SI for the First Year

When interest is compounded annually, the Simple Interest and Compound Interest for the first year are always equal.

Q19. Answer: (b) IV

Shortcut Trick

To find the lowest price, calculate the product of the remaining price factors (100% − discount%).

Shop I: 0.13 × 0.63 = 0.0819

Shop II: 0.19 × 0.63 = 0.1197

Shop III: 0.43 × 0.46 = 0.1978

Shop IV: 0.09 × 0.75 × 0.41 = 0.0277

The shop with the minimum factor (Shop IV) will have the lowest price.

Therefore The correct answer is Shop IV.

Alternate Method

Given: Marked Price (MP) is the same for all shops. Successive discounts are provided for four shops (I, II, III, and IV).

Formula Used: Selling Price (SP) = MP × (1 − d1/100) × (1 − d2/100) × ... where d1, d2 are successive discount percentages.

=> Let the Marked Price (MP) be 100 units.

=> Shop I SP = 100 × (100 − 87)/100 × (100 − 37)/100 = 100 × 0.13 × 0.63 = 8.19 units.

=> Shop II SP = 100 × (100 − 81)/100 × (100 − 37)/100 = 100 × 0.19 × 0.63 = 11.97 units.
=> Shop III SP = 100 × (100 − 57)/100 × (100 − 54)/100 = 100 × 0.43 × 0.46 = 19.78 units.
=> Shop IV SP = 100 × (100 − 91)/100 × (100 − 25)/100 × (100 − 59)/100 = 100 × 0.09 × 0.75 × 0.41 = 2.7675 units.
=> Comparing all Selling Prices: 2.7675 < 8.19 < 11.97 < 19.78.
Therefore The correct answer is Shop IV.
Additional Information
Single Equivalent Discount
For two successive discounts a% and b%, the effective discount is (a + b − ab/100)%.
Discount and Selling Price
Selling Price = Marked Price × (100 − Discount%)/100. A higher total discount results in a lower selling price.
Successive Multiplication
When multiple discounts are applied, the order of discounts does not change the final selling price.

Q20. Answer: (b) 5/9

Given:
4^x − 4^(x−1) = 48
Formula used:
a^(m−n) = a^m / a^n
Calculation:
4^x − (4^x / 4^1) = 48
=> 4^x (1 − 1/4) = 48
=> 4^x (3/4) = 48
=> 4^x = (48 × 4) / 3
=> 4^x = 16 × 4
=> 4^x = 64
=> 4^x = 4^3
=> x = 3
Now, substitute x = 3 into the expression (2x − 1) / (2x + 3):
=> (2 × 3 − 1) / (2 × 3 + 3)
=> (6 − 1) / (6 + 3)
=> 5/9
Therefore The correct answer is option (2).

Q21. Answer: (b) 9

Shortcut Trick
In any regular polygon, Interior angle + Exterior angle = 180^o.
Given: Interior angle − Exterior angle = 100^o.
2 × Exterior angle = (Sum − Difference) = 180^o − 100^o = 80^o.
=> Exterior angle = 40^o.
Number of sides (n) = 360^o ÷ Exterior angle = 360^o ÷ 40^o = 9.
Therefore The correct answer is 9.
Alternate Method
Given:
Difference between interior angle (I) and exterior angle (E) of a regular polygon is 100^o.
=> I − E = 100^o --- (i)
Formula Used:
1. I + E = 180^o (Linear pair property)
2. Each Exterior angle (E) = 360^o ÷ n, where n is the number of sides.
Calculations:
=> We know that I + E = 180^o --- (ii)
=> Adding equation (i) and (ii):
=> (I − E) + (I + E) = 100^o + 180^o

=> 2I = 280^o
=> I = 140^o
=> Now, substitute I in (ii):
=> 140^o + E = 180^o
=> E = 180^o − 140^o = 40^o
=> Using the formula for number of sides:
=> n = 360^o ÷ E
=> n = 360^o ÷ 40^o
=> n = 9
Therefore The correct answer is 9.
Additional Information
Sum of Interior Angles
The sum of all interior angles of a polygon with n sides is given by (n − 2) × 180^o.
Sum of Exterior Angles
The sum of the exterior angles of any convex polygon, taking one at each vertex, is always 360^o.
Regular Polygon Properties
In a regular polygon, all interior angles are equal and all exterior angles are equal. Each interior angle = [(n − 2) × 180^o] ÷ n.

Q22. Answer: (b) 1,700

Shortcut Trick
Ratio of original Cost Price (CP) to Selling Price (SP) is 100 : 121.
New Profit is 13.6%, so the new ratio is 100 : 113.6.
Using the Cross-Product Method with changes (+Rs. 50 for CP and −Rs. 69 for SP):
(100 × 113.6 − 121 × 100) units = (100 × −69 − 113.6 × 50)
−740 units = −6900 − 5680 = −12580 => 1 unit = Rs. 17.
Therefore The correct answer is Rs. 1,700.
Alternate Method
Given:
Original Profit = 21%
Increase in CP = Rs. 50
Decrease in SP = Rs. 69
New Profit = 13.6%
Formula Used:
SP = CP × (1 + Profit%)
=> Let original Cost Price (CP) = x
=> Original Selling Price (SP) = x + 21% of x = 1.21x
=> New CP = x + 50 and New SP = 1.21x − 69
=> According to the question: 1.136 × (x + 50) = 1.21x − 69
=> 1.136x + 56.8 = 1.21x − 69
=> 1.21x − 1.136x = 56.8 + 69
=> 0.074x = 125.8
=> x = 125.8 ÷ 0.074 = 1700
Therefore The correct answer is Rs. 1,700.
Additional Information
Profit Percentage
Profit % = (Selling Price − Cost Price) ÷ Cost Price × 100.
Relationship between CP and SP
If an article is sold at a profit of P%, then SP = CP × (100 + P) ÷ 100.
Cross-Product Method
Used when initial ratios and absolute changes are known to find the original values directly.

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Q23. Answer: (d) 1

Shortcut Trick

Test the options to find the smallest positive number.

For 1: Numbers become (3 − 1) = 2 and (5 − 1) = 4.

Third proportional = $b^2 \div a = 4^2 \div 2 = 16 \div 2 = 8$.

The condition is satisfied as 8 is the required third proportional.

Therefore The correct answer is 1.

Alternate Method

Given: Initial numbers are 3 and 5. The third proportional to be obtained is 8.

Formula Used: If c is the third proportional to a and b, then a : b = b : c, which means $b^2 = a \times c$.

Calculations:

=> Let x be the smallest positive number to be subtracted.

=> First number (a) = 3 − x

=> Second number (b) = 5 − x

=> Third proportional (c) = 8

=> According to the property: $(5 - x)^2 = (3 - x) \times 8$

=> $25 - 10x + x^2 = 24 - 8x$

=> $x^2 - 10x + 8x + 25 - 24 = 0$

=> $x^2 - 2x + 1 = 0$

=> $(x - 1)^2 = 0$

=> $x - 1 = 0$

=> $x = 1$

Therefore The correct answer is 1.

Additional Information

Mean Proportional

If b is the mean proportional between a and c, then $b = \sqrt{(a \times c)}$ or $b^2 = ac$.

Fourth Proportional

If d is the fourth proportional to a, b, and c, then a : b = c : d, which gives $d = (b \times c) \div a$.

Continued Proportion

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

Q24. Answer: (a) 13.2

Shortcut Trick

Total Work (LCM of 6, 34, 36) = 612 units.

Efficiencies: Eduardo = 102, Abraham = 18, Xavier = 17.

Adjusted Work = Total Work − (Eduardo's 2-day work) + (Abraham's work if he stayed for the last 3 days).

Adjusted Work = 612 − (102 × 2) + (18 × 3) = 612 − 204 + 54 = 462 units.

Total time = Adjusted Work ÷ (Combined Efficiency of Abraham and Xavier) = 462 ÷ (18 + 17) = 13.2 days.

Therefore The correct answer is 13.2 days.

Alternate Method

Given: Time taken by Eduardo = 6 days, Abraham = 34 days, and Xavier = 36 days.

Formula Used: Total Work = LCM of individual time; Efficiency = Total Work ÷ Time.

Person	Days	Total Work	Efficiency
Eduardo	6	612	102
Abraham	34	18	
Xavier	36	17	

=> Let the total number of days taken to finish the work be T.

=> Work done by Eduardo (for 2 days) = 102 × 2 = 204 units.

=> Work done by Abraham (for T − 3 days) = 18 × (T − 3) units.

=> Work done by Xavier (for T days) = 17 × T units.

=> Total Work = (Work by Eduardo) + (Work by Abraham) + (Work by Xavier)

=> 612 = 204 + 18(T − 3) + 17T

=> 612 = 204 + 18T − 54 + 17T

=> 612 = 150 + 35T

=> 35T = 612 − 150 => 35T = 462

=> T = 462 ÷ 35 = 13.2 days.

Therefore The correct answer is 13.2 days.

Additional Information

Time and Efficiency Relation

Efficiency is inversely proportional to the time taken to complete a task. Work = Efficiency × Time.

Leaving Before Completion

If a person leaves 'n' days before completion, adding their 'n' days' potential work to the total work allows you to treat them as having worked until the end.

LCM Method for Total Work

Assuming Total Work as the LCM of given time durations helps in calculating efficiencies as whole numbers, simplifying arithmetic steps.

Q25. Answer: (c) 04:45PM

Shortcut Trick

Time taken: Patna Express = 9h, Delhi Express = 11h. Let Distance = 99 units (LCM).

Speeds: Patna Express = 11 units/h, Delhi Express = 9 units/h.

Distance covered by Patna Express before 2:00 PM (4 hours) = 11 × 4 = 44 units.

Meeting time from 2:00 PM = Remaining distance ÷ Relative speed = (99 − 44) ÷ (11 + 9) = 55 ÷ 20 = 2 hours 45 min.

Therefore The correct answer is 04:45PM.

Alternate Method

Given:

Patna Express (Delhi to Patna): 10:00 AM to 07:00 PM = 9 hours.

Delhi Express (Patna to Delhi): 02:00 PM to 01:00 AM = 11 hours.

Formula Used:

Time = Distance ÷ Relative Speed

=> Let total distance = 99 km.

=> Speed of Patna Express = 99 ÷ 9 = 11 km/h.

=> Speed of Delhi Express = 99 ÷ 11 = 9 km/h.

=> Patna Express distance from 10:00 AM to 02:00 PM = 11 × 4 = 44 km.

=> Distance between trains at 02:00 PM = 99 − 44 = 55 km.

=> Relative Speed = 11 + 9 = 20 km/h.

=> Time taken to meet = 55 ÷ 20 = 2.75 hours.

=> 2.75 hours = 2 hours + (0.75 × 60) min = 2 hours 45 min.

=> Meeting time = 02:00 PM + 2 hours 45 min = 04:45 PM.

Therefore The correct answer is 04:45PM.

Additional Information

Relative Speed in Opposite Directions

When two objects move toward each other, their relative speed is the sum of their individual speeds: V_(rel) = S1 + S2.

Standard Meeting Time Logic

To find the meeting time, first calculate the distance covered by the early-starting train to bring both trains to the same starting time, then divide the remaining distance by the relative speed.

Average Speed for Same Distance

If a journey is covered at speed S1 and returned at speed S2, the Average Speed is (2 × S1 × S2) ÷ (S1 + S2).

Q26. Answer: (c) 8

Shortcut Trick

Average Speed = (Total Distance) ÷ (Total Time)

Total Distance = 6 + 18 = 24 km

Total Time = (6 ÷ 6) + (18 ÷ 9) = 1 + 2 = 3 hours
Average Speed = 24 ÷ 3 = 8 km/h
Therefore The correct answer is 8 km/h.
Alternate Method
Given:
Distance covered while walking (d1) = 6 km
Speed while walking (s1) = 6 km/h
Distance covered while running (d2) = 18 km
Speed while running (s2) = 9 km/h
Formula Used:
Average Speed = Total Distance ÷ Total Time
Time = Distance ÷ Speed
=> Time taken for walking (t1) = 6 ÷ 6 = 1 hour
=> Time taken for running (t2) = 18 ÷ 9 = 2 hours
=> Total Distance = 6 + 18 = 24 km
=> Total Time = 1 + 2 = 3 hours
=> Average Speed = 24 ÷ 3 = 8 km/h
Therefore The correct answer is 8 km/h.
Additional Information
Average Speed (Equal Distances)
If a person travels equal distances at speeds u and v, the average speed is given by the harmonic mean: 2uv ÷ (u + v).
Unit Conversion
To convert speed from km/h to m/s, multiply by 5/18. To convert from m/s to km/h, multiply by 18/5.
Relative Speed
When two objects move in the same direction, relative speed = |u − v|. When they move in opposite directions, relative speed = u + v.

Q27. Answer: (b) 2464 cm²

Shortcut Trick
Diameter of the sphere = 28 cm → Radius (r) = 14 cm.
Area of one circle with r = 14 cm is πr^2 = 616 cm².
Total Surface Area of a sphere = 4 × πr^2 = 4 × 616 = 2464 cm².
Therefore The correct answer is 2464 cm².
Alternate Method
Given:
Diameter of the spherical tank (d) = 28 cm
Value of π = 22/7
Formula Used:
Radius of sphere (r) = d ÷ 2
Total Surface Area of sphere = 4 × π × r^2
Calculations:
=> Radius (r) = 28 ÷ 2 = 14 cm
=> Total Surface Area = 4 × (22/7) × 14 × 14
=> Total Surface Area = 4 × 22 × 2 × 14
=> Total Surface Area = 88 × 28
=> Total Surface Area = 2464 cm²
Therefore The correct answer is 2464 cm².
Additional Information
Volume of a Sphere
The total space enclosed inside a sphere is given by the formula: Volume = (4/3) × π × r^3.
Curved Surface Area of a Hemisphere
For a hemisphere of radius r, the curved surface area is exactly half of the sphere's surface area: CSA = 2 × π × r^2.

Total Surface Area of a Hemisphere

For a solid hemisphere, the total surface area includes the curved surface and the flat circular base: TSA = 3 × π × r².

Q28. Answer: (c) √5

Shortcut Trick

Use the direct trigonometric identity: $\sec^2\theta = 1 + \tan^2\theta$.

Substitute $\tan\theta = 2$ into the formula: $\sec^2\theta = 1 + (2)^2 = 1 + 4 = 5$.

Taking square root on both sides: $\sec\theta = \sqrt{5}$.

Since θ is in the first quadrant, sec θ must be positive.

Thus, the value matches Option (3).

Therefore The correct answer is √5.

Alternate Method

Given: $\tan\theta = 2$ and θ is in the first quadrant.

Formula Used: In a right-angled triangle, tan θ = Perpendicular / Base and sec θ = Hypotenuse / Base. By Pythagoras Theorem: $H^2 = P^2 + B^2$.

=> $\tan\theta = 2 / 1$ → Perpendicular (P) = 2 and Base (B) = 1

=> Hypotenuse (H) = $\sqrt{(P^2 + B^2)}$

=> $H = \sqrt{(2^2 + 1^2)} = \sqrt{(4 + 1)} = \sqrt{5}$

=> sec θ = Hypotenuse / Base = $\sqrt{5} / 1 = \sqrt{5}$

Since the angle is in the first quadrant, all trigonometric ratios are positive, confirming the result matches Option (3).

Therefore The correct answer is √5.

Additional Information

Pythagorean Identities

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

Quadrant Rules (ASTC)

In the First Quadrant (0 to 90°), all trigonometric ratios are positive. In the Second, only sin and cosec are positive.

Reciprocal Relations

Trigonometric functions are related by reciprocals: sec θ = 1/cos θ, cosec θ = 1/sin θ, and cot θ = 1/tan θ.

Q29. Answer: (a) 3

Shortcut Trick

For a constant Rupee amount, Quantity1 × SP%1 = Quantity2 × SP%2

Here, Quantity1 = 5, Loss = 34% (SP%1 = 66%), Gain = 10% (SP%2 = 110%)

=> 5 × 66 = x × 110

=> 330 = 110 × x

=> x = 3

Therefore The correct answer is 3.

Alternate Method

Given:

Selling Price (SP1) of 5 lemons = Rs. 1

Loss = 34% | Target Gain = 10%

Formula Used:

Cost Price (CP) = SP ÷ (1 − Loss%) | New SP = CP × (1 + Gain%)

Calculations:

=> SP of 1 lemon = Rs. 1 ÷ 5 = Rs. 0.20

=> Since this is at 34% loss, 66% of CP = Rs. 0.20

=> CP of 1 lemon = 0.20 ÷ 0.66 = Rs. 20/66 = Rs. 10/33

=> To gain 10%, New SP = 110% of (Rs. 10/33)

=> New SP per lemon = (110 ÷ 100) × (10 ÷ 33) = (11 ÷ 10) × (10 ÷ 33) = 1 ÷ 3

=> New SP of 1 lemon = Rs. 1/3

=> Number of lemons sold for Rs. 1 = 1 ÷ (1/3) = 3

Therefore The correct answer is 3.

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Additional Information

Inverse Variation in Profit and Loss

When the total amount received remains the same, the quantity and the selling price percentage (100 ± P/L%) are inversely proportional. n1 × %SP1 = n2 × %SP2.

Successive Percentage Change

If a value is changed by a% and then by b%, the net change is given by the formula [a + b + (a × b) ÷ 100]%.

Relation between CP and SP

Cost Price is always considered as the base (100%). Profit increases the percentage above 100, while Loss decreases it below 100.

Q30. Answer: (a) 22854.85

Shortcut Trick

For a hollow cylinder, Total Surface Area = 2π(R + r)(h + R − r).

Given: Outer radius (R) = 10 cm, Inner radius (r) = 8 cm, Height (h) = 200 cm.

TSA = 2 × (22/7) × (10 + 8) × (200 + 10 − 8)

TSA = 2 × (22/7) × 18 × 202 = 159984 ÷ 7 ≈ 22854.85 cm².

Therefore The correct answer is 22854.85 cm².

Alternate Method

Given:

=> Outer radius (R) = 10 cm

=> Inner radius (r) = 8 cm

=> Length (h) = 2 m = 2 × 100 = 200 cm

Formula Used:

=> Total Surface Area (TSA) = Outer CSA + Inner CSA + 2 × Area of base rings

=> TSA = 2πRh + 2πrh + 2π(R² − r²)

Calculations:

=> TSA = 2 × (22/7) × [(10 × 200) + (8 × 200) + (10² − 8²)]

=> TSA = (44/7) × [2000 + 1600 + (100 − 64)]

=> TSA = (44/7) × [3600 + 36]

=> TSA = (44 × 3636) ÷ 7

=> TSA = 159984 ÷ 7

=> TSA ≈ 22854.857 cm²

Therefore The correct answer is 22854.85 cm².

Additional Information

Volume of Hollow Cylinder

The volume of the material in a hollow cylinder is given by V = π × (R² − r²) × h.

Curved Surface Area (CSA)

The total curved surface area is the sum of the inner and outer surface areas: CSA = 2πh(R + r).

Cross-sectional Area of the Ring

The area of the base ring (annulus) at each end of the pipe is π × (R² − r²).

Q31. Answer: (d) Token currency

The correct answer is Token currency.

Key Points

• In 1329-1330 AD, Muhammad bin Tughlaq introduced a Token Currency system to manage the severe global shortage of silver bullion during the 14th century.

• The Sultan issued coins made of base metals, specifically brass and copper, and decreed that they should be accepted at the same value as the silver Tanka.

• The primary objective was to preserve the state's silver reserves while maintaining a high level of liquidity for his ambitious military projects and administrative expenses.

• The idea was modeled after the successful use of paper currency (Chao) in China under Kublai Khan and similar experiments in Persia (Gaykhatu Khan).

• However, the experiment failed because the government could not prevent forgery; households reportedly began minting their

own copper coins, leading to massive inflation and a total collapse of the credit system.

• To restore order, the Sultan had to withdraw the token coins and exchange them for genuine silver and gold coins from the royal treasury, resulting in a massive financial loss.

Additional Information

• Muhammad bin Tughlaq:

• He is often referred to by historians as the Prince of Moneyers because of the high quality and variety of coins he produced during his reign.

• His other controversial projects included the transfer of the capital from Delhi to Devagiri (renamed Daulatabad) in 1327 AD.

• Land Revenue Reforms:

• While he did introduce heavy taxation in the Doab region to increase state revenue, this was aimed at funding his large standing army rather than directly addressing the bullion shortage.

• Garrison Towns:

• These were fortified settlements with soldiers, a concept more associated with the military control strategies of earlier Sultans like Ghiyasuddin Balban and Alauddin Khalji to defend against Mongol invasions.

Q32. Answer: (b) Service Tax

The correct answer is Service Tax.

Key Points

• The Constitution (88th Amendment) Act, 2003, was enacted to provide a formal constitutional framework for the levy and collection of Service Tax in India.

• Prior to this amendment, service tax was collected by the Union Government using its residuary powers under Entry 97 of the Union List (List I) since 1994.

• The amendment resulted in the insertion of Article 268A, which explicitly empowered the Government of India to levy taxes on services, while the appropriation of the revenue was to be shared between the Union and the States.

• It also expanded the Seventh Schedule of the Constitution by adding Entry 92C (Taxes on Services) to the Union List.

• This legislative step was crucial for formalizing the sharing of service tax proceeds between different levels of government, following the recommendations of various tax reform committees like the Chelliah Committee.

Additional Information

• Goods and Services Tax (GST):

• Introduced through the 101st Constitutional Amendment Act, 2016, it completely overhauled the indirect tax regime in India.

• The GST subsumed Service Tax, Excise Duty, and VAT, leading to the repeal of Article 268A and Entry 92C that were introduced by the 88th Amendment.

• Wealth Tax:

• Governed by the Wealth-tax Act, 1957, it was a Direct Tax on the net wealth of certain entities.

• The government abolished wealth tax in the Union Budget 2015, replacing it with an additional 2% surcharge on individuals with a taxable income exceeding 1 crore rupees.

• Property Tax:

• A local tax levied by Municipal Corporations or Local Bodies on real estate, based on the annual rental value or capital value of the property.

Q33. Answer: (d) Chandragupta Maurya

The correct answer is Chandragupta Maurya.

Key Points

• Megasthenes was an ancient Greek historian, diplomat, and explorer who served as the official ambassador of Seleucus I Nicator, the founder of the Seleucid Empire.

• Following the Seleucid–Mauryan war (approximately 305–303 BCE), a peace treaty was concluded between Seleucus I and Chandragupta Maurya, which involved territorial exchanges and a matrimonial alliance.

• As a consequence of this diplomatic reconciliation, Megasthenes was sent to the Mauryan capital, Pataliputra, to represent the Greeks in the royal court of Chandragupta Maurya.

• During his tenure at the court, he authored the seminal work titled Indica, which serves as a vital primary source for understanding the Mauryan administration, the seven-fold caste system, and the urban layout of Pataliputra.

• His accounts provide the earliest systematic description of Indian society and the military strength of the Mauryan Empire by a foreign observer.

Additional Information

• Chandragupta Maurya:

• He was the founder of the Mauryan Dynasty (reigned c. 321–297 BCE) and is credited with unifying most of the Indian subcontinent under a single central authority with the guidance of Chanakya.

• Bindusara:

• The son of Chandragupta Maurya; during his reign, the Greek king Antiochus I sent an ambassador named Deimachus to the Mauryan court.

• Ashoka:

• The third Mauryan emperor, famous for his conversion to Buddhism; historical records suggest that Dionysius was the Greek ambassador sent to his court by Ptolemy II Philadelphus.

• Brihadratha:

• The last ruler of the Mauryan Empire, who was assassinated by his general Pushyamitra Shunga in 185 BCE, leading to the rise of the Shunga Dynasty.

Q34. Answer: (c) Safeguarding the Girl Child

The correct answer is Safeguarding the Girl Child.

Key Points

• The 10th National Consultation on Child Protection was organized by the Supreme Court Juvenile Justice Committee in collaboration with UNICEF India on October 11-12, 2025.

• The event was specifically themed Safeguarding the Girl Child to coincide with the International Day of the Girl Child, which is observed globally on October 11 every year.

• The primary objective of the consultation was to evaluate the implementation of the Protection of Children from Sexual Offences (POCSO) Act, 2012, and the Juvenile Justice (Care and Protection of Children) Act, 2015, with a specific focus on the unique vulnerabilities faced by girls.

• Key stakeholders, including High Court Judges, representatives from the Ministry of Women and Child Development, and child rights advocates, discussed strategies to enhance gender-sensitive legal procedures and rehabilitation frameworks.

• The consultation emphasized the urgency of addressing the backlog of POCSO cases in Special Courts and ensuring the privacy and dignity of girl survivors during trial proceedings.

Additional Information

• International Day of the Girl Child:

• Declared by the United Nations in 2011, this day aims to highlight and address the needs and challenges girls face while promoting girl empowerment and the fulfillment of their human rights.

• The 2025 consultation utilized this global platform to push for structural changes in India's Child Protection Services (CPS).

• Judicial Oversight:

• The Supreme Court of India plays a pivotal role in monitoring the Juvenile Justice system through these annual consultations, ensuring that Special Juvenile Police Units (SJPUs) and Child Welfare Committees (CWCs) are functioning effectively.

• Previous themes have focused on the digital safety of children and the prevention of child trafficking, but the 10th edition prioritized the comprehensive safety of girls in both domestic and institutional settings.

Q35. Answer: (d) Dockyards

The correct answer is Dockyards.

Key Points

• Lothal, located in the Bhal region of modern-day Gujarat, is world-famous for possessing the earliest known artificial dockyard, which dates back to approximately 2400 BCE.

• The dockyard is a sophisticated rectangular basin made of kiln-burnt bricks, measuring roughly 214 meters in length and 36 meters in width, connected to the ancient course of the Sabarmati River.

• This structure was engineered with a sluice gate system to control the flow of water and maintain the water level during low tides, showcasing the advanced hydrographic knowledge of the Indus Valley Civilization (IVC).

• The presence of the dockyard established Lothal as a premier maritime trade center, linking the Harappan civilization with distant lands such as Mesopotamia (Sumer), Egypt, and the Persian Gulf.

• Excavations led by archaeologist S.R. Rao in 1954 revealed that this dockyard facilitated the export of luxury items like carnelian beads, ivory, and copper, which were highly valued in international markets.

Additional Information

• Other Archaeological Features at Lothal:

• Bead-Making Factory: Lothal was a major industrial hub for the production of micro-beads and gemstone ornaments, featuring a specialized factory with a working platform.

• Rice Husk: Evidence of rice cultivation was found here, which is relatively rare in other major Harappan sites.

• Persian Gulf Seals: The discovery of circular button-shaped seals indicates direct maritime contact with the Dilmun civilization

(modern-day Bahrain).

• Comparison with Other Options:

• Great Baths: This iconic structure is the hallmark of Mohenjo-daro, primarily used for ritualistic bathing rather than trade.

• Citadels: While most IVC cities, including Lothal, had a Citadel (upper town) for the ruling class, it is not the unique feature that defines Lothal's international importance.

• Granaries: Massive Granaries for surplus food storage were the dominant features of Harappa and Mohenjo-daro, serving as the state treasury.

Q36. Answer: (c) 2000

The correct answer is 2000.

Key Points

• The National Agriculture Policy (NAP) was officially announced by the Government of India on July 28, 2000. It was the first-ever comprehensive policy formulated to steer the country's agricultural sector into the new millennium.

• The central objective of the policy was to achieve a growth rate of over 4 percent per annum in the agriculture sector. This growth was intended to be sustainable, technologically driven, and demand-oriented.

• The policy introduced the concept of the Rainbow Revolution, which aimed to integrate various specialized revolutions like the Green Revolution (food grains), White Revolution (milk), Yellow Revolution (oilseeds), Blue Revolution (fisheries), Red Revolution (meat and poultry), and Golden Revolution (fruits and honey).

• It emphasized 'Growth with Equity', focusing on regional balance and ensuring that the benefits of agricultural development reached small and marginal farmers across all geographical areas of India.

• The NAP 2000 encouraged the involvement of the private sector through contract farming and land leasing arrangements to facilitate accelerated technology transfer, capital inflow, and a steady market for agricultural produce.

• The policy aimed at protecting plant varieties through a specialized sui generis system and promoting the use of biotechnology for developing improved seed varieties and sustainable farming practices.

Additional Information

• National Policy for Farmers (NPF), 2007:

• While the 2000 policy focused on agricultural production, the 2007 policy (approved based on the recommendations of the National Commission on Farmers chaired by Dr. M.S. Swaminathan) shifted the focus toward the well-being of the farmers and improving their net income.

• It introduced the concept of 'Income Security' for farmers as a primary goal.

• Resource Management:

• The National Agriculture Policy 2000 highlighted the importance of conserving biodiversity and the sustainable management of natural resources like land and water.

• It prioritized integrated pest management (IPM) and integrated nutrient management (INM) to reduce the chemical footprint on the environment.

Q37. Answer: (c) One-Child Policy

The correct answer is One-Child Policy.

Key Points

• The One-Child Policy was a rigorous population control program introduced by the Chinese government in 1979 to curb the country's rapid population growth.

• Deep-seated cultural traditions in China historically favored male heirs for agricultural labor, carrying on the family lineage, and providing social security for elderly parents.

• Under the strict limitation of a single child, many families resorted to sex-selective abortion, female infanticide, and abandonment of girls to ensure their only legal child was a boy.

• This demographic engineering led to a severely skewed Sex Ratio at Birth (SRB); while the natural ratio is roughly 105 boys to 100 girls, China's ratio peaked at approximately 118 to 120 males for every 100 females in the early 21st century.

Additional Information

• The policy was formally ended in 2015, transitioning first to a two-child policy in 2016 and subsequently to a three-child policy in 2021 to mitigate the crisis of an aging population and labor shortages.

• Impact of other options:

• Universal Healthcare Act: Refers to policies ensuring medical access for all citizens, which generally improves overall life expectancy rather than skewing birth ratios.

• Gender Equity Law: These legal frameworks are designed to eliminate discrimination and protect women's rights, which typically works toward balancing social disparities.

• Rural Migration Ban: Often associated with the Hukou system, this policy restricted internal migration from villages to cities but

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did not dictate reproductive outcomes or gender selection.

Q38. Answer: (d) Article 32

The correct answer is Article 32.

Key Points

• Article 32 of the Indian Constitution provides the Right to Constitutional Remedies, which allows citizens to approach the Supreme Court for the enforcement of Fundamental Rights listed in Part III.

• Dr. B.R. Ambedkar, the architect of the Constitution, described this article as the 'Heart and Soul of the Constitution' because it makes all other rights functional and enforceable.

• The Supreme Court is designated as the protector and guarantor of Fundamental Rights under this provision, ensuring that the State does not infringe upon individual liberties.

• The Article empowers the court to issue five types of prerogative writs: Habeas Corpus, Mandamus, Prohibition, Certiorari, and Quo-Warranto.

• This right cannot be suspended except as provided by the Constitution, specifically during a National Emergency under Article 359 by the President.

• Because it is vital to the constitutional structure, the Supreme Court has ruled that Article 32 is a basic feature of the Constitution, meaning it cannot be abridged or taken away even by a constitutional amendment.

Additional Information

• Article 226:

• Empowers the High Courts to issue writs for the enforcement of Fundamental Rights and for 'any other purpose', giving it a broader jurisdiction than the Supreme Court in this specific regard.

• Article 21:

• Guarantees the Protection of Life and Personal Liberty, stating that no person shall be deprived of their life or liberty except according to procedure established by law.

• It has been widely interpreted by the judiciary to include rights like privacy, clean environment, and legal aid.

• Article 19:

• Protects six basic freedoms for citizens: speech and expression, peaceful assembly, formation of associations, movement throughout India, residence, and practicing any profession.

Q39. Answer: (c) Article 39 A

The correct answer is Article 39 A.

Key Points

• Article 39 A is a significant provision under the Directive Principles of State Policy (DPSP), which are contained in Part IV of the Indian Constitution.

• This article was inserted by the 42nd Constitutional Amendment Act, 1976, during the emergency period to promote equal justice and free legal aid.

• The provision directs the State to ensure that the legal system operates in a manner that promotes justice on the basis of equal opportunity for all citizens.

• It specifically mandates the State to provide free legal aid through suitable legislation or schemes to ensure that opportunities for securing justice are not denied to any citizen by reason of economic or other disabilities.

• To fulfill the constitutional mandate of this Article, the Legal Services Authorities Act, 1987 was enacted, which led to the establishment of the National Legal Services Authority (NALSA) to monitor and implement legal aid programs.

Additional Information

• Article 29:

• Falls under Part III (Fundamental Rights) and deals with the Protection of interests of minorities.

• It grants any section of citizens residing in India the right to conserve their distinct language, script, or culture.

• Article 51 A:

• Contained in Part IV-A, it lists the Fundamental Duties of Indian citizens.

• Originally, ten duties were added by the 42nd Amendment Act, 1976, and an eleventh was added by the 86th Amendment Act, 2002.

• Article 78:

• Specifies the Duties of the Prime Minister regarding the furnishing of information to the President.

• It mandates the PM to communicate all decisions of the Council of Ministers related to the administration of the Union and proposals for legislation to the President.

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Q40. Answer: (c) Shehnai

The correct answer is Shehnai.

Key Points

• Ustad Bismillah Khan (1916–2006) was a legendary Indian musician who is credited with single-handedly elevating the Shehnai from a traditional folk and wedding instrument to the global classical concert stage.

• Born as Qamaruddin Khan in Dumraon, Bihar, he came from a lineage of court musicians; he received his training in Varanasi under his maternal uncle, Ali Baksh 'Vilayatu', a prominent Shehnai player at the Kashi Vishwanath Temple.

• He is celebrated for his historic performance at the Red Fort on 15th August 1947, where his music greeted the nation on the eve of Indian Independence at the invitation of Jawaharlal Nehru.

• He was a symbol of India's composite culture (Ganga-Jamuni Tehzeeb) and received the Bharat Ratna, India's highest civilian award, in 2001.

• Throughout his career, he was honored with numerous accolades including the Padma Shri (1961), Padma Bhushan (1968), and Padma Vibhushan (1980).

Additional Information

• Shehnai:

• A double-reed aerophone common in India, Pakistan, and Bangladesh; it features a wooden body and a flared metal bell.

• Tabla:

• A pair of twin hand drums (the Dayan and Bayan) fundamental to Hindustani classical music; famous maestros include Ustad Zakir Hussain and Pandit Kishan Maharaj.

• Sarod:

• A fretless string instrument with a deep, resonant tone; it is a vital part of the Indian classical tradition, mastered by Ustad Amjad Ali Khan and Ustad Ali Akbar Khan.

• Sitar:

• A plucked string instrument known for its complex sympathetic strings; it gained worldwide fame through Pandit Ravi Shankar and Ustad Vilayat Khan.

Q41. Answer: (a) North-Eastern Hills

The correct answer is North-Eastern Hills.

Key Points

• Slash-and-burn agriculture, locally known as Jhum or Jhumming, is a primitive form of shifting cultivation widely practiced in the North-Eastern Hills of India, encompassing states like Assam, Meghalaya, Mizoram, and Nagaland.

• The process involves clearing a patch of forest land by cutting down vegetation and burning it; the resulting ash provides essential nutrients to the soil for crop production.

• Farmers typically cultivate crops like dry paddy, buckwheat, maize, and millets for a few years until soil fertility declines, after which the land is left fallow to recover naturally.

• This agricultural system is deeply integrated into the tribal culture and socio-economic life of the North-Eastern region, though it is increasingly being regulated due to environmental concerns like deforestation and soil erosion.

Additional Information

• Regional nomenclature of shifting cultivation:

• Western Ghats: In the hilly regions of the Western Ghats (specifically Kerala and Karnataka), this practice is known as Kumari.

• Central India: It is called Bewar or Dahiya in Madhya Pradesh, and Podu or Penda in Andhra Pradesh and Odisha.

• Himalayan Belt: The practice is referred to as Khil in the Himalayan range.

• South-East Rajasthan: It is known as Valre or Waltre in this arid/semi-arid region.

• Global nomenclature:

• In Mexico and Central America, it is called Milpa.

• In Vietnam, it is known as Ray, and in Indonesia/Malaysia, it is termed Ladang.

• The Indo-Gangetic Plain and the Deccan Plateau are primarily known for intensive subsistence farming and commercial agriculture respectively, rather than slash-and-burn methods, due to their distinct topography and high population density.

Q42. Answer: (b) Uttar Pradesh

The correct answer is Uttar Pradesh.

Key Points

• Uttar Pradesh is situated in the fertile Indo-Gangetic Plain, a region characterized by rich alluvial soil and an abundance of perennial water sources like the Ganges and Yamuna rivers.

• Historically, this region served as the cradle of early human settlements in South Asia, including the center of the Vedic

civilization and several Mahajanapadas (powerful ancient kingdoms), which fostered high population concentrations over millennia.

• The flat topography of the state facilitated the easy development of transport networks, agriculture, and permanent housing, leading to a long-standing pattern of high-density habitation.

• According to the 2011 Census, Uttar Pradesh is the most populous state in India, with a population density of 829 persons per square kilometer, which is significantly higher than the national average.

• The continuous availability of arable land and a favorable climate for double-cropping have historically supported large agrarian societies, ensuring food security and sustained population growth.

Additional Information

• Rajasthan:

• Much of its territory is covered by the Thar Desert, where extreme temperatures and water scarcity historically limited the density of human settlements.

• Despite being the largest state by area, its population density is much lower than that of the northern plains.

• Sikkim and Meghalaya:

• These states are located in the Himalayan and North-Eastern hilly regions, respectively.

• Rugged terrain, steep slopes, and dense forest cover pose significant challenges for large-scale agriculture and infrastructure development, resulting in sparse population distribution.

• Sikkim is notably the least populous state in India, reflecting the constraints of high-altitude geography on human settlement.

Q43. Answer: (b) Maharashtra

The correct answer is Maharashtra.

Key Points

• In October 2025, the Government of Maharashtra entered into a strategic Memorandum of Understanding (MoU) with Spain's Fira Barcelona International to establish a state-of-the-art convention center.

• The project is specifically slated for development at the Multi-modal International Cargo Hub and Airport at Nagpur (MIHAN), which is the flagship industrial project of the Maharashtra Airport Development Company (MADC).

• The collaboration aims to leverage the expertise of Fira Barcelona, one of the world's leading organizers of trade fairs and congresses, to create a global destination for MICE (Meetings, Incentives, Conferences, and Exhibitions) tourism.

• By situating this world-class convention center in Nagpur, the state government intends to capitalize on the city's unique geographical position at the center of India, enhancing its potential as a logistics and commercial hub.

• The facility will be designed to host large-scale international exhibitions, business summits, and industrial trade fairs, providing a significant boost to the economy of the Vidarbha region.

Additional Information

• MIHAN (Nagpur):

• It stands as India's largest Multi-product Special Economic Zone (SEZ) attached to an existing airport.

• The project includes a re-developed international airport, a Captive Power Plant, and a sprawling IT park.

• Fira Barcelona International:

• Based in Spain, it is renowned for managing the Mobile World Congress (MWC) and the Smart City Expo World Congress.

• Their participation ensures that the Maharashtra project will adhere to European standards of infrastructure and operational excellence.

• Strategic Impact:

• This MoU represents a significant step in the Magnetic Maharashtra initiative to attract Foreign Direct Investment (FDI).

• The development is expected to create thousands of jobs in the hospitality, transport, and service sectors.

Q44. Answer: (d) Duodenum

The correct answer is Duodenum.

Key Points

• The Duodenum is the first and shortest segment of the small intestine, measuring approximately 20 to 25 cm in length and exhibiting a characteristic C-shape.

• It is the critical site where the stomach empties its acidic chyme to be mixed with alkaline digestive secretions from the accessory organs.

• The common bile duct (transporting bile from the liver and gall bladder) and the main pancreatic duct (carrying pancreatic juice) converge to form the hepatopancreatic ampulla, also known as the Ampulla of Vater.

• This ampulla opens into the second part of the duodenum through a structure called the major duodenal papilla, which is regulated by the Sphincter of Oddi.

• The bile received here is essential for the emulsification of fats, while the pancreatic juice provides enzymes like trypsin, lipase, and amylase along with bicarbonate ions to neutralize gastric acid.

Additional Information

• Jejunum

• The middle section of the small intestine, roughly 2.5 meters long, where the majority of nutrient absorption (sugars, amino acids, and fatty acids) occurs via its dense villi and microvilli.

• Ileum

• The final and longest segment (about 3.5 meters) that primarily absorbs Vitamin B12, bile salts, and any remaining nutrients before joining the large intestine at the ileocecal valve.

• Colon

• A major component of the large intestine, divided into ascending, transverse, descending, and sigmoid sections, primarily responsible for water reabsorption and the formation of solid waste.

Q45. Answer: (a) Bihar

The correct answer is Bihar.

Key Points

• The Wahabi Movement was an Islamic revivalist movement in India during the 19th century, which sought to purify Islam and return to its original simplicity as practiced during the time of the Prophet.

• The movement was founded in India by Sayyid Ahmad Barelvi (1786−1831), who was deeply influenced by the teachings of Shah Waliullah and the Wahabism of Saudi Arabia.

• While the founder belonged to Rae Bareli, Patna in Bihar emerged as the movement's primary organizational headquarters and the most active center for recruitment and operations.

• In 1821, Sayyid Ahmad Barelvi visited Patna and appointed four spiritual vice-regents (Khalifas), including Shah Muhammad Husain, which institutionalized Bihar as the nerve center for the movement in the subcontinent.

• The Sadiqpur family of Patna played a legendary role in providing leadership, funds, and logistics to the movement for several decades, making Bihar the focal point of their anti-colonial and reformist activities.

Additional Information

• Delhi:

• It served as the ideological birthplace where Shah Waliullah established the foundation for Islamic reform, but it did not serve as the movement's primary operational hub.

• Punjab:

• This region was the primary military theater where the Wahabis, led by Sayyid Ahmad Barelvi, fought against the Sikh Kingdom of Maharaja Ranjit Singh, culminating in the Battle of Balakot in 1831.

• Bengal:

• In Bengal, the movement was championed by Titu Mir (Mir Nisar Ali), who organized the Muslim peasantry against the British and local Zamindars, constructing a famous Bamboo Stockade at Narkelberia.

• Wahabi Trials:

• To suppress the movement, the British conducted a series of legal actions known as the Wahabi Trials (1863−1871) in locations like Ambala and Patna, leading to the arrest of key leaders from Bihar.

Q46. Answer: (c) Jasprit Bumrah

The correct answer is Jasprit Bumrah.

Key Points

• The Sir Garfield Sobers Trophy is the most prestigious individual award in world cricket, presented annually by the International Cricket Council (ICC) to the overall best male cricketer across all three formats of the game.

• Jasprit Bumrah was recognized with this honor for the year 2024 following a year of unprecedented dominance where he spearheaded India’s bowling attack to significant victories.

• A primary factor for this award was his sensational performance in the ICC Men’s T20 World Cup 2024, where he was named the Player of the Tournament for taking 15 wickets with a record-breaking economy rate of 4.17.

• In Test cricket, Bumrah demonstrated his class by claiming 19 wickets in the home series against England in early 2024, which propelled him to the Number 1 spot in the ICC Men’s Test Bowling Rankings.

• He became the first Indian specialist fast bowler to win the Sir Garfield Sobers Award, joining the ranks of Indian legends like Sachin Tendulkar, Virat Kohli, and Ravichandran Ashwin who have won it in previous years.

Additional Information

• Sir Garfield Sobers:

• The award is named after the legendary West Indian all-rounder, often regarded as one of the greatest cricketers of all time.

• Travis Head:

• An Australian aggressive top-order batter who was a top contender for the award due to his match-winning centuries in major ICC finals and consistency in White-ball cricket throughout 2023-2024.

• Joe Root:

• The England batting mainstay who continued his prolific run-scoring in Test cricket, nearing the record for the most runs and centuries for his country in 2024.

• Mitchell Starc:

• A premier Australian left-arm fast bowler known for his impact in ICC tournaments and for becoming one of the most expensive players in IPL history during the 2024 season.

Q47. Answer: (d) Iron is more reactive than copper

The correct answer is Iron is more reactive than copper.

Key Points

• The reaction between iron filings and copper sulphate solution is a classic example of a single displacement reaction, where a more reactive element displaces a less reactive element from its compound.

• According to the reactivity series of metals, Iron (Fe) is positioned above Copper (Cu), indicating that iron is more chemically active and has a higher tendency to lose electrons.

• When iron is added to the blue-coloured copper sulphate solution (CuSO4), it displaces the copper ions to form ferrous sulphate (FeSO4) and solid copper metal.

• The chemical equation for this reaction is represented as: Fe (s) + CuSO4 (aq) → FeSO4 (aq) + Cu (s).

• The observation of the solution changing from blue to light green confirms the formation of Fe^(2+) ions in the form of ferrous sulphate.

• The reddish-brown deposit seen on the iron filings is the pure copper metal that has been displaced from the solution.

Additional Information

• Reactivity Series:

• It is an arrangement of metals in the decreasing order of their reactivity. Metals at the top, like Potassium (K) and Sodium (Na), are highly reactive, while those at the bottom, like Gold (Au) and Platinum (Pt), are least reactive.

• Iron is more reactive than Tin (Sn), Lead (Pb), and Copper (Cu), allowing it to displace these metals from their respective salt solutions.

• Displacement Constraints:

• A reaction will not occur if a less reactive metal is added to a solution of a more reactive metal's salt; for instance, copper cannot displace iron from iron sulphate.

• Iron belongs to Group 8 and Period 4 of the Periodic Table, whereas Copper belongs to Group 11 and Period 4. Although they are both transition metals, their electronic configurations result in different levels of chemical reactivity.

Q48. Answer: (c) Sixth

The correct answer is Sixth.

Key Points

• The Bangkok Vision 2030 is a high-level strategic document that was officially approved during the Sixth BIMSTEC Summit, with Thailand serving as the host nation and the regional chair.

• The primary objective of this vision is to propel the Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC) toward a Prosperous, Resilient, and Open (PRO) region by the year 2030.

• This document aligns the regional goals of the member states with the United Nations 2030 Agenda for Sustainable Development, emphasizing collective growth and stability in the face of global economic uncertainties.

• The Sixth Summit signifies a shift from institutionalizing the group (which was the focus of the previous summit) to implementing a concrete roadmap for multimodal connectivity and maritime security.

Additional Information

• BIMSTEC Profile and Foundation:

• The organization was established on 6 June 1997 following the signing of the Bangkok Declaration, originally as BIST-EC.

• It serves as a unique bridge between South Asia and Southeast Asia, comprising seven member states: Bangladesh, Bhutan, India, Myanmar, Nepal, Sri Lanka, and Thailand.

• The permanent BIMSTEC Secretariat is located in Dhaka, Bangladesh, facilitating administrative and coordinated efforts among members.

• Evolution of Summit Decisions:

• The Fifth BIMSTEC Summit, held in Colombo, Sri Lanka in 2022, was landmark for adopting the BIMSTEC Charter, which provided the organization with a formal legal identity and flag.

• Following the Fifth Summit, the cooperation sectors were streamlined from 14 to 7 pillars, with India leading the Security pillar, which includes counter-terrorism and transnational crime.

• Economic Significance:

• BIMSTEC members represent approximately 22% of the global population and possess a combined Gross Domestic Product (GDP) exceeding 4.5 trillion USD.

• The Bangkok Vision 2030 specifically targets the reduction of trade barriers and the enhancement of digital connectivity to boost intra-regional trade.

Q49. Answer: (b) Article 21

The correct answer is Article 21.

Key Points

• In May 2025, the Supreme Court of India passed a significant judgment clarifying that the right to maternity leave is an intrinsic part of Article 21 of the Indian Constitution, which guarantees the Protection of Life and Personal Liberty.

• The Court held that the right to reproduce and the right to maternal health are fundamental components of a woman's dignity and bodily autonomy, which cannot be curtailed by the state or employers based on the number of children.

• The ruling addressed various state service rules that previously restricted maternity benefits to only the first two children. The Court declared such restrictions unconstitutional, stating that the biological reality of childbirth and the necessity of infant care do not change with the third child.

• The bench emphasized that Article 21 must be read in conjunction with the Maternity Benefit Act, 1961, to ensure that social security measures fulfill the constitutional goal of gender justice and economic empowerment for women in the workforce.

• By linking maternity leave to the Right to Life, the judiciary ensured that women are not forced to choose between their fundamental right to employment and their reproductive rights.

Additional Information

• Article 14:

• Guarantees Equality before the law and equal protection of laws within the territory of India.

• While it prohibits arbitrary classification, the primary focus of the 2025 declaration was the inherent dignity and survival rights found under the umbrella of Article 21.

• Article 19:

• Protects the six Fundamental Freedoms, including speech, assembly, and profession.

• Although maternity leave impacts the right to practice a profession, it is categorized under protective discrimination and right to health rather than mere freedom of movement or expression.

• Article 27:

• Provides Freedom as to payment of taxes for the promotion of any particular religion.

• This article is entirely unrelated to labor welfare, reproductive rights, or constitutional mandates for maternity benefits.

• Article 42:

• A Directive Principle of State Policy (DPSP) that mandates the state to make provisions for just and humane conditions of work and maternity relief.

• It serves as the interpretative guide that the Supreme Court used to expand the functional scope of Article 21 in this context.

Q50. Answer: (a) NARI 2025 Index

The correct answer is NARI 2025 Index.

Key Points

• The National Annual Report & Index (NARI) 2025 was released on August 28, 2025, by the National Commission for Women (NCW) under the leadership of Chairperson Vijaya Rahatkar.

• The index provides a unique perception-based safety score for urban women, aiming to capture the ground reality of safety across 31 major Indian cities covering all states.

• Methodologically, the report is based on a comprehensive survey of 12,770 women, documenting their lived experiences, unreported harassment, and sense of security, which often differs from official police records.

• The report established a national safety score of 65% as a benchmark; cities were categorized as much above, above, below, or much below this average.

• In the 2025 rankings, Kohima (Nagaland) emerged as the safest city, followed by Visakhapatnam, Bhubaneswar, Aizawl, Gangtok, Itanagar, and Mumbai, which all performed significantly above the benchmark.

• Conversely, cities like Patna, Jaipur, Faridabad, Delhi, Kolkata, Srinagar, and Ranchi were ranked at the bottom of the index, indicating high levels of perceived insecurity and weak institutional responsiveness.

Additional Information

• Gap between Perception and Statistics:

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• While NCRB (National Crime Records Bureau) data reflects only reported crimes, the NARI Index reveals that 40% of women in urban India feel unsafe or not so safe, particularly after dark.

• The survey found that only one in three women reported harassment incidents to the authorities, highlighting a significant gap in trust toward formal redressal mechanisms.

• Specific Risk Factors and Hotspots:

• Vulnerable Groups: Women under the age of 24 were found to be the most at-risk demographic, with 14% reporting harassment compared to the overall average of 7%.

• Locations: The most common locations for harassment identified were neighbourhoods (38%) and public transport (29%).

• Structural Determinants:

• The report emphasizes that safety is closely linked to gender equity, women-friendly infrastructure (such as adequate street lighting), and civic participation rather than just policing.

Q51. Answer: (b) Aravalli Range

The correct answer is Aravalli Range.

Key Points

• The Aravalli Range is an ancient mountain system in Northwestern India, stretching approximately 670 kilometers across the states of Gujarat, Rajasthan, Haryana, and the Union Territory of Delhi.

• It is globally recognized as one of the oldest fold mountain systems, with its geological origins dating back to the Proterozoic Eon, approximately 2.5 billion years ago.

• The range was formed during the Aravalli-Delhi Orogeny in the Precambrian era, making it significantly older than the Himalayas, which are classified as young fold mountains.

• Due to continuous weathering and erosion over millions of years, the Aravallis are now categorized as relict mountains (residual mountains), characterized by rounded peaks and lower elevations.

• The highest point of this range is Guru Shikhar, located on Mount Abu in Rajasthan, which stands at an elevation of 1,722 meters above sea level.

Additional Information

• Himalayas:

• Known as Young Fold Mountains, they formed about 50 million years ago due to the collision of the Indian and Eurasian plates.

• They contain the world's highest peaks, including Mount Everest and Kanchenjunga.

• Karakoram Range:

• Part of the Trans-Himalayan mountain system, it is home to K2 (Godwin-Austen), the second-highest peak in the world.

• It is a geologically active and young range situated in the Gilgit-Baltistan and Ladakh regions.

• Eastern Ghats:

• A discontinuous chain of mountains along India's eastern coast, spanning through Odisha, Andhra Pradesh, and Tamil Nadu.

• They are older than the Western Ghats but younger than the Aravallis, primarily composed of metamorphic rocks like khondalites and charnockites.

Q52. Answer: (b) All apps and data are closed and the PC powers off completely

The correct answer is All apps and data are closed and the PC powers off completely.

Key Points

• The Shut down command in Windows initiates a sequence that gracefully terminates all active software processes and services.

• When this option is selected, the Operating System sends a signal to all open applications to close; if there is unsaved data, Windows typically prompts the user to save their work before proceeding.

• Unlike other power modes, a full Shut down flushes the Random Access Memory (RAM) entirely, ensuring that no temporary session data remains in the volatile memory.

• Once all software components are closed and the Windows Kernel is stopped, the motherboard sends a signal to the Power Supply Unit (PSU) to cease the flow of electricity to the CPU, Hard Drives, and other peripherals.

• This process is essential for hardware maintenance, installing certain updates, and clearing system cache or memory leaks that may have occurred during the session.

• Therefore, the correct option is 2.

Additional Information

• Sleep Mode (Stand-by):

• This is a low-power state that keeps the current session, including all open apps and files, stored in the RAM.

• It allows the computer to resume full-power operation within seconds, but it requires a small amount of electricity to maintain the data in volatile memory.

• Hibernation:

• Primarily designed for laptops, this mode saves the current state of the system to the Hard Disk or SSD in a file named hiberfil.sys.

• After saving the session to the disk, the PC powers off completely, consuming zero power while allowing the user to resume exactly where they left off.

• Restart:

• This function closes all applications, shuts down the Operating System, and then immediately reboots the machine. It is frequently used to finalize software installations or driver updates.

Q53. Answer: (a) Austroasiatic

The correct answer is Austroasiatic.

Key Points

• The Munda languages represent the western sub-family of the Austroasiatic language family, which is considered one of the oldest indigenous linguistic groups in the Indian subcontinent.

• Geographically, these languages are concentrated in the Chota Nagpur Plateau and surrounding regions, spanning states such as Jharkhand, Odisha, West Bengal, Chhattisgarh, and parts of Madhya Pradesh.

• The most widely spoken Munda language is Santali, which is spoken by over 7 million people and holds the distinction of being the only Munda language listed in the Eighth Schedule of the Indian Constitution (added via the 92nd Amendment Act, 2003).

• Other significant languages in this group include Mundari, Ho, Korku, Sora, and Kharia, which are predominantly spoken by tribal communities identified as Adivasis.

• Linguistically, the Munda branch is distinct from the Mon-Khmer branch (the eastern sub-family of Austroasiatic) found in Southeast Asia and parts of North-East India (like the Khasi and Jaintia languages in Meghalaya).

Additional Information

• Indo-Aryan

• This is a branch of the Indo-European family and the largest language group in India, spoken by approximately 78 percent of the population.

• Major languages include Hindi, Bengali, Marathi, Gujarati, Punjabi, and Sanskrit.

• Dravidian

• This family is primarily indigenous to Southern India and is spoken by about 20 percent of the Indian population.

• It comprises major classical languages such as Tamil, Telugu, Kannada, and Malayalam.

• Sino-Tibetan

• Languages in this family are mostly found in the Himalayan region and North-East India.

• Key examples include Manipuri (Meitei), Bodo, Lushai, and various dialects spoken in Arunachal Pradesh.

Q54. Answer: (a) Womesh Chandra Bonnerjee

The correct answer is Womesh Chandra Bonnerjee.

Key Points

• The Indian National Congress (INC) held its first session from December 28 to December 31, 1885, marking the beginning of organized national political activity in India.

• Womesh Chandra Bonnerjee (W.C. Bonnerjee), a prominent barrister from Calcutta, was chosen as the first President of the assembly.

• The session was held at the Gokuldas Tejpal Sanskrit College in Bombay (now Mumbai). It was attended by 72 delegates representing various regions of British India.

• The formation of the Congress was spearheaded by Allan Octavian Hume (A.O. Hume), a retired British Civil Service officer, who served as the first General Secretary.

• Key objectives of the first session included promoting friendship among political workers from different parts of the country and formulating popular demands to be presented to the British government.

Additional Information

• Allan Octavian Hume:

• Often referred to as the Father of the Indian National Congress, he played a crucial role in organizing the first meeting to provide a constitutional outlet for Indian political aspirations, sometimes described as the Safety Valve Theory.

• Dadabhai Naoroji:

• Known as the Grand Old Man of India, he was the first Indian to be elected to the British House of Commons. He presided over the Congress sessions in 1886 (Calcutta), 1893 (Lahore), and 1906 (Calcutta), where he first used the word Swaraj.

• Dinshaw Wacha:

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• One of the founding members of the INC, he was a distinguished politician and economist who served as the President of the 1901 Calcutta session.

• Venue Change:

• The first session was originally scheduled to take place in Poona (Pune). However, due to a sudden outbreak of cholera in the city, the venue was shifted to Bombay.

Q55. Answer: (a) Ahmedabad

The correct answer is Ahmedabad.

Key Points

• The Commonwealth Sport General Assembly held in Glasgow, United Kingdom, in 2025 officially designated Ahmedabad, India, as the host city for the 2030 Commonwealth Games.

• The 2030 edition is of historical importance as it marks the Centenary (100th anniversary) of the Commonwealth Games, which originated as the British Empire Games in 1930.

• The successful bid was a joint effort by the Indian Olympic Association (IOA) and the Government of Gujarat, showcasing Ahmedabad as a premier global destination for multi-sport events.

• The city's selection was bolstered by its existing infrastructure, including the Sardar Vallabhbhai Patel Sports Enclave and the Narendra Modi Stadium, the largest stadium in the world.

• Hosting the 2030 Games is a strategic move by India to strengthen its bid for hosting the 2036 Summer Olympic Games.

• This will be the second time India hosts the event, 20 years after the 2010 Commonwealth Games were held in New Delhi.

Additional Information

• Centenary History:

• The first Commonwealth Games were held in Hamilton, Canada, in 1930, featuring 11 countries and 6 sports.

• The 2030 Centenary edition aims to celebrate a century of sportsmanship and the shared values of the Commonwealth.

• Other Notable Cities:

• New Delhi: The capital of India hosted the 19th Commonwealth Games in 2010, which saw India finishing second in the overall medal tally.

• Pune: Known as the cultural capital of Maharashtra, it successfully hosted the 3rd Commonwealth Youth Games in 2008 at the Balewadi Sports Complex.

• Bhopal: The capital of Madhya Pradesh has emerged as a major sports hub, notably hosting the 5th Khelo India Youth Games in 2023.

• Glasgow Connection:

• Glasgow hosted the 2014 Commonwealth Games and was selected to host the 2026 edition following the withdrawal of Victoria, Australia.

Q56. Answer: (b) This region receives low rainfall below 15 mm per year

The correct answer is This region receives low rainfall below 15 mm per year.

Key Points

• The Great Indian Desert, commonly known as the Thar Desert, is situated towards the western margins of the Aravali Hills. The range acts as a climatic divide, keeping the western part dry. Hence, statement 1 is correct.

• This region is characterized by an arid climate with extremely low precipitation. While the rainfall is indeed low, it typically averages between 100 mm and 150 mm per year (not below 15 mm). Hence, statement 2 is incorrect.

• It is geologically believed that the Thar Desert was under the sea during the Mesozoic era. This is supported by marine deposits and wood fossils discovered in regions like Akal near Jaisalmer, which date back to about 180 million years. Hence, statement 3 is correct.

• The desert features an undulating sandy plain covered with sand dunes. Due to high evaporation and low moisture, it has low vegetation cover consisting mostly of xerophytic plants. Hence, statement 4 is correct.

Additional Information

• Geographical Features of Thar Desert:

• Luni River: It is the only large and significant river in this region, which flows through the southern part of the desert before reaching the Rann of Kutch.

• Barchans: These are crescent-shaped sand dunes that cover larger areas of the desert, while longitudinal dunes become more prominent near the Indo-Pakistan border.

• Mesozoic Era Evidence: The Akal Wood Fossil Park contains fossils that prove the existence of lush forests in a humid climate before the region turned into a desert.

• Location: The desert spans across the states of Rajasthan, Gujarat, Haryana, and Punjab in India, as well as the Sindh and Punjab provinces in Pakistan.

Q57. Answer: (d) Proteins

The correct answer is Proteins.

Key Points

• Proteins are large, complex molecules known as the building blocks of the human body, composed of smaller units called amino acids. There are 20 different amino acids that combine in various sequences to form proteins.

• In the process of growth, proteins are essential for the production of new cells and the expansion of muscle mass, skin, and organs, especially during childhood, adolescence, and pregnancy.

• For healing and tissue repair, the body utilizes proteins to synthesize collagen, which provides the structural framework for skin and bones, and fibrin, which is necessary for blood clotting and wound closure.

• Beyond structure, proteins serve as enzymes and hormones (like insulin) that catalyze metabolic reactions and regulate physiological processes necessary for maintaining homeostasis.

• While the body can use proteins for energy, providing approximately 4 kcal per gram, their primary biological priority is the maintenance and regeneration of damaged tissues.

Additional Information

• Vitamins

• These are organic micronutrients required in trace amounts to facilitate chemical reactions, such as Vitamin C for immune function and Vitamin K for bone metabolism.

• Minerals

• Inorganic elements like Calcium and Phosphorus are vital for bone mineralization, while Iron is essential for hemoglobin production to transport oxygen.

• Fats

• Known as lipids, these provide the most concentrated source of energy (9 kcal per gram), aid in the absorption of fat-soluble vitamins (A, D, E, and K), and offer thermal insulation for the body.

Q58. Answer: (d) 3.5 billion cycles per second

The correct answer is 3.5 billion cycles per sec.

Key Points

• The Clock Rate (or clock speed) refers to the frequency at which a Central Processing Unit (CPU) executes its most basic operations, such as adding two numbers or moving data between registers.

• Clock speed is measured using the Hertz (Hz) unit, where 1 Hz is defined as one cycle per second.

• The prefix Giga (G) in the metric system represents a factor of 10^9, which is equivalent to 1,000,000,000 (one billion).

• Consequently, 1 Gigahertz (GHz) means the processor performs one billion clock cycles every second.

• For a CPU with a clock rate of 3.5 GHz, the calculation is 3.5 × 10^9, which equals 3,500,000,000 cycles per second.

• This measurement indicates the internal speed at which the System Clock oscillates to synchronize the components of the computer.

Additional Information

• Understanding Metric Prefixes in Computing:

• Kilohertz (kHz): Represents 1,000 (one thousand) cycles per second. Early computing devices often operated in this range.

• Megahertz (MHz): Represents 1,000,000 (one million) cycles per second. This was the standard unit for processors during the 1980s and 1990s (e.g., the Intel 80486).

• Gigahertz (GHz): The current standard for modern CPUs, RAM (Random Access Memory), and GPU (Graphics Processing Unit) speeds.

• The Fetch-Decode-Execute cycle:

• The speed of this cycle is directly limited by the clock rate; higher GHz generally allows more instructions to be processed in the same timeframe.

• Modern CPUs often employ Overclocking, which involves increasing the clock rate beyond the factory settings to enhance performance, though this generates significant heat.

• Efficiency is also measured by IPC (Instructions Per Cycle), meaning a CPU with a lower clock rate but higher IPC might outperform a high-GHz processor.

Q59. Answer: (d) 15 Years

The correct answer is 15 Years.

Key Points

• The Constitution (One Hundred Twenty-Eighth Amendment) Bill, 2023, also known as the Nari Shakti Vandan Adhiniyam, was introduced in the Lok Sabha on September 19, 2023, to enhance women's participation in governance.

• The legislation mandates the reservation of one-third (approximately 33 percent) of all seats for women in the Lok Sabha, the Legislative Assemblies of every State, and the Legislative Assembly of the National Capital Territory of Delhi.

• As per the newly inserted Article 334A, these reservation provisions will come into effect after a delimitation exercise is conducted based on the relevant figures of the first census taken after the commencement of the Constitution (One Hundred and Sixth Amendment) Act, 2023.

• The Act specifies that the reservation for women shall continue for an initial period of 15 years from the date of its commencement.

• The Parliament holds the authority to extend this duration beyond the initial 15-year period by enacting a new law if deemed necessary.

Additional Information

• Implementation Criteria:

• The reservation is linked to the completion of the next Census and the subsequent Delimitation exercise, ensuring seat allocation is based on updated demographic data.

• Seats reserved for women will be rotated after every subsequent delimitation exercise as determined by Parliamentary law.

• Horizontal Reservation:

• The bill provides for one-third reservation for women within the seats already reserved for Scheduled Castes (SCs) and Scheduled Tribes (STs) in the Lok Sabha and State Legislatures.

• Legislative Status:

• After receiving the President's assent on September 28, 2023, the bill became the Constitution (One Hundred and Sixth Amendment) Act, 2023.

Q60. Answer: (d) Ernest Rutherford

The correct answer is Ernest Rutherford.

Key Points

• In 1911, the British physicist Ernest Rutherford conducted the landmark Gold Foil Experiment (also known as the Geiger-Marsden experiment) to probe the structure of the atom.

• He bombarded a very thin sheet of gold foil, approximately 1000 atoms thick, with high-energy, positively charged alpha particles (doubly ionized helium nuclei).

• While most particles passed straight through the foil, Rutherford observed that a small fraction was deflected by large angles, and approximately 1 in 12,000 particles rebounded almost 180 degrees.

• Rutherford concluded that the atom is mostly empty space and contains a tiny, dense, and positively charged center called the nucleus, which contains nearly all of the atom's mass.

• This discovery effectively disproved the Plum Pudding Model proposed by J.J. Thomson, leading to the development of the Rutherford Atomic Model.

• Therefore, Ernest Rutherford is the scientist associated with the discovery of the atomic nucleus.

Additional Information

• Dmitri Mendeleev:

• A Russian chemist who formulated the Periodic Law and created the first widely recognized Periodic Table of elements in 1869.

• He famously left gaps for yet-to-be-discovered elements and predicted their properties based on their positions in the table.

• John Dalton:

• He pioneered the modern Atomic Theory in 1808, proposing that all matter is composed of tiny, indivisible particles called atoms.

• His work established the Law of Multiple Proportions and laid the foundation for modern chemical calculations.

• Robert Boyle:

• Regarded as the first modern chemist, he is most famous for Boyle's Law, which defines the inverse relationship between the pressure and volume of a gas at a constant temperature.

• He was a founding member of the Royal Society and was instrumental in separating chemistry from alchemy.

Q61. Answer: (c) It is partially molten and allows plates to move

The correct answer is It is partially molten and allows plates to move.

Key Points

• The asthenosphere is a highly viscous, mechanically weak, and ductile region of the Earth's upper mantle, situated just below the lithosphere.

• It typically extends from a depth of about 80 km to 200 km below the Earth's surface, though it can reach as deep as 700 km in certain regions.

• This layer exists in a plastic or semi-fluid state because the temperatures are high enough to cause partial melting of the rock

(approximately 1% to 5% melt), reducing its overall rigidity.

• The lithosphere, which is composed of the crust and the rigid uppermost mantle, is broken into tectonic plates that 'float' and glide over the yielding material of the asthenosphere.

• Convection currents occurring within the asthenosphere serve as the primary driving force for plate movements, facilitating processes such as seafloor spreading and subduction.

Additional Information

• Lithosphere:

• Characterized by its brittle and rigid nature compared to the layers below.

• It includes both continental crust and oceanic crust.

• Outer Core:

• The layer responsible for generating the Earth's magnetic field through the geodynamo process.

• Unlike the asthenosphere, the outer core is entirely liquid and composed mainly of iron and nickel.

• Mantle Composition:

• The asthenosphere is primarily composed of peridotite, an ultramafic rock rich in magnesium and iron.

• Seismic waves slow down when they hit the asthenosphere, a region often called the Low Velocity Zone (LVZ), confirming its less-than-solid state.

Q62. Answer: (c) Science and mathematics learning

The correct answer is Science and mathematics learning.

Key Points

• The Rashtriya Avishkar Abhiyan (RAA) was formally launched on July 9, 2015, by the Ministry of Human Resource Development (now the Ministry of Education) to create a scientific temper among school children.

• The initiative was conceptualized based on the vision of the late former President Dr. A.P.J. Abdul Kalam, aiming to nurture a spirit of inquiry and creativity in students outside the traditional rote-learning framework.

• It focuses primarily on students in the age group of 6 to 18 years, covering children from Class I to XII in government schools, Kendriya Vidyalayas, and Navodaya Vidyalayas.

• The core objective is to motivate children to develop an interest and excellence in Science, Mathematics, and Technology through observation, experimentation, and drawing inferences from their surroundings.

• The programme facilitates a mentorship model where Higher Education Institutions (HEIs) like IITs, IISERs, IIMs, and Central Universities adopt schools to provide technical guidance and academic support.

Additional Information

• Components of RAA:

• School-based Clubs: The scheme encourages the formation of Science Circles and Mathematics Circles to organize activities like quizzes, exhibitions, and model-making.

• Teacher Training: It emphasizes the professional development of Science and Mathematics teachers through workshops and exposure to modern pedagogical tools.

• Learning Resources: The Abhiyan promotes the use of Science Laboratories, Maths Kits, and Technology-Enabled Classrooms to make abstract concepts more tangible for students.

• Field Visits: Students are encouraged to visit National Research Laboratories, Innovation Hubs, Science Museums, and Industrial Units to see the real-world application of their curriculum.

• Sustainability: RAA is now implemented as a component of the Samagra Shiksha scheme, ensuring integrated support from pre-school to senior secondary levels.

Q63. Answer: (a) 2003

The correct answer is 2003.

Key Points

• The Fiscal Responsibility and Budget Management (FRBM) Act was enacted by the Parliament of India in 2003 to institutionalize fiscal discipline and reduce the country's fiscal deficit.

• The legislation was introduced during the tenure of the Atal Bihari Vajpayee government with the aim of ensuring inter-generational equity in fiscal management and long-term macro-economic stability.

• The primary mandate of the Act was for the Central Government to limit the fiscal deficit to 3% of the Gross Domestic Product (GDP) and eliminate the revenue deficit by a specified target date.

• The Act requires the government to maintain transparency in its fiscal operations by presenting three documents along with the annual budget: the Medium-term Fiscal Policy Statement, the Fiscal Policy Strategy Statement, and the Macro-economic Framework Statement.

Additional Information

• Implementation and Reviews:

• While the Act was enacted in 2003, it officially came into effect on July 5, 2004.

• In 2016, the N.K. Singh Committee was formed to review the FRBM Act, recommending a Debt-to-GDP ratio of 60% (40% for the Centre and 20% for States) to be achieved by 2023.

• Escape Clause and Amendments:

• The Act contains an Escape Clause (Section 4) that allows the government to exceed fiscal targets during exceptional circumstances like national security, war, national calamity, or a severe collapse in agriculture.

• The Finance Act, 2018 significantly amended the FRBM Act, shifting the policy focus toward targeting the Debt-to-GDP ratio rather than just the revenue deficit.

• Article 292 of the Indian Constitution provides the legal basis for the Union Government to borrow money upon the security of the Consolidated Fund of India within limits set by Parliament.

Q64. Answer: (c) Odisha

The correct answer is Odisha.

Key Points

• The Astra is a state-of-the-art Beyond Visual Range Air-to-Air Missile (BVRAAM) designed to engage and destroy highly maneuvering supersonic aerial targets, and its successful launch from the LCA Tejas marks a significant milestone in India's indigenization efforts.

• The Aeronautical Development Agency (ADA), in coordination with the Defence Research and Development Organisation (DRDO), conducted this critical test launch to validate the weapon system's integration with the LCA Tejas AF MK1 prototype.

• The test was conducted at the Integrated Test Range (ITR) located in Chandipur, Odisha, which is the premier facility for testing and evaluating the performance of Indian missiles, providing sophisticated telemetry, electro-optical, and radar systems for flight tracking.

• The successful validation of the Astra missile from the Tejas platform significantly enhances the combat potential of the Light Combat Aircraft (LCA), allowing it to strike enemy aircraft from a distance of over 100 kilometers without being detected.

Additional Information

• Astra Missile Features:

• It is an all-weather missile developed by Defence Research and Development Laboratory (DRDL) and other laboratories of DRDO.

• The missile has a speed of over Mach 4 and is equipped with advanced electronic counter-countermeasures (ECCM) to perform in electronic warfare environments.

• It serves as a key component of the Atmanirbhar Bharat initiative, reducing dependence on imported air-to-air missiles like the R-77 or MICA.

• Integrated Test Range (ITR), Odisha:

• Located along the Bay of Bengal in Balasore district, it includes the Chandipur range and the Dr. APJ Abdul Kalam Island (formerly Wheeler Island).

• It is the nerve center for India's Integrated Guided Missile Development Programme (IGMDP), where systems like Agni, Prithvi, and Akash undergo rigorous trials.

• Aeronautical Development Agency (ADA):

• Established in 1984, it is an autonomous body under the Ministry of Defence responsible for the design and development of India's Light Combat Aircraft (LCA).

Q65. Answer: (c) Administrative Tribunals Act, 1985

The correct answer is Administrative Tribunals Act, 1985.

Key Points

• The Central Administrative Tribunal (CAT) was established under the Administrative Tribunals Act, 1985, which was enacted by the Parliament in exercise of the powers conferred by Article 323A of the Constitution of India.

• Article 323A was inserted into the Constitution via the 42nd Amendment Act, 1976, specifically authorizing the Parliament to provide for the adjudication of disputes relating to the recruitment and conditions of service of public servants.

• The Administrative Tribunals Act, 1985 facilitates the setting up of a Central Administrative Tribunal for the Union and State Administrative Tribunals (SATs) for individual states to ensure speedy and inexpensive justice.

• The Central Administrative Tribunal was formally established on November 1, 1985, during the tenure of the Rajiv Gandhi government, with its principal bench located in New Delhi.

• The tribunal is a statutory body that functions as a specialized court to adjudicate service-related matters, thereby reducing the heavy pendency of cases in the High Courts and the Supreme Court.

Additional Information

• Constitutional Framework and Jurisdiction:

• While Article 323A is dedicated exclusively to administrative tribunals for public service matters, Article 323B provides for the establishment of tribunals for other matters like taxation, labor, and land reforms.

• The jurisdiction of CAT extends to the All-India Services, the Central Civil Services, civil posts under the Centre, and civilian employees of the defense services.

• Members of the regular defense forces, officers and servants of the Supreme Court, and the secretarial staff of the Parliament are specifically excluded from its jurisdiction.

• Composition and Procedural Nature:

• The tribunal is a multi-member body consisting of a Chairman and several Members drawn from both Judicial and Administrative backgrounds to provide balanced expertise.

• The tribunal is not bound by the rigid procedure prescribed in the Code of Civil Procedure, 1908; instead, it is guided by the Principles of Natural Justice.

• Following the landmark L. Chandra Kumar Case (1997), the Supreme Court ruled that orders of the CAT are subject to the judicial review of the High Courts under Article 226/227.

Q66. Answer: (d) Battle of Chinhat

The correct answer is Battle of Chinhat.

Key Points

• The Battle of Chinhat was fought on June 30, 1857, at Chinhat, a village near Lucknow, as part of the Indian Rebellion of 1857.

• Maulvi Ahmadullah Shah, a prominent revolutionary leader known as the 'Lighthouse of Rebellion', played a crucial role in leading the rebel forces during this encounter.

• The British East India Company forces, led by Sir Henry Lawrence, were significantly outnumbered and outmaneuvered by the rebel army, leading to a disastrous defeat for the British.

• Following the victory at Chinhat, the rebel forces effectively chased the British troops back to the Lucknow Residency, which initiated the historic Siege of Lucknow.

• This battle is noted for the desertion of the British native police and artillerymen to the rebel side, which fundamentally shifted the tide of the conflict in the Awadh region.

Additional Information

• Maulvi Ahmadullah Shah:

• He was a native of Arcot but became a central figure in Faizabad and was a staunch advocate of armed resistance against British colonial rule.

• Because of his military success and spiritual influence, the British government placed a significant bounty of Rs 50,000 on his head.

• Battle of Jhansi:

• This refers to the Siege of Jhansi in 1858, where Rani Lakshmibai defended her state against the Central India Field Force led by Sir Hugh Rose.

• Battle of Kanpur:

• A major center of rebellion led by Nana Sahib and Tatya Tope, which included events like the Satichaura Ghat incident before the city was retaken by Sir Colin Campbell.

• Battle of Plassey:

• Fought on June 23, 1757, between Siraj-ud-Daulah and Robert Clive; it predates the 1857 Revolt by a century and established British political dominance in Bengal.

Q67. Answer: (c) 32

The correct answer is 32.

Key Points

• ASCII, which stands for American Standard Code for Information Interchange, is a character encoding standard that uses 7 bits to represent each character.

• A 7-bit system allows for a total of 128 unique characters (2^7 = 128), ranging from decimal values 0 to 127.

• Within this set, the original standard specifically designates a block of 32 control characters located at the beginning of the character map.

• These 32 control characters occupy decimal positions 0 through 31 (hexadecimal 00 to 1F) and are primarily non-printable.

• The purpose of these codes is to manage hardware devices and data streams; for instance, CR (Carriage Return) at 13 and LF (Line Feed) at 10 are used to control text formatting on printers and screens.

• Other notable control characters include NUL (Null) at 0, TAB (Horizontal Tab) at 9, and ESC (Escape) at 27, all of which provide functional instructions rather than visual symbols.

Additional Information

• ASCII Character Categories:

• Printable Characters: There are 95 printable characters in the 7-bit ASCII standard, ranging from decimal 32 to 126. This group includes the space character, punctuation marks, digits 0-9, and both uppercase and lowercase English alphabets.

• The DEL Character: Decimal 127 represents the Delete (DEL) character. While it is non-printable, it is often categorized separately from the primary 32-character control block (0-31).

• Extended ASCII: To support more characters, an 8-bit version was developed, doubling the capacity to 256 characters. This allows for additional mathematical symbols, graphical elements, and foreign language characters.

• Evolution to Unicode: Modern computing has largely transitioned to Unicode (UTF-8), which maintains the original ASCII table as its first 128 entries to ensure backward compatibility with older systems and files.

Q68. Answer: (c) In RAM, which remains powered with a small amount of electricity

The correct answer is In RAM, which remains powered with a small amount of electricity.

Key Points

• Sleep Mode, technically referred to as the S3 sleep state under the ACPI (Advanced Configuration and Power Interface) specification, is a low-power mode that allows a computer to quickly resume full operation.

• When a Windows laptop enters this mode, the Operating System saves the current working state, including all open applications, files, and system metadata, into the RAM (Random Access Memory).

• Since RAM is volatile memory, it requires a constant flow of power to retain data; therefore, the system maintains a trickle charge or a small amount of electricity to the memory modules while cutting power to most other hardware components.

• The primary advantage of this mechanism is the resume speed, as the system does not need to reload data from the slower storage drive into the memory upon waking.

• If power is completely lost (e.g., battery dies) while in this mode, any unsaved data stored in the RAM is permanently lost because the volatile storage resets without power.

Additional Information

• Comparison of Power States:

• Hibernate Mode (S4 State): Saves the session to the Hard Disk (HDD) or Solid State Drive (SSD) in a file named hiberfil.sys and turns off the power entirely.

• Hybrid Sleep: A combination used mainly on desktops where the session is saved to both RAM and the Hard Drive to protect against power failure.

• Modern Standby (S0 Low Power Idle): A newer state used in modern laptops that allows the system to stay connected to the internet and receive notifications even when the screen is off.

• Technical Limitations of Other Options:

• System Drive: Writing to the drive is a non-volatile process characteristic of Hibernation, not standard Sleep.

• CPU Cache: L1, L2, and L3 caches are extremely small (ranging from a few kilobytes to several megabytes) and cannot hold the Gigabytes of data required for a user session.

• BIOS Chip: The ROM or Flash memory on the Motherboard is reserved for firmware and POST (Power-On Self-Test) instructions and lacks the capacity or speed for session storage.

Q69. Answer: (b) Maharashtra

The correct answer is Maharashtra.

Key Points

• Maharashtra remains the leading state in India regarding the density of UNESCO World Heritage Sites, boasting a total of five unique cultural inscriptions as of December 2025.

• The Ajanta Caves, recognized in 1983, consist of 30 rock-cut Buddhist cave monuments dating from the 2nd century BCE to about 480 CE, famous for their mural paintings.

• The Ellora Caves, also inscribed in 1983, are a magnificent complex of 34 monasteries and temples representing Buddhism, Hinduism, and Jainism, including the largest monolithic structure, the Kailasa Temple.

• The Elephanta Caves, located on Gharapuri Island in the Mumbai Harbour, were designated in 1987 and are primarily dedicated to the cult of Lord Shiva.

• The Chhatrapati Shivaji Maharaj Terminus (formerly Victoria Terminus) was added to the list in 2004 as a masterpiece of Victorian Gothic Revival architecture blended with Indian traditional motifs.

• The Victorian Gothic and Art Deco Ensembles of Mumbai, inscribed in 2018, highlight the city's unique urban development through 19th-century neo-Gothic and 20th-century Art Deco styles.

Additional Information

• UNESCO World Heritage Sites are places of Outstanding Universal Value to humanity, protected under an international

convention.

• Rajasthan:

• Hosts four primary entries: the Keoladeo National Park, Jantar Mantar, the Hill Forts of Rajasthan (Chittorgarh, Kumbhalgarh, etc.), and the Pink City of Jaipur.

• Karnataka:

• Contains four distinct entries: the Group of Monuments at Hampi, Group of Monuments at Pattadakal, the Sacred Ensembles of the Hoysalas (added in 2023), and portions of the Western Ghats.

• Uttar Pradesh:

• Home to three world-renowned sites: the Taj Mahal, Agra Fort, and the abandoned city of Fatehpur Sikri.

Q70. Answer: (b) keeping a bill pending indefinitely

The correct answer is keeping a bill pending indefinitely.

Key Points

• The Pocket Veto is a constitutional power exercised by the President of India whereby they neither give assent to a bill nor return it for reconsideration to the Parliament.

• Under Article 111 of the Indian Constitution, the President has three choices regarding a bill: grant assent, withhold assent, or return it (if it is not a Money Bill). However, the Constitution does not specify any time limit within which the President must take action.

• Because there is no prescribed duration for the President to act, they can simply keep the bill on their desk for an indefinite period, effectively preventing the bill from becoming an Act.

• This veto is called 'pocket' because the President metaphorically puts the bill in their pocket and forgets about it, as the Constitution is silent on the urgency of the decision.

Additional Information

• Veto Powers of the Indian President:

• Absolute Veto: The power of the President to say 'no' to a bill passed by Parliament. The bill then ends and does not become an act. This is usually used for Private Members' Bills.

• Suspensive Veto: The President exercises this by returning a bill for reconsideration. If Parliament passes the bill again with a simple majority (with or without amendments), the President is bound to give assent. This veto cannot be used for Money Bills.

• Historical Instance: In 1986, President Giani Zail Singh exercised the pocket veto with respect to the Indian Post Office (Amendment) Bill, which the government of Rajiv Gandhi had passed, as it was criticized for violating the privacy of correspondence.

• Comparison: In the USA, the President must return a bill within 10 days; thus, the Indian President has a wider scope for the pocket veto because of the absence of a constitutional deadline.

Q71. Answer: (b) 7

The logic follows here,

Therefore, the code for E is 7.

Hence, the correct answer is "Option 2"

Q72. Answer: (d) Two

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 two boxes are kept above F.

2. Only three boxes are kept below C.

3. E is kept immediately above F but below A.

Position	Box
7	A
6	E
5	F
4	C
3	
2	
1	

1. B is kept above G but below D.

Final Arrangement:

7	A
6	E
5	F
4	C
3	D
2	B
1	G

Thus, two boxes are kept between A and C.

Hence, the correct answer is 'Option 4'.

Q73. Answer: (a) 6

The logic followed here is.

Therefore, the code for L is 6.

Hence, the correct answer is "option 1"

Q74. Answer: (d) QC - PY

The logic followed here is

For AI - ZF,

For TL - SI,

For GY - FV,

For QC - PY

This pair does not follow the rule.

Therefore, the letter-cluster pair that is different from the others is QC - PY.

Hence, the correct answer is 'Option 4'.

Q75. Answer: (a) 92

The logic followed here is:

• 70 + 10 = 80

• 80 + 12 = 92

• 92 + 14 = 106

• 106 + 16 = 122

• 122 + 18 = 140

The value that should come in place of the question mark is 92.

Hence, The correct answer is "option 1"

Q76. Answer: (d) 10 km to the south

Given:

• Sitara starts from Point A and drives 23 km towards the west. He then takes a left turn, drives 24 km, turns left and drives 33 km.

• He then takes a left turn and drives 34 km.

• He takes a final left turn, drives 10 km and stops at Point P.

The correct answer is 10 km to the south.

Hence, the correct answer is "Option 4"

Q77. Answer: (d) HQN

The logic follows here,

The next term is HQN.

Hence, the correct answer is "Option 4"

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Q78. Answer: (a) BBIG

The logic followed is,

For 'DVUK' related to 'GZZQ':

For 'PLOI' related to 'SPTO':

Applying the same logic to 'YXDA':

Note:

Thus, YXDA is related to BBIG.

Hence, the correct answer is 'Option 1'.

Q79. Answer: (c) AGD

The logic followed here is:

Therefore, the correct answer is AGD.

Hence, the correct answer is "option 3"

Q80. Answer: (c) Neither conclusion (I) nor (II) follows

The least possible Venn diagram for the given statements is:

(I) Some cameras are monkeys - Doesn't follow (Their is no direct relation between camera and monkey; maybe it is possible but not definite)

(II) All monkeys are pictures - Doesn't follow

(Some Monkey are pictures, and some picture are monkeys.)

Neither conclusion (I) nor (II) follows.

Hence, the correct answer is "Option 3"

Q81. Answer: (a) Brother's wife's brother

Preparing the family tree diagram by using the following symbols:

Let us first decode the given symbols and then draw a family tree.

Symbol	**÷**	**#**	**•**	**&**
Meaning	Son	Wife	Brother	Father

Given expression: S ÷ D & R # Y + H’

Based on the family tree, S is the brother of R, R is the wife of Y, and Y is the brother of H. Thus, S is the brother of H's brother's wife.

Therefore, S is the Brother's wife's brother of H.

Hence, the correct answer is 'Option 1'.

Q82. Answer: (b) YQC

The logic follows here,

Hence, the correct answer is "option 2"

Q83. Answer: (c) 1046

BODMAS Table:

Sign Conversion:

–	**÷ (div)**	**•**	**× (times)**
×	•	–	÷

Given: 38 − 25 ÷ 133 + 703 × 19

After replacing the symbols with their meaning and following BODMAS rule, we get.

= 38 × 25 + 133 − 703 ÷ 19

= 38 × 25 + 133 − 37

= 950 + 133 − 37

= 1083 − 37

= 1046

Hence, the correct answer is "option 3"

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Q84. Answer: (c) 1

Given word: COMBINE:

Original	C	O	M	B	I	N	E	
| Alphabetical order | | --- |	Alphabetical order	B	C	E	I	M	N	O
Alphabetical order								

Only the letter N remains in its original 6th position after the letters are arranged in alphabetical order.

The number of letters whose position remains unchanged is 1.

Hence, the correct answer is "option 3"

Q85. Answer: (a) 311

The logic followed here is,

• 486 − 45 = 441

• 441 − 40 = 401

• 401 − 35 = 366

• 366 − 30 = 336

• 336 − 25 = 311

Thus, the missing term in the series is 311.

Hence, the correct answer is 'Option 1';

Q86. Answer: (c) 16

The logic followed here is:

Total number of people in the row = 195

Position of Rt from the left end = 143^(rd)

Position of Kl from the right end = 36^(th)

To find the number of people between them, we first determine the position of Kl from the left end.

Position of Kl from the left end = (Total number of people − Position of Kl from the right end) + 1

= (195 − 36) + 1

= 159 + 1

= 160^(th)

Now, the number of people between Rt and Kl = (Position of Kl from the left end − Position of Rt from the left end) − 1

= (160 − 143) − 1

= 17 − 1

= 16

Hence, the correct answer is "Option 3".

Q87. Answer: (a) Q

Given word: VOLUNTARY

Applying the logic to the word VOLUNTARY:

Original Letter	V	O	L	U	N	T	A	R	Y
New Letter	U	Q	K	W	M	S	C	Q	X

The letters formed after the transformation are: U, Q, K, W, M, S, C, Q, X.

The letter Q appears exactly twice in the group.

Hence, the correct answer is "option 1"

Q88. Answer: (b) Only conclusion (II) follows

The least possible Venn diagram for the given statements is:

(I) All buttons are kings - Doesn't follow (All kings are buttons and All buttons are kings is may be possible but not definite.Hence, it is false)

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(II) Some buttons are not pants - Follow (all kings are buttons and no kings are pants, the part of buttons that consists of kings can never be pants.)

Only conclusion (II) follows

Hence, the correct answer is " Option 2"

Q89. Answer: (a) N

Given: Seven boxes L, M, N, O, P, Q and R are kept one over the other but not necessarily in the same order

1. Q is placed at the topmost position.
2. Exactly three boxes are kept between P and M, and P is kept on one of the positions above M.
3. Box M is kept immediately above O.

Position	Box
7	Q
6	P
5	
4	
3	
2	M
1	O

1. Only one box is kept between R and O, and R is kept on one of the positions above O.
2. Box N is kept immediately below L.

Final Arrangement:

7	Q
6	P
5	L
4	N
3	R
2	M
1	O

Thus, the box kept fourth from the top is N.

Hence, the correct answer is 'Option 1'.

Q90. Answer: (b) A

Given : A, B, C, D, S, T and U are sitting around a circular table, facing the centre of the table.

1. Only three people sit between B and C, when counted from the left of B.
2. Only three people sit between U and T, when counted from the right of T.
3. D sits to the immediate right of U.
4. A is an immediate neighbor of T as well as C

The Final Arrangement is,

Therefore, A sits second to the left of S.

Hence, the correct answer is 'Option 2'.

Q91. Answer: (a) OLM

The logic followed here is,

Logic: Second letter = First letter − 4; Third letter = Second letter + 2.

OLM,

CYA,

EAC,

AWY,

Therefore, the letter cluster that is different from the others is OLM.

Hence, the correct answer is 'Option 1'.

Q92. Answer: (c) LS 9

The logic follows here,

KG 13 is related to IC −2,

NH 20 is related to LD 5,

Applying same logic to NW 24 is related to LS 9,

Hence, the correct answer is 'Option 3'.

Q93. Answer: (d) KGI−EAC

Logic followed here is.

Logic: The second letter cluster is determined by subtracting 6 from the positional values of the letters in the first cluster.

For

QMO − KGI,

For RNP − LHJ,

Applying for the same logic,

For KGI−EAC,

Hence, the correct answer is "Option 4"

Q94. Answer: (d) Two

Given: P W I C T G T X W J N L X T D X E S C S Z

Required Pattern: Consonant — Vowel — Consonant

(Left) P W I C T G T X W J N L X T D X E S C S Z (Right)

I C, E S

Hence, the correct answer is "option 4"

Q95. Answer: (a) S

Given: Seven people, U, T, E, N, S, I and L, are sitting in a row, facing the north.

1. Only E sits to the left of N.

2. Only four people sit between E and T.

3. Only U sits between I and L and I is not an immediate neighbor of T.

The final seating arrangement,

From the above arrangement, we can see that S sits at the extreme right of the line.

Hence, the correct answer is "option 1"

Q96. Answer: (d) JK - WV

The logic followed here is

For MN - CY,

For OP - EA,

For UV - KG,

For JK - WV

This pair does not follow the rule, as the difference in the second cluster is −1.

Therefore, the letter-cluster pair that is different from the others is JK - WV.

Hence, the correct answer is 'Option 4'.

Q97. Answer: (d) (6, 1, 25)

The logic followed here is:

Logic: (First Number + Second Number) + 18 = Third Number

For the first set (2, 11, 31)

=> (2 + 11) + 18

=> 13 + 18 = 31.

For the second set (13, 10, 41)

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=> (13 + 10) + 18

=> 23 + 18 = 41.

Applying the same logic to the set (6, 1, 25)

=> (6 + 1) + 18

=> 7 + 18 = 25.

Hence, the correct answer is 'Option 4'.

Q98. Answer: (d) 30

BODMAS Table:

Given equation: 9 − 4 + 45 × 5 ÷ 3 = ?

The operator conversions are:

Original Symbol	New Symbol
•	−
−	×
×	÷
÷	•

After replacing the symbols with their new meanings, the equation becomes:

= 9 × 4 − 45 ÷ 5 + 3

= 9 × 4 − 9 + 3

= 36 + 3 − 9

= 39 − 9

= 30

The value that comes in place of the question mark is 30.

Hence, the correct answer is "option 4"

Q99. Answer: (c) Mother's mother's brother

Preparing the family tree diagram by using the following symbols:

As per the given information

Let us first decode the given symbols and then draw a family tree.

Symbol	−	•	•	times
Meaning	Brother	Wife	Father	Mother

Given : H − I + O * D * J

Therefore, D is the mother of J, and I is the mother of D (as I is the wife of D's father O). H is the brother of I. Thus, H is the Mother's mother's brother of J.

Hence, the correct answer is 'Option 3'.

Q100. Answer: (b) 19

BODMAS Table:

Given Interchanges:

• + and ÷ are interchanged.

• − and × are interchanged.

Given Equation: 14 − 2 × 48 + 3 ÷ 7 = ?

Step 1: Replace the signs with their interchanged and applying BODMAS rule,

The new equation becomes: 14 × 2 − 48 ÷ 3 + 7

= 14 × 2 − 48 ÷ 3 + 7

= 14 × 2 − 16 + 7

= 28 + 7 − 16

= 35 − 16

= 19

The final value obtained is 19.

Hence, the correct answer is "option 2"

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