RRB NTPC (UG) CBT-I Official Paper (Held On: 14 Aug, 2025 Shift 1) (Previous Year Paper)

RRB Group D • 2025 • 100 questions • 90 minutes • Answer key and solutions

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GENERAL AWARENESS

Q1. Rabindranath Tagore's "Geetanjali," which was awarded the Nobel Prize in 1913, is best classified as which form of writing?

(a) A collection of short stories
(b) A play
(c) A collection of poetry
(d) A novel

Q2. India participated in the 9th BRICS Industry Ministers' Meeting held on 21 May 2025, under the Chairmanship of which country?

(a) Russia
(b) South Africa
(c) Brazil
(d) UAE

Q3. Which institution played a key role in influencing the structural reforms of the industrial sector in India post 1991?

(a) NABARD
(b) WTO
(c) IMF and World Bank
(d) RBI

Q4. The Acheulian cultural tradition is primarily identified with which types of advanced and symmetrical stone tools?

(a) Blades and borers
(b) Microliths and scrapers
(c) Chisels and adzes
(d) Cleavers and hand-axes

Q5. Which international agreement was signed to control emissions of ozone-depleting substances?

(a) Basel Convention
(b) Montreal Protocol
(c) Earth Summit
(d) Kyoto Protocol

Q6. Which of the following schemes aims to skill rural youth who are poor and provide them with jobs having regular monthly wages or above the minimum wages?

(a) Deen Dayal Upadhyaya Grameen Kaushalya Yojana (DDU-GKY)
(b) Garib Kalyan Rozgar Yojana (GKRY)
(c) Prime Minister Employment Generation Programme (PMEGP)
(d) Pradhan Mantri Kaushal Vikas Yojana (PMKVY)

Q7. The Human Genome Project, launched in 1990, had the goal of determining the sequence of how many billion base pairs that make up human DNA?

(a) 3.0 billion
(b) 5.2 billion
(c) 4.3 billion
(d) 2.1 billion

Q8. India's foreign trade structure changed significantly under British rule. During the colonial period, what kind of goods did India primarily export?

(a) Capital goods
(b) Manufactured goods
(c) Automobiles
(d) Raw materials

Q9. What name did Dobereiner give to his groups of three similar elements?

(a) Triangles
(b) Triads
(c) Triplets
(d) Triodes

Q10. What does 'dyarchy' mean in the context of the 1919 Act?

(a) Power to the judiciary and legislature
(b) Dual monarchy system
(c) Dual control in provinces
(d) Centralised governance

Q11. What is the primary function of the Control Unit within a CPU?

(a) Performing arithmetic calculations
(b) Managing external device connections
(c) Directing the flow of instructions and data
(d) Storing frequently used data

Q12. Which of the following minerals is known for its insulating properties and is used in electrical industries?

(a) Bauxite
(b) Limestone
(c) Mica
(d) Iron ore

Q13. Which of the following is an example of social legislation introduced by the British during the colonial period in India?

(a) The Rowlatt Act
(b) The Vernacular Press Act
(c) The Indian Councils Act
(d) The Widow Remarriage Act

Q14. The M23 rebel group, which has recently advanced in eastern regions such as Goma and Bukavu, is active in which of the following countries?

(a) South Sudan
(b) Republic of Congo
(c) Democratic Republic of Congo
(d) Central African Republic

Q15. Which article of the Indian Constitution relates RTI to the fundamental right to freedom of speech and expression?

(a) Article 15(1)(b)
(b) Article 21
(c) Article 32

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(d) Article 19(1)(a)

Q16. Which of the following exercises was conducted by the Indian Air Force (IAF) in April 2025 to simulate attacks on mountain and ground targets using advanced fighter jets like Rafale and Su-30MKI?

(a) Vayu Shakti
(b) Meghdoot
(c) Aakraman
(d) Gagan Shakti

Q17. Which of the following Articles of the Indian Constitution is commonly cited as forming the constitutional basis for Judicial Review?

(a) Article 30
(b) Article 19
(c) Article 370
(d) Article 13

Q18. Which Indian institute's scientists unlocked the mystery of a cellular 'messenger' that may help treat Alzheimer's and diabetes?

(a) AIIMS New Delhi
(b) IIT Delhi
(c) IISc Bengaluru
(d) IIT Kharagpur

Q19. What is a special feature of the new 'Agni-Prime' missile tested by India in March 2025?

(a) Hits many targets
(b) Canister launch and new materials
(c) Launched from submarines
(d) Cryogenic engine

Q20. Joseph Francois Dupleix was the governor who led the forces of which of the following European powers?

(a) British
(b) Portuguese
(c) Dutch
(d) French

Q21. What can be the shape of the trajectory of a charged particle moving in a uniform magnetic field?

(a) Helical path
(b) Elliptical path
(c) Parabolic path
(d) Hyperbolic path

Q22. What is the main feature of the 106th Constitutional Amendment Act, 2023?

(a) Set up of the Lokpal
(b) Reservation of one-third seats for women in legislatures
(c) Provision of legal status to Right to Property
(d) Abolishment of titles

Q23. The Western Ghats and the northeastern hills of India are primarily covered with which type of natural vegetation?

(a) Tropical Evergreen Forests
(b) Tropical Deciduous Forests
(c) Tropical Thorn Forests
(d) Montane Forests

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Q24. Which nation became the fourth nation to successfully dock two satellites in space in January 2025?

(a) China
(b) The US
(c) Russia
(d) India

Q25. Major Malla Rama Gopal Naidu of the Maratha Light Infantry of the Indian Army was awarded with which of the following honours in May 25?

(a) Shaurya Chakra (Posthumous)
(b) Kirti Chakra
(c) Kirti Chakra (Posthumous)
(d) Shaurya Chakra

Q26. Which of the following is NOT a major cause of the people's revolts before 1857?

(a) Exploitation of rural society by corrupt officers.
(b) Destruction of indigenous industries.
(c) Conversion of people to Christianity.
(d) Colonial land revenue settlements.

Q27. At the 2025 Cannes Film Festival, who was honoured with the Honorary Palme d'Or recognising lifetime achievement?

(a) Leonardo DiCaprio
(b) Robert De Niro
(c) Quentin Tarantino
(d) Denzel Washington

Q28. Which of the following colonial-era buildings in Chennai serves as the headquarters of the Greater Chennai Corporation?

(a) High Court
(b) Ripon Building
(c) Fort St. George
(d) Government Museum

Q29. Who among the following launched the Nationwide Mass Drug Administration Campaign for Lymphatic Filariasis?

(a) Chirag Paswan
(b) Amit Shah
(c) Shivraj Singh Chauhan
(d) Jagat Prakash Nadda

Q30. Under the Fifth Schedule, which primary authority is granted to the Governor of a State regarding Scheduled Areas?

(a) Power to dissolve the State Legislative Assembly
(b) Power to regulate land, forests and social customs in Scheduled Areas
(c) Power to amend the Constitution regarding Schedule amendments
(d) Authority to appoint Members of Parliament from Scheduled Areas

Q31. Who among the following is the founder of the Pala dynasty?

(a) Bhoja
(b) Dharmapala
(c) Gopala
(d) Dhruva

Q32. In which of the following Indian regions is an alpine climate with snowy winters and cool summers predominant?

(a) Thar Desert
(b) Northern Plains
(c) Himalayan Mountains

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(d) Western Ghats

Q33. Which of the following is not a factor that affects ocean currents?

(a) Soil type
(b) Temperature differences
(c) Earth's rotation
(d) Wind

Q34. In which of the following cities of India was Infosys established in 1994?

(a) Hyderabad
(b) Mumbai
(c) Bengaluru
(d) Kolkata

Q35. In February 2025, which major Zambian river was polluted by an acid spill from a Chinese-operated copper mine?

(a) Chambeshi River
(b) Kafue River
(c) Luangwa River
(d) Zambezi River

Q36. Which physical factor most influences the formation of dispersed settlements in hilly and forested regions of India?

(a) Industrial development
(b) Language diversity
(c) Railway networks
(d) Altitude and terrain

Q37. What is required when creating a file or folder?

(a) A password
(b) A desktop shortcut
(c) An email ID
(d) A name

Q38. Which author released the memoir 'Mother Mary Comes to Me' in 2025, reflecting on her relationship with her late mother?

(a) Arundhati Roy
(b) Jhumpa Lahiri
(c) Kiran Desai
(d) Anita Desai

Q39. Which Indian para-athlete was honoured with the Major Dhyan Chand Khel Ratna Award in 2025 for his achievements in high jump?

(a) Mariyappan Thangavelu
(b) Sharad Kumar
(c) Varun Singh Bhati
(d) Praveen Kumar

Q40. In which state did the DRDO successfully conduct the first flight test of its indigenous Stratospheric Airship Platform (SAP) on 3 May 2025?

(a) Odisha
(b) Gujarat
(c) Rajasthan
(d) Madhya Pradesh

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MATHEMATICS

Q41. An article marked at Rs. 500 is sold for Rs. 425. What is the percentage discount?

(a) 13%
(b) 15%
(c) 14%
(d) 12%

Q42. Pipe A can fill a tank in 15 hours, pipe B can fill the same tank in 27 hours and pipe C can fill the same tank in 10 hours. The time taken by them to fill the same tank if they operate together is::

(a) 810/11 hours
(b) 910/11 hours
(c) 410/11 hours
(d) 1210/11 hours

Q43. A vendor claims to sell wheat at a loss of 20%, but he cheats by using weights that are 35% less than the stated weight. What is his actual profit percentage (round off to two decimal places)?

(a) 21.33%
(b) 24.74%
(c) 23.08%
(d) 24.72%

Q44. Find the area of a triangle whose sides are 9 cm, 12 cm, and 15 cm.

(a) 60 cm^2
(b) 54 cm2
(c) 42 cm2
(d) 48 cm2

Q45. Simplify $2((6/2)x^2-22x+15)-6(x^2+5x-18)$

(a) −74x − 138
(b) 74x + 138
(c) 74x − 138
(d) −74x + 138

Q46. 37 light bulbs were purchased for Rs. 37, and 19 light bulbs broke in transit. The trader sold the remaining light bulbs at Rs. 3.90 each. Find his profit.

(a) Rs. 23.60
(b) Rs. 33.20
(c) Rs. 33.90
(d) Rs. 39.80

Q47. Three times the present age of P exceeds the present age of Q by 23 years. After 7 years, six times Q's age will be 30 years less than six times P's age at that time. What is the present age (in years) of Q?

(a) 8
(b) 3
(c) 11
(d) 4

Q48. In triangle ABC, BD ? AC at D and angle DBC = 44°. E is a point on BC such that angle CAE = 23°. What is the measure of angle AEB?

(a) 56°
(b) 69°
(c) 77°
(d) 64°

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Q49. The average price of three items of furniture is Rs. 5,300. If their prices are in the ratio 3 : 5 : 7, the price of the cheapest item (in Rs.) is:

(a) 5,300
(b) 3,180
(c) 1,060
(d) 7,420

Q50. The number 541096943 is divisible by which of the following?

(a) 97
(b) 87
(c) 103
(d) 107

Q51. Find the simple interest (in Rs.) on Rs. 1,200 at an interest rate of 4% per month for 12 months.

(a) Rs. 68
(b) Rs. 96
(c) Rs. 48
(d) Rs. 576

Q52. The number of prime numbers lying between 393 and 401, both included, is:

(a) 7
(b) 2
(c) 3
(d) 1

Q53. The product of two consecutive natural numbers is 462. The greater of the two numbers is:

(a) 21
(b) 22
(c) 23
(d) 24

Q54. An article is marked at Rs. 1,500 and sold for Rs. 1,200. Find the percentage discount.

(a) 20%
(b) 30%
(c) 25%
(d) 15%

Q55. Find the simple interest (in Rs.) on Rs. 4,000 at 7.5% per annum rate of interest deposited on 8 February 2024 and withdrawn on 9 April 2024.

(a) 50
(b) 51
(c) 48
(d) 49

Q56. By how much is 65% of 65 greater than 2/5 of 25?

(a) 29.25
(b) 30.25
(c) 26.25
(d) 32.25

Q57. 4 men can complete a piece of work in 10 days, while 3 women can do it in 16 days. In how many days can 6 women and 5 men complete this work?

(a) 5 days
(b) 3 days
(c) 4 days

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(d) 6 days

Q58. Zeeshan travels 612 km at 68 km/hr, the next 312 km at 39 km/hr and the next 620 km at 62 km/hr. What is his average speed (in km/hr) for the whole journey? (Round off your answer to two decimal places)

(a) 51.18
(b) 57.19
(c) 66.13
(d) 58.22

Q59. Which of the following numbers divides 718754023?

(a) 21
(b) 3
(c) 18
(d) 13

Q60. A, B and C invested a sum in the ratio of 8 : 36 : 76, respectively. If they earned a total profit of Rs. 3,030 at the end of the year, what is the difference between the shares of B and C?

(a) Rs. 1,051
(b) Rs. 1,010
(c) Rs. 1,046
(d) Rs. 993

Q61. Rs. 30,600 was divided among A, B and C such that 8 times the share of A = 4 times the share of B = 3 times the share of C. Find the share of A.

(a) Rs. 5,400
(b) Rs. 5,252
(c) Rs. 5,594
(d) Rs. 5,377

Q62. If the radius of the base of a right circular cylinder is decreased by 18% and its height is increased by 141%, then what is the percentage increase (closest integer) in its volume?

(a) 74%
(b) 92%
(c) 43%
(d) 62%

Q63. A man walks to a viewpoint and returns to the starting point by his car maintaining a constant speed and thus, takes a total time of 4 hours 45 minutes. He would have gained 2 hours by driving both ways. How long would it have taken for him to walk both ways with the same walking speed?

(a) 6 hours 30 minutes
(b) 7 hours 15 minutes
(c) 5 hours 45 minutes
(d) 6 hours 45 minutes

Q64. The average runs scored by a batsman in 23 matches is 43. In the next 10 matches, the batsman scored an average of 14 runs. Find his average runs scored (rounded off to two decimal places) in all the 33 matches.

(a) 35.21
(b) 34.21
(c) 33.21
(d) 36.21

Q65. Find the value of $[135 \div \{25 + 5 \times (7 - 3)\}]$.

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

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Q66. Aditya is standing on a light house of 150 m height and watching two boats on either side with angles of depression of 30° and 60°, respectively. Find the distance between the two boats.

(a) 300 m
(b) 150√3 m
(c) 250 m
(d) 200√3 m

Q67. Salil's salary was first reduced by 25% and subsequently raised by 12%. What percentage was his final salary lower than his initial salary?

(a) 3%
(b) 16%
(c) 12%
(d) 25%

Q68. The LCM of the numbers 4.7 and 0.04 is:

(a) 94
(b) 0.94
(c) 9.4
(d) 0.094

Q69. If the third proportional of 16 and 40 be x, then what is the value of x?

(a) 102
(b) 99
(c) 101
(d) 100

Q70. The value of √1.0201 is _____.

(a) 1.02
(b) 10.1
(c) 101
(d) 1.01

GENERAL INTELLIGENCE AND REASONING

Q71. Refer to the following number and symbol series and answer the question that follows. Counting to be done from left to right only.

(Left) @ + 1 < 9 6 9 2 % \ + 2 3 2 ^ 9 9 (Right)

How many such numbers are there that are immediately preceded by a symbol and immediately followed by another number?

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

Q72. If + means −, − means ×, × means ÷ and ÷ means +, then what will come in place of the question mark (?) in the following equation?

75 × 5 + 11 − 2 ÷ 18 = ?

(a) 21
(b) 17
(c) 26
(d) 11

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Q73. 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 letter-cluster pair 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) KE-MF
(b) EY-GZ
(c) YS-AT
(d) PJ-RI

Q74. A is the brother of S. S is the daughter of L. L is married to K. K is the daughter of D. D is the father of P. P is the sister of R. R is married to N. How is D related to S?

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

Q75. Each of the digits in the number 5341289 is arranged in ascending order from left to right. The position(s) of how many digits will remain unchanged as compared to that in the original number?

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

Q76. What should come in place of the question mark (?) in the given series?

108 122 139 159 182 208 ?

(a) 222
(b) 237
(c) 229
(d) 248

Q77. 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 to 13 can be performed. Breaking down 13 into 1 and 3 and then performing mathematical operations on 1 and 3 is not allowed.)

(19, 31, 55)

(14, 26, 50)

(a) (48, 60, 84)
(b) (18, 32, 54)
(c) (15, 30, 45)
(d) (13, 26, 43)

Q78. If '+' means 'subtraction', '−' means 'multiplication', '×' means 'division' and '÷' means 'addition', then what will come in place of the question mark (?) in the following equation?

64 × 8 + 6 − 6 ÷ 33 = ?

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

Q79. What should come in place of the question mark (?) in the following series?

2 6 12 20 ?

(a) 40
(b) 35
(c) 30
(d) 25

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Q80. What should come in place of the question mark (?) in the given series based on the English alphabetical order?

WRM RMH MHC HCX ?

(a) CXD
(b) CDX
(c) CXS
(d) CSX

Q81. In the following triads, each group of letters is related to the subsequent one following a certain logic. Select from the given options, the one which follows the same logic.

LIVE – ELVI – LEIV

HANG – GHNA – HGAN

(a) PORT – TPOR – ORTP
(b) REDS – ERDS – SEDR
(c) DUSK – KDSU – DKUS
(d) PAIN – NPIA – PANI

Q82. Select the pair that follows the same pattern as that followed by the two pairs given below. Both pairs follow the same pattern.

ERT : FSV

RDX : SEZ

(a) DUC : EVD
(b) UHS : VIU
(c) EOC : FPF
(d) IOP : JPS

Q83. HDLI is related to FBJG in a certain way based on the English alphabetical order. In the same way, KGOL is related to IEMJ. To which of the given options is NJRO related, following the same logic?

(a) LHPM
(b) LHMP
(c) HLPM
(d) HLMP

Q84. Based on the English alphabetical order, three of the following four letter-clusters are alike in a certain way and thus form a group. Which letter-cluster DOES NOT belong to that group? (Note: The odd one out is not based on the number of consonants/vowels or their position in the letter-cluster.)

(a) SXR
(b) LQK
(c) NSL
(d) QVP

Q85. Gautam starts from Point A and drives 9 km towards south. He then takes a right turn, drives 4 km, turns right and drives 11 km. He then takes a right turn and drives 6 km. He takes a final right turn, drives 2 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° turns only unless specified.)

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

Q86. Which of the following letter-number clusters will replace the question mark (?) in the given series to make it logically complete?

ZY 43 VU 40 RQ 35 NM 28 ?

(a) JI 19
(b) JI 18
(c) KJ 18

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(d) KJ 19

Q87. Seven boxes A, B, C, D, E, F and G are kept one over the other but not necessarily in the same order. G is kept immediately above F. C is kept immediately above A. Only E is kept above B. Only two boxes are kept above G. C is not kept at the third position from the bottom. How many boxes are kept above B?

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

Q88. Read the given statement(s) and conclusions carefully. Assuming that the information given in the statement(s) 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 buckets are mugs.

All mugs are cans.

Conclusions:

(I) Some cans are mugs.

(II) All buckets are cans.

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

Q89. This question is based on the five, three-digit numbers given below.

(Left) 629 189 586 643 746 (Right)

(Example- 697 – First digit = 6, second digit = 9 and third digit = 7)

(NOTE: All operations to be done from left to right.)

If 2 is added to the first digit of every number, in how many numbers thus formed will the first digit be exactly divisible by the second digit?

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

Q90. In a certain code language, ‘BORN’ is coded as ‘3257’ and ‘RIPE’ is coded as ‘6142’. What is the code for ‘R’ in the given code language?

(a) 5
(b) 6
(c) 4
(d) 2

Q91. Seven people, G, H, I, J, K, L and S, are sitting around a circular table facing the centre of the table. I sits third to the left of J. Only two people sit between J and G. Only three people sit between I and L. K sits to the immediate left of H. How many people sit between K and S when counted from the right of S?

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

Q92. Pranay ranked 14th from the top and 44th from the bottom in his class. How many students are there in his class?

(a) 55
(b) 56
(c) 58

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(d) 57

Q93. In a certain code language, ‘CAME’ is coded as ‘6781’ and ‘RACE’ is coded as ‘5618’. What is the code for ‘R’ in the given code language?

(a) 5
(b) 8
(c) 1
(d) 6

Q94. Each of the digits in the number 7314685 is arranged in ascending order from left to right. What will be the sum of the digits that are third from the left and third from the right in the new number thus formed?

(a) 9
(b) 7
(c) 6
(d) 10

Q95. Read the given statements and conclusions carefully. Assuming that the information given in the statements is true, even if it appears to be at variance with commonly known facts, decide which of the given conclusion(s) logically follow(s) from the statements.

Statements:

All triangles are compasses.

All squares are compasses.

Conclusions:

(I) Some triangles are squares.

(II) Some compasses are squares.

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

Q96. Seven boxes U, V, W, X, E, F and G are kept one over the other but not necessarily in the same order. U is kept immediately above V. X is kept immediately above W. Only E is kept above G. Only two boxes are kept above U. X is not kept at the third position from the bottom. How many boxes are kept between F and E?

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

Q97. Seven people, I, J, K, L, P, Q and R, are sitting in a row, facing north. Only two people sit to the left of K. Only three people sit between K and L. Only one person sits between L and J. P sits to the immediate left of I. Q is not an immediate neighbour of L. How many people sit to the right of R?

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

Q98. Divesh starts from point D and runs 3 km towards south. He then takes a right turn and runs 4 km. He then takes a left turn and runs 3 km. He takes another left turn and runs 4 km. He takes a final right turn and runs 1 km to reach point E. How far (shortest distance) and towards which direction should he run in order to reach point D again? (All turns are 90-degree turns only unless otherwise specified.)

(a) 7 km north
(b) 6 km north
(c) 3 km north
(d) 4 km north

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Q99. Based on the English alphabetical order, three of the following four letter-clusters are alike in a certain way and thus form a group. Which letter-cluster DOES NOT belong to that group? (Note: The odd one out is not based on the number of consonants/vowels or their position in the letter-cluster.)

(a) BEKR
(b) CGLS
(c) LPUB
(d) QUZG

Q100. What should come in place of the question mark (?) in the given series?

91, 102, 119, 142, 171, ?

(a) 204
(b) 214
(c) 215
(d) 206

ANSWER KEY

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

SOLUTIONS

Q1. Answer: (c) A collection of poetry

The correct answer is A collection of poetry.

Key Points

• Rabindranath Tagore was an Indian poet, philosopher, and polymath who became the first non-European to win the Nobel Prize in Literature in 1913.

• His work "Geetanjali" is a collection of poetry that contains prose and verse, which reflects themes of spirituality, devotion, and the connection between humanity and the divine.

• "Geetanjali" is considered one of Tagore's masterpieces and is recognized for its profound philosophical depth and lyrical beauty.

• The poems in "Geetanjali" were originally composed in Bengali, and Tagore himself translated them into English, leading to its recognition by the global literary community.

• The Nobel Prize was awarded to Tagore for his exceptional literary contributions, particularly for "Geetanjali," which earned him worldwide acclaim.

Additional Information

• Rabindranath Tagore's Life:

• Born on May 7, 1861, in Kolkata, India, Tagore is often referred to as the "Bard of Bengal."

• He was a prolific writer, penning novels, short stories, poems, essays, and plays, and also composed thousands of songs, including the national anthems of India and Bangladesh.

• Tagore was deeply influenced by the Indian Upanishads and his works often reflect themes of universalism, spirituality, and humanism.

• Geetanjali:

• "Geetanjali" means "Song Offerings" in Bengali and was published in 1910.
• The English translation, which brought Tagore international fame, was published in 1912.
• It consists of 157 poems in the original Bengali version and 103 poems in the English version.
• The poems focus on a deep spiritual connection with God, nature, and humanity.
• Nobel Prize in Literature:
• Tagore received the Nobel Prize in 1913 for his literary work, specifically "Geetanjali."
• He was the first Asian laureate to win the Nobel Prize in Literature.
• The Nobel citation praised his work for its "profoundly sensitive, fresh, and beautiful verse."
• Other Options Explained:
• A collection of short stories: Tagore did write short stories, but "Geetanjali" is not a collection of them.
• A play: Tagore wrote plays like "The Post Office" and "Chitra," but "Geetanjali" is not a play.
• A novel: Tagore authored novels such as "Gora" and "Home and the World," but "Geetanjali" is a collection of poems.

Important Points

• Tagore's Legacy:
• He established Visva-Bharati University in Santiniketan, West Bengal, which became a center for Indian culture and education.
• Tagore's works are studied globally and continue to inspire poets, philosophers, and artists across generations.
• His philosophy promoted universal brotherhood and harmony, transcending borders and cultures.

Q2. Answer: (c) Brazil

The correct answer is Brazil.

Key Points

• The 9th BRICS Industry Ministers' Meeting was held on 21 May 2025, under the chairmanship of Brazil.
• BRICS is a grouping of five major emerging economies: Brazil, Russia, India, China, and South Africa, established to promote economic, political, and cultural cooperation.
• The meeting focused on strengthening industrial development, cooperation, and innovation among BRICS nations.
• India, being a member of BRICS, actively participated to discuss various global and regional issues, particularly emphasizing sustainable industrial growth and development.
• Brazil held the chairmanship of BRICS for the year 2025, leading the agenda of the meeting and hosting the event.

Additional Information

• BRICS Overview:
• BRICS was formed in 2006, consisting of five member countries: Brazil, Russia, India, China, and South Africa.
• The primary objective of BRICS is to promote economic cooperation, political dialogue, and multilateral partnerships among its members.
• BRICS collectively represents about 41% of the global population, 24% of the world GDP, and contributes significantly to global trade.
• Rotating Chairmanship:
• BRICS operates on a principle of rotating chairmanship among the member countries annually.
• Each country gets the opportunity to host summits, meetings, and lead the agenda for that year.
• Brazil served as the chair for BRICS in 2025, organizing events and steering discussions on key issues.
• Focus Areas of the BRICS Industry Ministers' Meeting:
• The meeting focuses on industrial cooperation, sustainable development, and the use of emerging technologies to boost economic growth.
• It aims to strengthen collaboration in sectors such as trade, investment, manufacturing, and innovation.
• Discussions revolve around enhancing trade and removing barriers among member countries for seamless economic growth.
• Key Achievements of BRICS:
• Establishment of the New Development Bank (NDB) in 2014 to mobilize resources for infrastructure and sustainable development projects in BRICS and other emerging economies.
• Promotion of multilateral trade and economic partnerships among member nations to reduce dependency on Western financial systems.
• Enhanced political and cultural ties through various programs and initiatives.

Important Points

• Brazil's Role in BRICS:
• Brazil, one of the founding members of BRICS, plays a crucial role in fostering cooperation, especially in areas of sustainable

development and innovation.

• As the chair of BRICS in 2025, Brazil prioritized discussions on addressing global challenges like climate change, poverty alleviation, and industrial growth.

• Other BRICS Initiatives:

• The BRICS nations have established institutions like the Contingent Reserve Arrangement (CRA) to provide financial support during economic crises.

• BRICS has also initiated projects in areas like space exploration, cybersecurity, and energy cooperation.

Q3. Answer: (c) IMF and World Bank

The correct answer is IMF and World Bank.

Key Points

• IMF (International Monetary Fund) and World Bank played a pivotal role in guiding India's structural reforms post the 1991 economic crisis.

• India faced a balance of payments crisis in 1991, compelling the government to approach the IMF and World Bank for financial assistance.

• In return for financial aid, these institutions recommended the implementation of structural reforms, which included liberalization, privatization, and globalization (LPG).

• The reforms focused on reducing government control over industries, eliminating unnecessary regulatory barriers, and encouraging private sector participation in the economy.

• IMF and World Bank encouraged India to adopt measures such as foreign direct investment (FDI), reduction of tariffs, and currency devaluation to improve economic stability and growth.

Additional Information

• IMF:

• The International Monetary Fund was established in 1944 during the Bretton Woods Conference to promote international monetary cooperation.

• IMF's primary role is to provide financial assistance to countries facing balance of payments problems.

• It offers loans on the condition that recipient countries implement economic reforms to stabilize their economies.

• World Bank:

• The World Bank Group was created in 1944 alongside the IMF and focuses on long-term economic development and poverty reduction.

• It provides financial and technical assistance for development projects such as infrastructure, education, and health.

• In India, the World Bank has supported numerous programs to boost economic growth and reduce poverty.

• 1991 Economic Crisis:

• India faced a severe economic crisis in 1991 due to a fiscal deficit, declining foreign exchange reserves, and rising inflation.

• The crisis led to the government seeking emergency assistance from the IMF and World Bank.

• This marked the beginning of significant economic reforms under the leadership of Prime Minister Narasimha Rao and Finance Minister Dr. Manmohan Singh.

• Key Features of 1991 Reforms:

• Liberalization: Removal of trade barriers, easing restrictions on industries, and eliminating the License Raj.

• Privatization: Encouraging private sector participation and reducing government ownership in public enterprises.

• Globalization: Integration of the Indian economy with the global market through increased foreign trade and investment.

Important Points

• Role of RBI:

• The Reserve Bank of India is the central bank of India responsible for monetary policy, regulation of banks, and ensuring financial stability.

• While the RBI played a crucial role in stabilizing the economy during the crisis, it was not directly involved in structural reforms like IMF and World Bank.

• NABARD:

• The National Bank for Agriculture and Rural Development primarily focuses on providing credit and support to rural and agricultural sectors.

• NABARD was not involved in the structural reforms of the industrial sector in 1991.

• WTO:

• The World Trade Organization, established in 1995, focuses on regulating international trade.

• While WTO promotes trade liberalization, it was not directly involved in influencing India's 1991 economic reforms.

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Q4. Answer: (d) Cleavers and hand-axes

The correct answer is Cleavers and hand-axes.

Key Points

• The Acheulian cultural tradition is identified with advanced and symmetrical stone tools such as cleavers and hand-axes. These tools represent a significant step in human technological evolution.

• The Acheulian tools are associated with the Lower Paleolithic period, dating back approximately 1.7 million years to 200,000 years ago.

• These tools were primarily made using a technique called bifacial flaking, where stone tools were shaped on both sides to create sharp edges.

• Cleavers and hand-axes were multipurpose tools used for tasks such as cutting, chopping, and scraping, enabling early humans to process food and other materials more effectively.

• These tools are found at numerous archaeological sites across Africa, Asia, and Europe, showcasing their wide geographical distribution and significance in early human history.

Additional Information

• Cleavers:

• Cleavers are characterized by their straight cutting edge and broad blade, making them effective for chopping and slicing.

• They were used for processing animal carcasses and other heavy-duty cutting tasks.

• Cleavers were crafted from large flakes or cores of stone, and their design reflects the advanced skills of early humans in toolmaking.

• Hand-axes:

• Hand-axes are typically pear-shaped or oval tools with a sharp edge all around, used for cutting, scraping, and digging.

• They are considered one of the most iconic tools of the Acheulian tradition.

• Hand-axes demonstrate early humans' ability to plan and execute complex designs in toolmaking.

• Lower Paleolithic Period:

• This era marks the earliest phase of human tool use, spanning from approximately 2.5 million years ago to 200,000 years ago.

• It witnessed the emergence of Homo erectus, who is believed to have created Acheulian tools.

• The Acheulian culture represents an advancement from earlier Oldowan tools, showcasing improved functionality and aesthetics.

• Global Distribution:

• Acheulian tools have been discovered at archaeological sites in countries such as India, Kenya, South Africa, France, and England.

• Prominent sites in India include Attirampakkam in Tamil Nadu and the Sohan Valley in Punjab.

• The widespread presence of Acheulian tools indicates early human migration and adaptation to diverse environments.

Important Points

• Option Analysis:

• Blades and borers: These tools are associated with the Upper Paleolithic period and are more advanced than Acheulian tools. Hence, this option is incorrect.

• Microliths and scrapers: Microliths are small stone tools from the Mesolithic period, while scrapers were used across multiple periods but are not distinct to the Acheulian culture. Hence, this option is incorrect.

• Chisels and adzes: These tools are typically associated with later Neolithic periods, focusing on woodworking and agriculture. Hence, this option is incorrect.

• Cleavers and hand-axes: These are iconic tools of the Acheulian tradition, making this the correct option.

Q5. Answer: (b) Montreal Protocol

The correct answer is Montreal Protocol.

Key Points

• The Montreal Protocol is an international treaty designed to protect the ozone layer by phasing out the production and consumption of substances responsible for ozone depletion, such as chlorofluorocarbons (CFCs), halons, and other ozone-depleting substances (ODS).

• It was adopted on September 16, 1987, and entered into force on January 1, 1989, with subsequent amendments strengthening its provisions.

• The Protocol has been ratified by 197 countries, making it one of the most universally supported agreements in history.

• It includes legally binding commitments for countries to reduce ODS production and consumption in accordance with specific schedules.

• Due to its successful implementation, the Protocol is considered instrumental in reducing the harmful effects on the ozone layer, with predictions of full recovery of the ozone layer by the mid-21st century.

Additional Information

• Basel Convention:

• The Basel Convention, adopted in 1989, deals with the control of transboundary movements of hazardous wastes and their disposal.

• Its primary focus is to prevent the dumping of hazardous waste from developed nations into developing countries.

• It does not address ozone-depleting substances, making it unrelated to the question.

• Earth Summit:

• The Earth Summit, held in 1992 in Rio de Janeiro, addressed sustainable development and environmental protection.

• Key outcomes included Agenda 21 and the Rio Declaration, focusing broadly on environmental issues rather than ozone depletion specifically.

• Kyoto Protocol:

• The Kyoto Protocol, adopted in 1997, focuses on reducing greenhouse gas emissions to combat climate change.

• It is not related to ozone-depleting substances but rather to global warming and carbon emissions.

• Montreal Protocol's Success:

• The Protocol is widely regarded as the most successful environmental treaty due to its universal ratification and effectiveness in reducing ODS emissions.

• It has been amended multiple times (London, Copenhagen, Montreal, Beijing amendments) to include new substances and stricter controls.

• The Kigali Amendment (2016) added hydrofluorocarbons (HFCs) to the list of controlled substances due to their high global warming potential.

• Important Points

• Ozone Layer: The ozone layer is a vital part of the Earth's atmosphere, located in the stratosphere, which absorbs harmful ultraviolet (UV) radiation from the sun.

• ODS Impact: Substances like CFCs cause ozone depletion by releasing chlorine and bromine upon breakdown, which react with ozone molecules.

• Montreal Protocol Day: September 16 is celebrated as International Day for the Preservation of the Ozone Layer to commemorate the signing of the Montreal Protocol.

• Scientific Data: According to reports, the ozone hole over Antarctica has significantly reduced in size since the Protocol's implementation.

Q6. Answer: (a) Deen Dayal Upadhyaya Grameen Kaushalya Yojana (DDU-GKY)

The correct answer is Deen Dayal Upadhyaya Grameen Kaushalya Yojana (DDU-GKY).

Key Points

• Deen Dayal Upadhyaya Grameen Kaushalya Yojana (DDU-GKY) was launched on 25th September 2014, under the Ministry of Rural Development (MoRD), Government of India.

• It aims to skill rural youth aged 15–35 years, especially those from economically disadvantaged households, and provide them with sustainable employment opportunities.

• DDU-GKY focuses on income generation through regular jobs where wages are above the minimum wage threshold.

• The scheme targets rural youth from families below the poverty line identified under the Socio-Economic Caste Census (SECC) data.

• It is part of the National Rural Livelihood Mission (NRLM), aimed at reducing poverty by promoting diversified and gainful employment opportunities.

Additional Information

• Garib Kalyan Rozgar Yojana (GKRY):

• Launched in June 2020 during the COVID-19 pandemic to provide immediate livelihood opportunities for migrant workers.

• Focused on public infrastructure creation and rural development by employing returnee migrants.

• This scheme aimed to generate 125 days of employment for migrant workers in 116 districts across six states.

• Prime Minister Employment Generation Programme (PMEGP):

• Implemented by the Ministry of Micro, Small, and Medium Enterprises (MSME) since 2008.

• The scheme focuses on generating employment through entrepreneurship and promoting self-employment ventures in rural and urban areas.

• It provides financial assistance for setting up micro-enterprises.

• Pradhan Mantri Kaushal Vikas Yojana (PMKVY):

• Launched in 2015 under the Ministry of Skill Development and Entrepreneurship (MSDE).
• Aims to provide short-term skill training to youth to make them employable.
• Focuses on skill certification and training across various sectors based on industry demands.
• Key Features of DDU-GKY:
• Provides free skill training in various sectors like IT, hospitality, healthcare, retail, and construction.
• Offers placement-linked training programs ensuring job opportunities for candidates post-training.
• Special focus on marginalized groups such as women, differently-abled, and SC/ST communities.
• Supported by public-private partnerships to ensure industry-relevant training.

Important Points

• Eligibility Criteria for DDU-GKY:
• Beneficiaries must belong to rural households listed in SECC 2011.
• Applicants should be aged between 15–35 years.
• Relaxation in age for categories such as SC/ST, women, and persons with disabilities is provided.
• Funding Support:
• DDU-GKY is 100% centrally funded, with funds allocated based on states' rural population and poverty levels.
• Training costs, job placement expenses, and accommodation for candidates are covered under the scheme.
• Impact:
• DDU-GKY has successfully skilled and placed thousands of rural youths in diverse industries.
• Promotes economic growth by reducing poverty and unemployment in rural areas.

Q7. Answer: (a) 3.0 billion

The correct answer is 3.0 billion base pairs.

Key Points

• The Human Genome Project (HGP) was an international scientific research project launched in 1990, aimed at mapping and understanding all the genes in human DNA.
• The primary goal of the HGP was to determine the complete sequence of the 3 billion base pairs that make up human DNA.
• DNA is composed of four chemical bases: adenine (A), thymine (T), cytosine (C), and guanine (G), which are paired to form the rungs of the DNA double helix.
• The Human Genome Project was completed in April 2003, two years earlier than planned.
• The completion of the HGP marked a significant milestone in biological sciences, providing valuable insights into genetics, disease, and human evolution.

Additional Information

• Goals of the Human Genome Project:
• To identify all the approximately 20,000-25,000 genes in human DNA.
• To determine the complete sequence of the 3 billion DNA base pairs.
• To store this information in public databases for further research.
• To improve tools for data analysis and enable personalized medicine.
• To address ethical, legal, and social implications arising from genomic research.
• Significance of Base Pairs in DNA:
• The sequence of base pairs determines the genetic instructions for building proteins, which perform essential functions in the body.
• The pairing rules are specific: A pairs with T, and C pairs with G, ensuring accurate replication and functioning of genetic material.
• Key Achievements of the Human Genome Project:
• Discovery of genes associated with diseases like cancer, Alzheimer’s, and cystic fibrosis.
• Development of genetic testing for inherited conditions.
• Advancement in personalized medicine, allowing treatments tailored to individual genetic profiles.
• Increased understanding of human evolution and migration patterns through genetic studies.
• Collaborating Organizations:
• The HGP was a collaborative effort involving institutions from the United States, the United Kingdom, Japan, France, Germany, and China.
• It was coordinated by organizations like the National Institutes of Health (NIH) and the U.S. Department of Energy.
• Applications of Genome Sequencing:

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• Used in identifying genetic disorders and developing targeted therapies.
• Plays a critical role in understanding genetic factors in diseases like diabetes, cancer, and cardiovascular disorders.
• Enables advancements in forensic science, agriculture, and bioinformatics.

Important Points

• Timeline of the Human Genome Project:
• Started in 1990 and completed in April 2003, ahead of schedule.
• Initial funding was provided by the United States government, followed by global collaborative investments.
• Ethical Implications:
• Raised concerns about privacy, genetic discrimination, and ethical use of genetic information.
• Prompted the development of legislation like the Genetic Information Nondiscrimination Act (GINA) in the U.S.

Q8. Answer: (d) Raw materials

The correct answer is Raw materials.

Key Points

• Under British colonial rule, India primarily exported raw materials such as cotton, jute, indigo, and tea to Britain and other parts of the world.
• India was forced to supply raw materials to fuel the Industrial Revolution in Britain, which significantly altered India's traditional economic structure.
• The British policies discouraged industrialization in India and promoted India as a source of raw materials and a market for British manufactured goods.
• Examples of raw materials exported during this period include cotton (to feed British textile mills), spices, opium (exported to China), and tea.
• This export-oriented policy led to the de-industrialization of traditional Indian industries like textiles, as they could not compete with cheaper, mass-produced British goods.

Additional Information

• Colonial Economic Policies:
• The British implemented policies aimed at transforming India into a supplier of raw materials and a consumer of British manufactured goods.
• Heavy duties were imposed on Indian manufactured goods, making them non-competitive in the international market, while raw materials were exported at low costs.
• Impact on Indian Industries:
• Traditional industries such as textile weaving, handicrafts, and metalwork suffered greatly due to the influx of British factory-made goods.
• India became reliant on British imports, which stifled local entrepreneurship and innovation.
• Key Raw Materials Exported:
• Cotton: Exported to British textile mills to produce clothes.
• Jute: Used in manufacturing gunny bags and other items.
• Indigo: Vital for dyeing textiles, primarily exported to Europe.
• Opium: Exported to China, leading to the infamous Opium Wars between Britain and China.
• De-industrialization:
• Due to the dominance of British goods and policies, India's traditional industries declined, leading to widespread unemployment and poverty.
• The Indian economy shifted from being an exporter of manufactured goods to one heavily reliant on agriculture and raw material exports.
• Important Points
• The British East India Company's control over trade routes facilitated the export of raw materials and the import of British goods.
• The introduction of the railway system in India was aimed at improving the transportation of raw materials to ports for export.
• India's dependence on agriculture and raw material exports during the colonial period led to frequent famines and economic stagnation.

Q9. Answer: (b) Triads

The correct answer is Triads.

Key Points

• Johann Wolfgang Dobereiner, a German chemist, introduced the concept of triads in 1829. He grouped three chemically similar

elements together based on their atomic weights and properties.

• In a triad, the atomic weight of the middle element is approximately the average of the atomic weights of the other two elements. For example, in the triad of lithium (Li), sodium (Na), and potassium (K), the atomic weight of sodium is roughly the average of lithium and potassium.

• Dobereiner's triads were an early attempt to organize elements systematically, laying the groundwork for the modern periodic table.

• This concept demonstrated that there was a relationship between the properties of elements and their atomic weights, and hinted at the periodicity of elements. This was later developed further by Dmitri Mendeleev and other scientists.

• Examples of Dobereiner's triads include: chlorine (Cl), bromine (Br), iodine (I), and calcium (Ca), strontium (Sr), barium (Ba).

Additional Information

• Development of the Periodic Table:

• The periodic table evolved over several centuries as scientists discovered patterns in the properties of elements.

• Early theories included Dalton's atomic theory, which provided the foundation for understanding atomic structure.

• Dobereiner's triads were one of the first systematic attempts to group elements based on their properties and atomic weights.

• Later, John Newlands proposed the Law of Octaves in 1864, suggesting that every eighth element had similar properties when arranged in increasing atomic weight.

• Dmitri Mendeleev created the first widely accepted periodic table in 1869, predicting properties of elements yet to be discovered.

• Limitations of Dobereiner's Triads:

• Not all elements could be grouped into triads, and many elements did not fit into this pattern.

• Dobereiner's triads could only identify relationships between a few elements, leaving many others unaccounted for.

• For example, elements like fluorine and oxygen could not be arranged into triads.

• Dobereiner's Legacy:

• While Dobereiner's triads had limitations, they were an important milestone in the development of the periodic table.

• They demonstrated the importance of atomic weight in determining chemical properties.

• Dobereiner's work inspired later scientists, such as Mendeleev, who built upon his ideas to create the modern periodic table.

• Modern Periodic Table:

• The modern periodic table is organized by atomic number rather than atomic weight, a discovery made by Henry Moseley in 1913.

• It consists of 118 confirmed elements, grouped into periods (rows) and groups (columns) based on their electron configuration and chemical properties.

• Elements are categorized into metals, non-metals, and metalloids, with further divisions such as alkali metals, transition metals, and noble gases.

Important Points

• Johann Wolfgang Dobereiner:

• Born in 1780 in Germany, Dobereiner was a chemist who contributed significantly to early chemistry.

• He discovered catalytic reactions and developed the concept of triads.

• His invention of the Dobereiner's lamp, which used platinum as a catalyst to ignite hydrogen, was one of his noteworthy contributions.

• Triads in Chemistry:

• The concept of triads was based on observing similarities between groups of three elements.

• Although limited, the triads demonstrated a fundamental concept that elements could be organized systematically.

• This idea contributed to the development of the periodic law and table.

Q10. Answer: (c) Dual control in provinces

The correct answer is Dual control in provinces.

Key Points

• The term 'dyarchy' refers to a system of dual governance introduced by the Government of India Act, 1919. This was a significant constitutional reform in British India, aimed at gradually introducing self-governance.

• The system divided the subjects of administration into two categories: Transferred Subjects and Reserved Subjects. This division of powers between the elected Indian ministers and the British officials in the provinces is what is referred to as "dual control."

• The Transferred Subjects included areas such as education, health, and agriculture, which were to be administered by the Indian ministers accountable to the legislative councils.

• The Reserved Subjects included areas like law and order, finance, and revenue, which remained under the direct control of the British governors and their executive councils.

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• The dyarchy system was implemented in the provincial governments of British India, marking a step towards democratic decentralization. However, it was met with criticism due to the restricted powers given to Indian ministers.

Additional Information

• Government of India Act, 1919:

• The Government of India Act, 1919, also known as the Montagu-Chelmsford Reforms, was enacted to increase the participation of Indians in the governance of British India.

• It introduced the concept of dual governance (dyarchy) at the provincial level.

• This act also expanded the participation of Indians in the legislative councils and introduced the system of bicameralism at the central level.

• Limitations of Dyarchy:

• The dyarchy system failed to provide real power to Indian ministers as the most important subjects like finance, law, and police were reserved for the British governors.

• The Indian ministers had limited power, and their decisions could be overruled by the British authorities.

• The system was criticized as being complicated and ineffective in addressing the demands of self-rule.

• Impact of the Government of India Act, 1919:

• It paved the way for further constitutional reforms, such as the Government of India Act, 1935, which introduced provincial autonomy and further expanded the role of Indians in governance.

• The Act marked the beginning of the process of decentralization in British India, even though it was limited in its scope.

• Features of Other Options:

• Power to the judiciary and legislature: This was not a feature of dyarchy but relates to the separation of powers principle in governance.

• Dual monarchy system: This refers to a political system where two monarchs rule simultaneously, which is unrelated to the Government of India Act, 1919.

• Centralised governance: This refers to a system where the central authority retains most of the power, which is opposite to the decentralization attempted under the dyarchy system.

Q11. Answer: (c) Directing the flow of instructions and data

The correct answer is Directing the flow of instructions and data.

Key Points

• The Control Unit (CU) is a crucial part of the Central Processing Unit (CPU), responsible for managing and coordinating all operations within the CPU.

• Its primary function is to direct the flow of instructions and data, ensuring proper communication between the memory, input/output devices, and the processor.

• The Control Unit deciphers instructions fetched from memory and determines the sequence of operations required for execution.

• It manages instruction decoding and ensures that the relevant components of the CPU are activated to perform tasks efficiently.

• The Control Unit coordinates the execution of instructions by generating control signals for various components like the Arithmetic Logic Unit (ALU), registers, and other hardware.

Additional Information

• Functions of the Control Unit:

• The Control Unit acts as a supervisor for the CPU, ensuring that all components work together harmoniously.

• It controls the sequence of operations and the timing of signals to ensure the synchronization of tasks within the system.

• The Control Unit interacts with the memory unit, fetching instructions and data that need to be processed.

• It sends control signals to the Arithmetic Logic Unit (ALU) for performing necessary calculations and logical operations.

• It directs the input/output devices to exchange data with the CPU and memory when required.

• Comparison of Options:

• Option 1 (Performing arithmetic calculations): This is not the function of the Control Unit but rather the role of the Arithmetic Logic Unit (ALU), which performs mathematical and logical operations.

• Option 2 (Managing external device connections): While external devices interact with the CPU, their management is the responsibility of the input/output controllers, not the Control Unit.

• Option 4 (Storing frequently used data): This function is primarily handled by the cache memory or registers, not the Control Unit.

• Option 5 (Blank): This is not a valid option in the given question.

• Components of the CPU:

• The CPU consists of three main components: Control Unit, Arithmetic Logic Unit (ALU), and Memory Unit.

• Control Unit: Directs the operations of the CPU and ensures proper execution of instructions.

• ALU: Performs mathematical calculations and logical operations.
• Memory Unit: Stores instructions and data for immediate access by the CPU.
• Importance of Control Unit:
• The Control Unit ensures that the CPU operates in a systematic manner, effectively coordinating the execution of instructions.
• It plays a vital role in maintaining the efficiency and reliability of the system by managing tasks and resources.
• Without the Control Unit, the CPU would not be able to execute instructions correctly or manage the flow of data between its components.

Q12. Answer: (c) Mica

The correct answer is Mica.

Key Points

• Mica is a mineral known for its excellent insulating properties, making it invaluable in electrical and electronic industries.
• It is a non-conductor of electricity, which allows it to be used in applications where insulation is required.
• Mica is widely utilized in electrical insulation products such as capacitors, transformers, and electrical cables due to its ability to withstand high temperatures and electrical resistance.
• This mineral is also valued for its heat-resistant properties, making it suitable for use in high-temperature environments.
• Mica is found in abundance in various parts of India, especially in the states of Jharkhand, Bihar, and Rajasthan.

Additional Information

• Mica:
• Mica is a group of silicate minerals that are commonly found in igneous, metamorphic, and sedimentary rocks.
• It is known for its ability to split into thin sheets, which makes it ideal for electrical and thermal insulation.
• Mica is used in various industries, including electronics, cosmetics, construction, and paints.
• India is one of the largest producers of mica globally, and the Giridih district in Jharkhand is particularly famous for its mica production.
• Bauxite:
• Bauxite is the primary ore of aluminum and is not used as an electrical insulator.
• It is widely used in the aluminum industry to produce metal for construction, transportation, and packaging.
• Limestone:
• Limestone is a sedimentary rock primarily composed of calcium carbonate ($CaCO_3$).
• It is mainly used in the construction industry for cement production, as well as in the steel and glass industries.
• It lacks the insulating properties required for electrical applications.
• Iron Ore:
• Iron ore is primarily used in the production of steel, which is a key material in construction and manufacturing industries.
• It is not used for electrical insulation due to its high electrical conductivity.

Important Points

• Mica Sheets: Mica sheets are used to provide effective insulation in electrical and electronic devices, particularly in high-voltage applications.
• Uses in Cosmetics: Mica is also used in cosmetics for its shimmering properties, adding a glossy or sparkling effect to products like eyeshadow and nail polish.
• Global Producers: Apart from India, other significant mica-producing countries include China, Russia, and the United States.
• Environmental Considerations: Mining mica has environmental impacts, and ethical practices are being emphasized globally to ensure sustainable and responsible extraction.

Q13. Answer: (d) The Widow Remarriage Act

The correct answer is The Widow Remarriage Act.

Key Points

• The Widow Remarriage Act of 1856 was introduced by the British in India to promote the remarriage of widows.
• This act was a significant piece of social legislation aimed at addressing the plight of widows in Indian society, where widow remarriage was largely prohibited due to religious and social norms.
• The act was championed by Ishwar Chandra Vidyasagar, a prominent social reformer, who worked tirelessly to push for this progressive change.
• It enabled widows to remarry legally and provided them with rights and protections under the law, challenging the deeply entrenched patriarchal and orthodox practices.
• The act was seen as a major step towards social reform during the colonial period and marked a progressive move by the British

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in the sphere of Indian social issues.

Additional Information

• The Rowlatt Act:

• The Rowlatt Act of 1919 was a repressive law passed by the British government to curb revolutionary activities in India.

• It gave authorities the power to arrest individuals and detain them without trial, leading to widespread protests across the country.

• This act was not related to social reform but rather a political move to suppress dissent during the colonial period.

• The Vernacular Press Act:

• The Vernacular Press Act of 1878 was introduced to curb the freedom of the Indian vernacular press.

• The act aimed to suppress writings critical of the British government, and it was widely opposed by Indian journalists and reformers.

• It was a political act and not a social reform measure.

• The Indian Councils Act:

• The Indian Councils Act of 1861 was a political reform that introduced limited representation of Indians in the legislative councils.

• It was not aimed at social reform but rather at involving Indians in governance under British rule.

• Social Reform Movements during British Rule:

• Other significant social legislation during the colonial period included the Abolition of Sati Act (1829) and the Child Marriage Restraint Act (1929).

• These acts were aimed at eliminating harmful practices and promoting progressive changes in Indian society.

Important Points

• Ishwar Chandra Vidyasagar:

• He was a key figure in advocating for the Widow Remarriage Act and worked tirelessly to change societal attitudes towards widows.

• He argued against the orthodox Hindu practices that prohibited widow remarriage and highlighted the plight of widows who were often ostracized and faced severe hardships.

• His efforts were instrumental in convincing the British authorities to introduce this landmark legislation.

• Impact of the Widow Remarriage Act:

• The act paved the way for progressive changes in Indian society by providing legal recognition to widow remarriage.

• It challenged the deeply entrenched patriarchal norms and gave widows the opportunity to lead a dignified life.

• Although the act faced resistance from conservative sections of society, it marked a significant step towards gender equality and social reform.

Q14. Answer: (c) Democratic Republic of Congo

The correct answer is Democratic Republic of Congo.

Key Points

• The M23 rebel group, also known as the March 23 Movement, is a rebel military group based in the Democratic Republic of Congo (DRC).

• The group was formed in 2012 by former members of the National Congress for the Defence of the People (CNDP), a militia that had integrated into the Congolese army as part of a peace deal signed in 2009.

• M23 is active primarily in the eastern regions of the Democratic Republic of Congo, including areas like Goma and Bukavu, which are rich in natural resources but have been plagued by conflict for decades.

• The group claims to fight for the rights of Congolese Tutsi people and against the marginalization of ethnic minorities, although it has often been accused of committing human rights abuses and exploiting natural resources in the region.

• The M23 has been involved in conflicts with the Congolese government and has been accused of receiving support from neighboring countries, particularly Rwanda, although Rwanda has denied these allegations.

Additional Information

• Democratic Republic of Congo (DRC):

• The Democratic Republic of Congo is located in Central Africa and is the second-largest country in Africa by land area.

• The country is known for its vast natural resources, including gold, diamonds, and cobalt. However, it has been marred by political instability and armed conflicts, especially in its eastern regions.

• The DRC has faced several decades of conflict involving various armed groups, including the M23, leading to significant humanitarian crises.

• M23 Rebel Group:

• The M23 rebel group takes its name from the March 23, 2009, peace agreement, which its members claim the DRC government

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failed to implement.

• It is an ethnic Tutsi-led group, and its resurgence has been linked to broader regional tensions, including those involving Rwanda and Uganda.

• The group has been accused of committing war crimes, including mass killings, rapes, and the recruitment of child soldiers.

• Key Locations in Eastern DRC:

• Goma: Goma is the capital of North Kivu province and has been a hotspot for conflicts involving armed groups like M23.

• Bukavu: Bukavu is the capital of South Kivu province, another region affected by violence and instability caused by armed groups.

• Both regions are rich in resources but suffer from poor governance, making them vulnerable to exploitation and conflict.

• Neighboring Countries:

• The DRC shares borders with Rwanda, Uganda, Burundi, and other African nations, making it strategically significant in the Great Lakes region.

• Allegations of foreign involvement, particularly from Rwanda and Uganda, have complicated efforts to resolve conflicts in the DRC.

• International Response:

• The United Nations Organization Stabilization Mission in the Democratic Republic of the Congo (MONUSCO) has been deployed to stabilize the region and protect civilians.

• Despite international efforts, the situation in eastern DRC remains volatile, with ongoing attacks and displacement caused by armed groups.

Q15. Answer: (d) Article 19(1)(a)

The correct answer is Article 19(1)(a).

Key Points

• Article 19(1)(a) of the Indian Constitution guarantees the fundamental right to freedom of speech and expression to all citizens of India.

• In the landmark judgment of Union of India vs. Association for Democratic Reforms (2002), the Supreme Court of India held that the Right to Information (RTI) is intrinsic to freedom of speech and expression under Article 19(1)(a).

• The RTI Act, 2005 was enacted by Parliament to empower citizens to request information from public authorities, ensuring transparency and accountability in governance.

• RTI strengthens the democratic process by enabling citizens to actively participate in governance and decision-making processes.

• The provision under Article 19(1)(a) ensures that citizens can access public records, policies, and decisions to make informed opinions, which is a crucial aspect of democratic societies.

Additional Information

• Right to Information Act, 2005:

• The RTI Act was passed by the Indian Parliament in 2005 and came into force on 12 October 2005.

• It provides citizens the right to request information from public authorities, including government departments, ministries, and organizations funded by the government.

• The Act mandates that public authorities must respond to RTI requests within 30 days, making it a powerful tool for transparency.

• Key exceptions under the Act include information related to national security, sovereignty, and personal privacy.

• Freedom of Speech and Expression:

• Article 19(1)(a) is a cornerstone of democracy, allowing citizens to express themselves freely without fear of censorship, subject to reasonable restrictions.

• Reasonable restrictions under Article 19(2) include considerations for national security, public order, morality, and defamation.

• The right to freedom of speech and expression also encompasses the freedom of the press, which is essential for maintaining accountability and transparency in governance.

• It provides individuals the right to freely share and access information, including through public platforms and media.

• Role of Judiciary:

• The Indian judiciary has played a significant role in interpreting Article 19(1)(a), expanding its scope to include the Right to Information.

• Landmark cases like PUCL vs. Union of India (2003) emphasized that informed citizens are essential for a functioning democracy.

• The judiciary has consistently upheld the principle that access to information is vital for ensuring transparency and accountability in governance.

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• Article 15(1)(b), Article 21, and Article 32:

• Article 15(1)(b): Prohibits discrimination based on religion, race, caste, sex, or place of birth. It does not relate to the Right to Information.

• Article 21: Guarantees the right to life and personal liberty, which is indirectly linked to RTI but not directly related to freedom of speech and expression.

• Article 32: Relates to the right to constitutional remedies to enforce fundamental rights but is not specifically linked to RTI.

Important Points

• RTI and Democracy:

• The RTI Act empowers citizens to ask questions, inspect government documents, and seek accountability.

• It has been instrumental in exposing corruption and ensuring transparency in various government departments.

• RTI activists have played a crucial role in bringing significant reforms and uncovering malpractices.

• Global Context:

• RTI laws are present in more than 100 countries, making access to information a global movement.

• India's RTI Act is considered one of the most robust frameworks for transparency in governance worldwide.

Q16. Answer: (d) Gagan Shakti

The correct answer is Gagan Shakti.

Key Points

• Gagan Shakti is one of the largest military exercises conducted by the Indian Air Force (IAF), aiming to test and enhance operational readiness across various terrains and scenarios.

• The exercise was specifically conducted to simulate attacks on mountain and ground targets, leveraging advanced fighter jets such as the Rafale and Su-30MKI.

• It involves testing the capabilities of the IAF in real-time scenarios, including air combat, ground strikes, and logistical support.

• The exercise is comprehensive, covering various types of operations like air dominance, precision strikes, and support missions in both mountainous and plain terrains.

• Such exercises allow the IAF to assess its preparedness against potential threats and improve coordination between different units and commands.

Additional Information

• Vayu Shakti:

• Vayu Shakti is another aerial exercise conducted by the Indian Air Force, focusing specifically on showcasing the firepower capabilities of the IAF.

• It is held at the Pokhran range in Rajasthan and demonstrates operational capabilities such as precision strikes, bombing runs, and combat drills.

• Vayu Shakti emphasizes the IAF's ability to conduct coordinated attacks using fighter jets, helicopters, and transport aircraft.

• Meghdoot:

• Meghdoot is a military operation by the Indian Armed Forces, primarily aimed at securing the Siachen Glacier, the world's highest battlefield.

• This operation began in 1984 and focuses on protecting India's territorial integrity in the region against external threats.

• The operation involves not just air force maneuvers but also troop deployment and survival strategies in extreme weather conditions.

• Aakraman:

• Aakraman is not an official name for any specific IAF exercise but is often used generically to refer to offensive or combat operations.

• The term signifies an aggressive attack or assault strategy, which may relate to military drills or war games.

• Indian Air Force Operations:

• The IAF conducts various military exercises to assess its preparedness, including Gagan Shakti, Vayu Shakti, and Iron Fist.

• These exercises involve coordination among fighter jets, helicopters, and ground forces to ensure seamless operational capability.

• They also focus on testing the integration of advanced technology, such as radars, missiles, and electronic warfare systems.

Important Points

• Gagan Shakti's Importance:

• The exercise tests the IAF's ability to respond to two-front war scenarios, simulating threats from both the western and northern borders.

• It aims to improve the coordination between various airbases, ground forces, and naval units, ensuring a synchronized response

to any threat.

• Gagan Shakti also involves the use of advanced technology and modern warfare tactics, including network-centric operations.

• Significance of Military Exercises:

• Military exercises like Gagan Shakti are essential to identify and rectify operational gaps in defense preparedness.

• They help improve coordination among different branches of the armed forces and test the effectiveness of new defense systems.

• Such drills also act as deterrents to external threats by showcasing military prowess and readiness.

Q17. Answer: (d) Article 13

The correct answer is Article 13.

Key Points

• Article 13 is a fundamental provision in the Indian Constitution that provides the basis for judicial review in India.

• It declares that all laws inconsistent with or in derogation of the fundamental rights shall be void.

• This article empowers the judiciary to scrutinize and invalidate any law that violates the Fundamental Rights enshrined in Part III of the Constitution.

• Judicial review is an essential mechanism to ensure the supremacy of the Constitution and protect citizens' rights against unconstitutional legislative actions.

• Under Article 13, laws made before the enactment of the Constitution are also subject to judicial review to determine their consistency with the Fundamental Rights.

Additional Information

• Article 13 and Judicial Review:

• Judicial Review is a process where courts evaluate the validity of legislative and executive actions in light of the Constitution.

• Article 13 acts as the guardian of Fundamental Rights, ensuring that laws do not infringe upon the rights granted by the Constitution.

• Under this article, any law that contravenes Fundamental Rights is deemed void from the outset.

• Significance of Judicial Review:

• Judicial Review ensures the supremacy of the Constitution and acts as a check on the arbitrary exercise of power by the legislature and executive.

• It strengthens the role of the judiciary as the custodian of Fundamental Rights.

• Features of Fundamental Rights:

• Fundamental Rights are guaranteed under Part III of the Indian Constitution.

• They are justiciable, meaning that citizens can approach the judiciary if these rights are violated.

• Some of the key Fundamental Rights include the Right to Equality, Right to Freedom, Right to Constitutional Remedies, and Right against Exploitation.

• Other Articles and their Importance:

• Article 30: Grants minorities the right to establish and administer educational institutions.

• Article 19: Provides citizens with six fundamental freedoms, such as freedom of speech and expression.

• Article 370: Earlier provided special status to the state of Jammu and Kashmir, which was abrogated in August 2019.

Important Points

• Judicial Review in India:

• India follows the concept of procedural due process, where the judiciary can review not only the substance but also the procedure of lawmaking.

• Judicial Review is upheld under Articles 13, 32, 226, and 136 of the Indian Constitution.

• Historical Context:

• The concept of judicial review originated in the United States under the landmark case Marbury v. Madison (1803).

• In India, the judiciary derives its power of review primarily from Article 13 and other related provisions.

• Role of Judiciary:

• The judiciary acts as the protector of the Constitution, ensuring the government operates within its constitutional limits.

• It plays a pivotal role in upholding democratic values and maintaining the balance of power.

Q18. Answer: (c) IISc Bengaluru

The correct answer is IISc Bengaluru.

Key Points

• Scientists from the Indian Institute of Science (IISc), Bengaluru, have discovered critical details about a cellular 'messenger'

known as cyclic AMP (cAMP) that could play a significant role in treating diseases like Alzheimer's and diabetes.

• cAMP is a second messenger in cells that helps transmit signals from the surface of the cell to its interior, influencing various biological processes.

• The research at IISc focused on understanding how cAMP interacts with other molecules in cells, particularly in relation to cellular stress and signaling pathways.

• This discovery could pave the way for developing new drugs targeting cAMP pathways to address conditions such as neurodegenerative disorders and metabolic diseases.

• IISc Bengaluru is renowned globally for its contributions to cutting-edge research in science and technology, particularly in the field of medical and biological sciences.

Additional Information

• Indian Institute of Science (IISc), Bengaluru:

• Established in 1909, IISc Bengaluru is one of India's premier research institutions located in Karnataka.

• The institute focuses on advanced research in various fields, including biotechnology, physics, chemistry, and engineering.

• Globally recognized for its contributions, IISc has consistently ranked among the top institutions in academic and research excellence.

• It collaborates with international institutions to advance scientific research and innovation.

• Alzheimer's Disease:

• Alzheimer's is a chronic neurodegenerative disorder primarily affecting older adults, leading to memory loss, confusion, and cognitive decline.

• It is caused by the accumulation of beta-amyloid plaques and tau tangles in the brain, disrupting neural functions.

• Research into signaling pathways such as cAMP could help identify new treatments to manage this condition.

• Diabetes:

• Diabetes is a metabolic disorder characterized by high blood sugar levels due to insufficient insulin production or ineffective insulin use.

• cAMP has been studied for its role in regulating glucose metabolism and insulin secretion in pancreatic cells.

• Targeting cAMP pathways could lead to novel therapeutic approaches for Type 1 and Type 2 diabetes.

• cAMP (Cyclic Adenosine Monophosphate):

• cAMP is a second messenger molecule involved in transmitting signals within cells, regulating various physiological processes.

• It plays a role in processes such as energy regulation, hormone signaling, and neuronal communication.

• Research into cAMP's interaction with stress and signaling pathways is crucial for understanding its role in disease mechanisms.

Important Points

• cAMP Signaling Pathways:

• cAMP is essential for cellular communication and is involved in the activation of protein kinases, ion channel regulation, and gene transcription.

• Disruptions in cAMP signaling are linked to various diseases, including cardiovascular issues, cancer, and neurological disorders.

• Targeted therapies aimed at modulating cAMP levels could offer effective treatments for these conditions.

• Role of IISc in Research:

• IISc consistently contributes to groundbreaking discoveries in areas such as biotechnology, material science, and nanotechnology.

• The institute has a multidisciplinary approach, combining expertise from physics, chemistry, and biology to tackle complex research challenges.

Q19. Answer: (b) Canister launch and new materials

The correct answer is Canister launch and new materials.

Key Points

• Agni-Prime is an advanced variant of the Agni series of ballistic missiles developed by the Defence Research and Development Organisation (DRDO) in India.

• The missile uses canister-based launch technology, which allows for easier transportation and quick deployment, significantly enhancing its operational flexibility and reducing response time.

• It incorporates the use of cutting-edge composite materials in its construction, making it lighter, more efficient, and improving its range and accuracy.

• Agni-Prime has a range of 1,000 to 2,000 kilometers, making it a medium-range ballistic missile suitable for addressing regional security needs.

• It is equipped with advanced guidance and navigation systems, ensuring pinpoint accuracy and precision targeting, which

enhances its effectiveness in strategic missions.

Additional Information

• Development of Agni-Prime:

• The Agni-Prime missile is part of India's integrated guided missile development programme (IGMDP), under which various missiles like Agni, Prithvi, and others have been developed.

• It is a canisterised missile, which means it can be launched from a sealed canister, allowing for better storage, mobility, and quick launch capabilities.

• The missile is a lighter and more efficient version of the Agni-I and Agni-II missiles, with enhanced features for strategic deterrence.

• Features of Canister Launch:

• Canister launching provides the advantage of mobility and reduces the time needed for launch preparations.

• It allows the missile to be pre-fueled and stored for extended periods, enhancing the missile system's reliability and readiness.

• The canister protects the missile from environmental conditions and increases its shelf life.

• Importance of New Materials:

• Agni-Prime uses lightweight composite materials that improve its overall performance by reducing weight and enhancing fuel efficiency.

• The advanced materials increase the missile’s structural strength and its ability to withstand high temperatures and pressures during flight.

• The use of cutting-edge materials also reduces the cost of production while maintaining the missile's reliability and effectiveness.

• Advanced Features:

• Agni-Prime is equipped with state-of-the-art navigation and guidance systems, which ensure high precision in hitting targets.

• The missile has a dual-stage engine, making it more efficient and providing it with a longer range compared to its predecessors.

• It is capable of carrying a variety of warheads and has high maneuverability, making it a versatile component of India’s defense arsenal.

Important Points

• Agni Missile Series:

• The Agni missile series is a family of medium to intercontinental range ballistic missiles developed by the DRDO of India under the IGMDP.

• The series includes Agni-I, Agni-II, Agni-III, Agni-IV, Agni-V, and now Agni-Prime.

• Agni-V is India’s longest-range ballistic missile, with a range of over 5,000 kilometers, capable of carrying nuclear warheads.

• Strategic Importance:

• The Agni series strengthens India’s deterrence capability and bolsters its defense against potential external threats.

• The enhanced features of Agni-Prime make it a crucial element in India’s strategy of credible minimum deterrence and no-first-use policy.

• Canister-Based Systems:

• Canister-based missile systems provide a significant edge in terms of quick deployment and mobility during conflict scenarios.

• Such systems are particularly useful for maintaining an effective second-strike capability.

Q20. Answer: (d) French

The correct answer is French.

Key Points

• Joseph Francois Dupleix was a French colonial administrator who served as the Governor-General of French India from 1742 to 1754. He played a significant role in expanding French influence in India.

• He was instrumental in establishing French dominance in South India, especially in regions like Pondicherry, Mahe, Yanam, Karaikal, and Chandernagore, which were under French control during his tenure.

• During his governorship, Dupleix strengthened French military power in India, forming alliances with Indian rulers and attempting to counter British influence in the region. His efforts were part of the larger struggle between the French and the British for control over India during the 18th century.

• Dupleix's tenure was marked by conflicts such as the First Carnatic War (1746–1748), where he sought to gain an upper hand over the British East India Company. He achieved notable success during this war, including the capture of Madras in 1746.

• Despite his initial successes, Dupleix's efforts to establish French supremacy ultimately failed due to lack of support from the French government and strong resistance from the British. He was eventually recalled to France in 1754 and his contributions to French India were overshadowed by British dominance in subsequent years.

Additional Information

• French Colonial Presence in India:

• The French East India Company was established in 1664 to compete with other European colonial powers like the British, Portuguese, and Dutch for trade dominance in India.

• The major French settlements in India were Pondicherry, Mahe, Yanam, Karaikal, and Chandernagore.

• French influence in India was concentrated in the south and east of the country, particularly in and around their stronghold of Pondicherry.

• The Treaty of Paris (1763) marked the end of the Seven Years' War and significantly curtailed French ambitions in India.

• Carnatic Wars:

• The Carnatic Wars (1746–1763) were a series of military conflicts between the British and the French in India, fought for control over trade routes and territories.

• The wars were a part of the global struggle between France and Britain and included three major phases:

• The First Carnatic War (1746–1748), in which Dupleix played a key role, was sparked by the War of the Austrian Succession in Europe.

• The French achieved early victories, but their influence waned in the subsequent Second and Third Carnatic Wars, culminating in British dominance.

• Joseph Francois Dupleix:

• Dupleix's strategy involved forming alliances with Indian rulers and using diplomacy and military strength to expand French territories.

• Despite his efforts, Dupleix faced criticism for overextending resources, and his recall to France marked the decline of French aspirations in India.

• Impact of French Colonial Efforts:

• Although the French failed to establish a lasting empire in India, their presence influenced India's colonial history and introduced European architectural and cultural practices.

• The French settlements, especially Pondicherry, remain a testament to French influence and continue to attract visitors with their unique blend of French and Indian heritage.

Important Points

• Reasons for French Decline in India:

• Lack of consistent support from the French government, which prioritized European conflicts over colonial expansion in Asia.

• Strong competition from the British East India Company, which had better financial resources and naval strength.

• Strategic and political miscalculations by French administrators, including overreliance on local alliances that did not always yield the desired results.

• Legacy of French India:

• The French colonial territories were officially merged into the Republic of India in 1954.

• The French language and culture continue to have a presence in areas like Pondicherry, which is a popular tourist destination known for its French Quarter and colonial architecture.

Q21. Answer: (a) Helical path

The correct answer is Helical path.

Key Points

• A charged particle moving in a uniform magnetic field experiences a force due to the magnetic field, called the Lorentz force.

• The Lorentz force acts perpendicular to both the velocity of the particle and the magnetic field, causing the particle to move in a curved path, resulting in a helical trajectory.

• The shape of the trajectory depends on the initial velocity of the particle relative to the magnetic field:

• When the velocity is perpendicular to the magnetic field, the particle moves in a circular path.

• When the velocity has both parallel and perpendicular components to the magnetic field, the result is a helical path.

• The radius of the helical path (cyclotron radius) is determined by the equation: r = mv / (qB), where:

• m is the mass of the particle.

• v is the velocity component perpendicular to the magnetic field.

• q is the charge of the particle.

• B is the magnetic field strength.

• The pitch of the helix depends on the component of the velocity parallel to the magnetic field.

Additional Information

• Other types of trajectories:

• Elliptical path: This occurs in certain non-uniform magnetic fields or when other forces, such as electric fields, act on the particle. However, this is not the case in a uniform magnetic field.

• Parabolic path: A charged particle follows a parabolic path when it moves under the influence of an electric field only, not when in a uniform magnetic field.

• Hyperbolic path: A hyperbolic trajectory is related to gravitational interactions or certain scattering phenomena, not applicable to a charged particle in a uniform magnetic field.

• Applications of the helical motion of charged particles:

• Mass spectrometry: Helical motion is exploited to separate ions based on their mass-to-charge ratio in a magnetic field.

• Particle accelerators: Devices like cyclotrons use circular orbits in magnetic fields to accelerate charged particles.

• Auroras: The beautiful light displays in polar regions are caused by charged particles from the solar wind following the Earth's magnetic field lines in a helical motion.

• Key equations:

• The force on a charged particle in a magnetic field is given by $F = q(v \times B)$.

• The angular frequency (cyclotron frequency) of the particle is $\omega = qB / m$, where q is the charge, B is the magnetic field strength, and m is the mass of the particle.

• The helical motion is a combination of circular motion perpendicular to the magnetic field and linear motion parallel to the field.

Q22. Answer: (b) Reservation of one-third seats for women in legislatures

The correct answer is Reservation of one-third seats for women in legislatures.

Key Points

• The 106th Constitutional Amendment Act, 2023 is a landmark legislation that provides for reservation of one-third seats for women in the Lok Sabha and State Legislatures.

• This amendment aims to promote gender equality and increase the representation of women in legislative bodies.

• The reservation will apply to seats in the Lok Sabha and State Legislative Assemblies, ensuring that a significant percentage of elected representatives are women.

• The amendment stipulates that the reservation will be implemented after the next delimitation exercise, which is based on the population census.

• This amendment is seen as a step towards empowering women politically and addressing the gender gap in decision-making bodies.

Additional Information

• Historical Background:

• The demand for reservation of seats for women in legislative bodies has been a long-standing issue in India.

• The 73rd and 74th Constitutional Amendments had earlier introduced reservation for women in Panchayati Raj Institutions (local governance).

• The Women’s Reservation Bill was first introduced in 1996 but faced hurdles in getting passed until 2023.

• Key Features of the 106th Constitutional Amendment:

• The amendment reserves 33% seats for women in the Lok Sabha and State Legislative Assemblies.

• This reservation will be operational after the next census-based delimitation of constituencies.

• The law ensures that women from various socio-economic backgrounds get a fair opportunity for representation.

• Global Perspective:

• Many countries, including Rwanda, Sweden, and Norway, have implemented reservation policies for women in their legislative bodies.

• India’s move aligns with global efforts to promote gender equality and women’s participation in governance.

• Challenges in Implementation:

• There are concerns about the actual implementation of the reservation, especially in regions with deep-rooted patriarchal norms.

• Delimitation processes and census data accuracy will play a crucial role in ensuring fair representation.

Important Points

• Delimitation:

• Delimitation refers to the process of redrawing constituency boundaries based on population data.

• It is conducted by the Delimitation Commission, an independent body established under the Constitution of India.

• The next delimitation exercise is expected to be based on the 2021 census, though implementation timelines are yet to be clarified.

• Impact on Governance:

• Reservation of seats for women is expected to enhance the quality of governance by ensuring diverse perspectives.

• It can lead to better policymaking and focus on issues affecting women and marginalized communities.

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Q23. Answer: (a) Tropical Evergreen Forests

The correct answer is Tropical Evergreen Forests.

Key Points

• The Western Ghats and northeastern hills of India are primarily covered with Tropical Evergreen Forests. These regions receive high annual rainfall, making them ideal for the growth of dense, green forests that remain lush throughout the year.

• Tropical Evergreen Forests are characterized by a dense canopy of trees, which do not shed their leaves at the same time, ensuring that the forests remain green year-round.

• These forests are typically found in areas receiving over 200 cm of annual rainfall with short dry seasons, which is a characteristic feature of the Western Ghats and the northeastern hills.

• Some common tree species found in these forests include mahogany, rosewood, ebony, rubber, and bamboo. These trees are known for their hardwood and economic value.

• These forests are also home to a rich variety of flora and fauna, including rare species like the Malabar civet, lion-tailed macaque, and different species of reptiles, birds, and insects.

Additional Information

• Tropical Evergreen Forests:

• These forests are found in regions with high temperature and heavy rainfall, typically above 200 cm per year.

• They are distributed in areas such as the Western Ghats, Andaman and Nicobar Islands, and the northeastern states of India like Arunachal Pradesh, Meghalaya, Nagaland, and Assam.

• The trees in these forests usually have broad leaves, and the forests are known for their multi-layered vegetation.

• These forests are also referred to as rainforests due to their lush greenery and the continuous availability of water throughout the year.

• Tropical Deciduous Forests:

• Also known as monsoon forests, these are found in areas with moderate rainfall ranging between 70-200 cm annually.

• They shed their leaves during the dry season to conserve water.

• Examples of trees include teak, sal, sandalwood, and mahua.

• These forests are mainly found in states like Madhya Pradesh, Odisha, Maharashtra, and parts of the eastern Himalayas.

• Tropical Thorn Forests:

• These forests occur in regions with low rainfall, typically less than 50 cm annually.

• They consist of thorny shrubs and bushes adapted to dry climates, such as babul, cactus, and acacia.

• They are mainly found in the dry regions of Rajasthan, Gujarat, Haryana, and parts of Punjab.

• Montane Forests:

• These forests are found in the mountainous regions where the altitude plays a significant role in determining the vegetation type.

• They are characterized by coniferous trees like pine, deodar, fir, and spruce.

• In India, montane forests are common in regions like the Himalayas and the Nilgiri Hills.

Q24. Answer: (d) India

The correct answer is India.

Key Points

• In January 2025, India successfully docked two satellites in space, becoming the fourth nation in the world to achieve this significant milestone.

• The achievement is a testament to the advancements of the Indian Space Research Organisation (ISRO), which has become a leading space agency globally, known for its cost-effective and successful missions.

• Prior to India, the other countries that successfully docked satellites in space were Russia, the United States, and China.

• The docking of satellites is a crucial step in space exploration and technology, enabling the assembly of large space stations, satellite servicing, and scientific research.

• India’s capability to dock satellites in orbit demonstrates its growing prowess in space technology and strengthens its position in the global space industry.

Additional Information

• Indian Space Research Organisation (ISRO):

• Founded in 1969, ISRO is India’s national space agency headquartered in Bengaluru.

• ISRO has achieved several milestones, including the successful launch of the Mangalyaan (Mars Orbiter Mission) in 2014, making India the first Asian nation to reach Martian orbit.

• ISRO is renowned for its cost-effective missions, such as the Chandrayaan and Mangalyaan programs.

• The organization has consistently contributed to satellite launches, space exploration, and technological advancements in

collaboration with other countries.

• Countries with Satellite Docking Capability:

• Russia: The first country to achieve satellite docking in space during the 1960s with its Soyuz program.

• United States: Achieved satellite docking during the Apollo program, with the first successful docking occurring in 1966.

• China: Achieved docking capabilities with its Tiangong space station modules, solidifying its status as a significant space power.

• Importance of Satellite Docking:

• Enables the creation and maintenance of space stations such as the International Space Station (ISS) or China's Tiangong Station.

• Facilitates space exploration missions by allowing the assembly of larger spacecraft or refueling in orbit.

• Allows for the repair and maintenance of existing satellites, extending their operational lifespans.

• India's Emerging Space Power:

• India's space program has been focusing on satellite launches, interplanetary exploration, and space observation systems.

• Achievements like the Gaganyaan mission (India's manned space mission) and Chandrayaan-3 demonstrate its growing capabilities.

• India has also emerged as a global leader in commercial satellite launches, offering cost-effective solutions to international clients.

Important Points

• Significance of Space Exploration:

• Advances in space technology have led to improvements in communication systems, weather forecasting, GPS navigation, and Earth observation.

• Space programs contribute to national security, economic growth, and scientific innovation.

• Collaborations between nations in space exploration promote diplomacy and shared technological advancements.

• Future of Space Exploration:

• Countries are now focusing on deep space exploration, including missions to the Moon, Mars, and beyond.

• Private companies like SpaceX, Blue Origin, and others are playing a vital role in advancing space technologies.

• Space exploration is expected to contribute to new scientific discoveries and the development of new technologies such as space-based solar power.

Q25. Answer: (b) Kirti Chakra

The correct answer is Kirti Chakra.

Key Points

• Major Malla Rama Gopal Naidu of the Maratha Light Infantry was awarded the Kirti Chakra on May 25 for his exceptional bravery and service.

• The Kirti Chakra is India's second-highest peacetime gallantry award, awarded for conspicuous bravery or acts of valor during peacetime.

• This award recognizes individuals who display exceptional bravery in non-combat situations, including counter-terrorism operations and disaster response.

• The Kirti Chakra can be awarded posthumously, but in this case, Major Malla Rama Gopal Naidu received it for his valor without it being posthumous.

• Recipients of the Kirti Chakra are honored for their outstanding courage and self-sacrifice in the service of the nation.

Additional Information

• Gallantry Awards in India:

• India has instituted several gallantry awards to recognize courage and valor displayed by individuals in service, both during wartime and peacetime.

• The awards include Param Vir Chakra, Maha Vir Chakra, Vir Chakra, Kirti Chakra, Shaurya Chakra, and Ashoka Chakra.

• The Kirti Chakra is awarded for acts of gallantry other than in the face of the enemy.

• It ranks second in the order of precedence among peacetime gallantry awards, after the Ashoka Chakra.

• Maratha Light Infantry:

• The Maratha Light Infantry is one of the oldest regiments in the Indian Army, established in 1768.

• The regiment has a long history of bravery and has participated in many battles, including the Kargil War and World War II.

• It is known for its motto, "Duty, Honour, Courage," which reflects its commitment to the nation.

• Criteria for Kirti Chakra:

• It is awarded to military personnel, civilian citizens, and members of the police forces for their courage in non-combat operations.

• Acts such as saving lives during natural calamities, fighting insurgency, and preventing significant loss of life are recognized.

• Other Gallantry Awards:

• The Shaurya Chakra is the third-highest peacetime gallantry award in India, given for acts of courage and bravery.

• The Param Vir Chakra is the highest wartime gallantry award in India, given for the most conspicuous bravery or self-sacrifice in the face of the enemy.

• The Ashoka Chakra is the highest peacetime gallantry award, awarded for valor, courageous action, or self-sacrifice away from the battlefield.

Important Points

• Kirti Chakra Design:

• The medal is circular, made of silver, and has a design featuring a chakra (wheel) in the center.

• The ribbon is green with a central orange stripe, symbolizing courage and bravery.

• Posthumous Award:

• The Kirti Chakra can be awarded posthumously, ensuring recognition for those who sacrifice their lives for the nation.

• Other Award Categories:

• Gallantry awards are classified into wartime and peacetime categories, each with unique criteria for selection.

• Both military and civilian personnel are eligible for these awards, depending on their acts of valor.

Q26. Answer: (c) Conversion of people to Christianity.

The correct answer is Conversion of people to Christianity.

Key Points

• One of the major causes of revolts before 1857 was the exploitation of rural society by corrupt officers. Rural society, especially peasants, suffered due to heavy taxation, extortion by local officials, and oppressive practices. Hence, statement 1 is correct.

• The destruction of indigenous industries was another significant factor. The British policies led to the decline of traditional handicrafts and forced dependency on imported goods, which created economic distress. Hence, statement 2 is correct.

• The allegation of forced conversion to Christianity was not a widespread cause of revolts before 1857. Although there were certain grievances regarding religious interference, the primary revolts were driven by socio-economic and administrative issues rather than religious conversion. Hence, statement 3 is incorrect.

• The British introduced colonial land revenue settlements, such as the Permanent Settlement, Mahalwari, and Ryotwari systems. These systems disrupted traditional land ownership and caused widespread distress among peasants and landlords alike. Hence, statement 4 is correct.

Additional Information

• Exploitation by corrupt officers:

• The British administration relied heavily on intermediaries, zamindars, and local officials to collect taxes, which led to corruption and exploitation of the rural population.

• Peasants were forced to pay exorbitant taxes, leading to widespread poverty and resentment.

• Impact of colonial policies on indigenous industries:

• The introduction of British goods and policies like free trade resulted in the decline of local handicrafts and textile industries.

• Indian weavers and craftsmen faced unemployment as imported goods were cheaper and dominated the market.

• Colonial land revenue settlements:

• The Permanent Settlement of 1793, introduced by the British, fixed land revenue irrespective of agricultural yield, which burdened the peasants and zamindars.

• The Ryotwari system, implemented in southern India, made individual peasants directly responsible for paying taxes, often leading to exploitation.

• The Mahalwari system, prevalent in northern India, was similarly harsh and led to widespread rural distress.

• Religious conversion during colonial rule:

• While there were isolated attempts at conversion to Christianity by missionaries, this was not a major cause of revolts before 1857.

• Religious grievances became more prominent during the 1857 revolt, when rumors of forced conversion and disrespect for local traditions spread widely.

Important Points

• Revolts before 1857:

• These revolts were primarily localized and focused on specific grievances such as land revenue policies, exploitative practices, and economic distress.

• Examples include the Poligar Rebellion (1799), the Sanyasi Rebellion, and the Paika Rebellion.

• Most of these uprisings lacked coordination and were limited to specific regions or communities.

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• 1857 Revolt:

• The 1857 revolt, also known as the First War of Indian Independence, marked a significant turning point in Indian history.

• Religious interference, such as rumors about the greased cartridges, fueled the anger of soldiers and civilians alike.

• Unlike earlier revolts, the 1857 uprising saw a broader participation from various sections of Indian society.

Q27. Answer: (b) Robert De Niro

The correct answer is Robert De Niro.

Key Points

• Robert De Niro, one of the most celebrated actors of all time, was honoured with the prestigious Honorary Palme d'Or at the 2025 Cannes Film Festival for his lifetime achievements in the film industry.

• The Honorary Palme d'Or is an honorary award bestowed by the Cannes Film Festival to recognize the exceptional achievements and contributions of individuals in the field of cinema.

• Robert De Niro is renowned for his versatile acting skills and has delivered iconic performances in films such as Taxi Driver, Raging Bull, Goodfellas, and The Irishman.

• De Niro has previously won two Academy Awards for his roles in The Godfather Part II (1974) and Raging Bull (1980), cementing his legacy in Hollywood.

• By receiving the Honorary Palme d'Or, De Niro joins a distinguished list of filmmakers and actors who have been recognized for their contributions to world cinema.

Additional Information

• Robert De Niro:

• Born: August 17, 1943, in New York City, USA.

• Known for his intense method acting, De Niro is celebrated for his ability to embody complex characters and deliver powerful performances.

• He co-founded the Tribeca Film Festival in 2002, promoting independent films and revitalizing the Tribeca neighborhood post-9/11.

• De Niro has collaborated with legendary directors like Martin Scorsese and Francis Ford Coppola, contributing to cinematic masterpieces.

• His career spans over five decades, making him an influential figure in both Hollywood and global cinema.

• Honorary Palme d'Or:

• The Honorary Palme d'Or is awarded at the Cannes Film Festival to individuals whose careers have significantly impacted the global film industry.

• Past recipients include iconic personalities such as Agnes Varda, Jean-Luc Godard, and Jodie Foster.

• The award is not part of the competitive categories but serves as a tribute to artistic excellence and lifetime achievement.

• Cannes Film Festival:

• The Cannes Film Festival, held annually in Cannes, France, is one of the most prestigious film festivals globally.

• It was founded in 1946 and showcases films of all genres, including documentaries, dramas, and experimental works.

• The festival's top prize is the Palme d'Or, awarded to the best film in the competition.

• The event attracts global celebrities, filmmakers, and industry professionals, making it a significant platform for film promotion and networking.

• Other Nominees:

• Leonardo DiCaprio: Known for his roles in films like Titanic, Inception, and The Revenant, DiCaprio is a celebrated actor but has not received the Honorary Palme d'Or.

• Quentin Tarantino: Renowned director and screenwriter of films like Pulp Fiction and Kill Bill, Tarantino has won the Palme d'Or for "Pulp Fiction" but not the honorary award.

• Denzel Washington: An acclaimed actor famous for movies like Training Day and Malcolm X, Washington has received numerous awards but not the Honorary Palme d'Or.

Q28. Answer: (b) Ripon Building

The correct answer is Ripon Building.

Key Points

• The Ripon Building is the headquarters of the Greater Chennai Corporation, the civic body that governs the city of Chennai, Tamil Nadu.

• It was constructed in the year 1913 during the British colonial rule in India and is named after Lord Ripon, who served as the Viceroy of India from 1880 to 1884.

• The building is a fine example of Neo-Classical architecture, with influences from the Gothic, Ionic, and Corinthian styles.

• The Ripon Building is a white structure made of chunam (lime plaster) and is notable for its 200-foot-long frontage, a central tower, and a clock known as the Westminster Chimes.

• The building is situated near Park Town, opposite the Chennai Central railway station, making it a prominent landmark of the city.

Additional Information

• High Court:

• The Madras High Court, established in 1862, is one of the three High Courts in India created under Queen Victoria's charter.

• It is located on NSC Bose Road in Chennai and is known for its Indo-Saracenic architecture.

• The High Court is the principal judicial body of Tamil Nadu and Puducherry and does not serve as the headquarters of the Greater Chennai Corporation.

• Fort St. George:

• Fort St. George was built in 1644 by the British East India Company and is considered the first English fortress in India.

• It is located on the eastern coast of Chennai and currently houses the administrative offices of the Tamil Nadu Government and the Legislative Assembly.

• Though historically significant, it is not the headquarters of the Greater Chennai Corporation.

• Government Museum:

• The Government Museum, also known as the Egmore Museum, is located in Chennai and was established in 1851.

• It is the second oldest museum in India and houses a rich collection of artifacts, including bronze sculptures, archaeological findings, and rare coins.

• The museum is dedicated to preserving historical and cultural artifacts and does not serve as the headquarters of the Greater Chennai Corporation.

• Ripon Building:

• The Ripon Building is named after Lord Ripon, who is often referred to as the "Father of Local Self-Government in India."

• The building is an iconic structure in Chennai and represents the city’s colonial past.

• The clock tower, which is 43 meters high, houses a clock known as the Westminster Chimes, which was installed in 1913 and continues to function till date.

• The Ripon Building is used for administrative purposes and is the central office for city governance in Chennai.

Q29. Answer: (d) Jagat Prakash Nadda

The correct answer is Jagat Prakash Nadda.

Key Points

• The Nationwide Mass Drug Administration (MDA) Campaign for Lymphatic Filariasis (LF) was launched by Jagat Prakash Nadda, the then Union Minister of Health and Family Welfare in India.

• The campaign is a part of India's commitment to eliminate Lymphatic Filariasis (LF) as a public health problem, in line with the global goal of eradicating the disease by 2030.

• The Mass Drug Administration involves the distribution of preventive medications, such as Diethylcarbamazine Citrate (DEC) and Albendazole, to the population at risk of the disease.

• The program aims to interrupt the transmission of the filarial parasite by ensuring the intake of these drugs by the majority of the population in endemic areas.

• India has the highest burden of Lymphatic Filariasis globally, with over 650 million people at risk of infection in endemic districts across the country.

Additional Information

• Lymphatic Filariasis:

• Lymphatic Filariasis, commonly known as elephantiasis, is a neglected tropical disease caused by infection with parasitic worms transmitted through the bites of infected mosquitoes.

• The disease causes severe swelling in the arms, legs, breasts, and genitalia, leading to disability and social stigma.

• Three species of worms are primarily responsible: Wuchereria bancrofti, Brugia malayi, and Brugia timori.

• Lymphatic Filariasis is endemic in more than 70 countries, with a significant burden in tropical and subtropical regions.

• India's Efforts to Eliminate Lymphatic Filariasis:

• India is committed to eliminating Lymphatic Filariasis by 2030, in alignment with the WHO's Global Programme to Eliminate Lymphatic Filariasis (GPELF).

• The National Filaria Control Programme (NFCP) was launched in 1955 to combat the disease in endemic areas through vector control and treatment.

• The Mass Drug Administration (MDA) campaign is one of the most significant steps taken by the government to combat LF by providing preventive drugs to large populations.

• Jagat Prakash Nadda:

• Jagat Prakash Nadda is an Indian politician and the current National President of the Bharatiya Janata Party (BJP) since January 2020.

• He has served as the Union Minister of Health and Family Welfare in the Government of India from 2014 to 2019.

• During his tenure as Health Minister, he spearheaded several health initiatives, including the Nationwide Mass Drug Administration Campaign for Lymphatic Filariasis and the implementation of the Ayushman Bharat Yojana.

• Global Programme to Eliminate Lymphatic Filariasis (GPELF):

• The World Health Organization (WHO) launched this program in 2000 to eliminate Lymphatic Filariasis as a public health problem worldwide by 2030.

• The two main strategies of GPELF are interrupting transmission through MDA and managing morbidity and preventing disability in affected individuals.

• It is estimated that around 36 million people currently suffer from the disfiguring and debilitating effects of LF globally.

Q30. Answer: (b) Power to regulate land, forests and social customs in Scheduled Areas

The correct answer is Power to regulate land, forests and social customs in Scheduled Areas.

Key Points

• Fifth Schedule of the Indian Constitution provides provisions for the administration and control of Scheduled Areas and Scheduled Tribes.

• Under the Fifth Schedule, the Governor of a state has the special responsibility to regulate matters such as land transfer, management of forests, and social practices in Scheduled Areas.

• The Governor can issue regulations to prohibit or restrict the transfer of land by or among members of Scheduled Tribes to protect their rights and interests.

• These regulations help in preserving the cultural identity and ensuring economic stability for the Scheduled Tribes living in these areas.

• The Governor is required to consult the Tribal Advisory Council (TAC) before making regulations. The TAC consists of representatives of Scheduled Tribes in the state legislative assembly.

Additional Information

• Scheduled Areas:

• Scheduled Areas are regions identified by the President of India under Article 244(1) of the Indian Constitution due to their significant tribal population and socio-economic backwardness.

• These areas are mainly found in states such as Madhya Pradesh, Odisha, Chhattisgarh, Rajasthan, Gujarat, Maharashtra, and Jharkhand.

• Special provisions are made to protect the rights of Scheduled Tribes in these areas and to promote their welfare.

• Role of the Governor:

• The Governor has a pivotal role in safeguarding the interests of Scheduled Tribes in Scheduled Areas.

• They have the authority to make regulations prohibiting or restricting land transfer, regulating allotment of land, and overseeing the management of money lending to the Scheduled Tribes.

• The Governor must act in consultation with the Tribal Advisory Council, ensuring that the regulations are beneficial to the community.

• Tribal Advisory Council:

• This council is established in states that have Scheduled Areas and comprises 20 members, of which three-fourths are Scheduled Tribe representatives.

• The council advises the Governor on matters related to the welfare and advancement of Scheduled Tribes in the state.

• Other Provisions of the Fifth Schedule:

• It provides for the establishment of a Commission to report on the administration of Scheduled Areas and Tribes.

• The President of India can direct the constitution of such a commission and lay its report before Parliament.

• Difference from the Sixth Schedule:

• While the Fifth Schedule deals with the administration of Scheduled Areas in non-Northeastern states, the Sixth Schedule governs tribal areas in Northeastern states such as Assam, Meghalaya, Tripura, and Mizoram.

• The Sixth Schedule allows for the creation of Autonomous District Councils with legislative, administrative, and judicial powers.

Important Points

• Key Legal Provisions:

• The Fifth Schedule is governed by Article 244(1) of the Indian Constitution.

• Any regulation made by the Governor for Scheduled Areas requires presidential assent.

• The provisions of the Fifth Schedule aim to protect the rights and interests of Scheduled Tribes in areas where they constitute a

significant portion of the population.

• Historical Background:

• The concept of Scheduled Areas was introduced under the Government of India Act, 1935, and carried forward into the Indian Constitution.

• The Tribal Advisory Council was established to serve as a consultative body to address tribal welfare issues in Scheduled Areas.

• The idea was to ensure that tribal populations are not exploited and are allowed to retain their culture, traditions, and land rights.

Q31. Answer: (c) Gopala

The correct answer is Gopala.

Key Points

• Gopala was the founder of the Pala dynasty, which was established in the late 8th century in the region of Bengal, present-day West Bengal and Bangladesh.

• The Palas were known for their efficient administration, military prowess, and promotion of art and culture. They ruled for approximately four centuries, from the 8th to the 12th century.

• Gopala was a local chieftain who rose to power through a democratic election by the regional leaders to bring stability and order to the region, which was suffering from chaos and lawlessness.

• He successfully established a strong kingdom in the region, laying the foundation of a dynasty that would later achieve great heights under rulers like Dharmapala and Devapala.

• The Pala dynasty is also known for its promotion of Buddhism and its significant contribution to the spread of Buddhist culture and education in Southeast Asia.

Additional Information

• About the Pala Dynasty:

• The Pala dynasty ruled over the regions of Bengal and Bihar from the late 8th century to the 12th century.

• The term "Pala" means protector, and the rulers of this dynasty were staunch patrons of Buddhism, supporting the construction of numerous monasteries and temples.

• The Palas established the famous Vikramashila and Nalanda Universities, which were significant centers of learning during their reign.

• Notable Kings of the Pala Dynasty:

• Dharmapala: The most powerful ruler of the Pala dynasty, who expanded the kingdom and played a crucial role in the revival of Buddhism in India.

• Devapala: Succeeded Dharmapala and continued the Pala legacy by further extending the empire and patronizing Buddhist institutions and art.

• Other Options Explained:

• Bhoja: Bhoja was a king from the Paramara dynasty in central India, known for his contributions to literature, art, and architecture. He was not associated with the Pala dynasty.

• Dharmapala: Dharmapala was one of the most prominent rulers of the Pala dynasty but not its founder. He was the son of Gopala and expanded the empire significantly.

• Dhruva: Dhruva was a ruler from the Rashtrakuta dynasty in southern India and had no connection to the Pala dynasty.

• Significance of the Pala Dynasty:

• The Palas were instrumental in spreading Buddhism to Tibet and Southeast Asia, making it a dominant religion in the region.

• Their rule saw the flourishing of art, culture, and education, with the establishment of monasteries and universities like Vikramashila, Nalanda, and Somapura.

• The Pala dynasty also maintained diplomatic and cultural relations with Southeast Asian countries such as Java, Sumatra, and Sri Lanka.

Q32. Answer: (c) Himalayan Mountains

The correct answer is Himalayan Mountains.

Key Points

• Alpine climate is characterized by cold, snowy winters and cool summers, typically found in high-altitude regions such as the Himalayan Mountains.

• The Himalayan region experiences such climatic conditions due to its high altitude, with significant snowfall during winter and relatively cool temperatures even during summer.

• In contrast, the Thar Desert has an arid climate characterized by extreme temperatures and very low precipitation, making it unsuitable for an alpine climate. Hence, this is incorrect.

• The Northern Plains have a humid subtropical climate with hot summers and cold winters, which is different from the alpine climate. Hence, this is incorrect.

• The Western Ghats experience a tropical monsoon climate, with heavy rainfall and warm temperatures, not an alpine climate. Hence, this is incorrect.

Additional Information

• Himalayan Mountains:

• The Himalayas are the world's youngest mountain range and the highest, stretching across five countries: India, Nepal, Bhutan, China, and Pakistan.

• The region's altitude ranges from 1,500 meters to over 8,000 meters, contributing to varying climatic zones, including the alpine climate in high altitudes.

• Prominent peaks in the Himalayan range include Mount Everest (8,848 meters), the tallest mountain in the world, and Kangchenjunga, the third-highest peak.

• The Himalayan ecosystem supports diverse flora and fauna, including species like the snow leopard, red panda, and Himalayan tahr, which thrive in the alpine climate.

• Thar Desert:

• The Thar Desert, also known as the Great Indian Desert, is located in Rajasthan and extends into Pakistan.

• It is characterized by a hot desert climate with low rainfall (100–500 mm annually), extremely high temperatures in summer, and cool winters.

• The vegetation is sparse, with thorny bushes and drought-resistant plants dominating the landscape.

• Northern Plains:

• The Northern Plains of India are formed by the deposition of sediments by the rivers Ganga, Brahmaputra, and Indus.

• They feature a humid subtropical climate, characterized by hot summers, cold winters, and moderate to heavy monsoon rains.

• This region is one of the most fertile and densely populated regions in the world, making it a significant agricultural area.

• Western Ghats:

• The Western Ghats, also known as the Sahyadri Hills, are a mountain range that runs parallel to the western coast of India.

• This region experiences a tropical monsoon climate, receiving heavy rainfall during the monsoon season, especially on its western slopes.

• The Western Ghats are a UNESCO World Heritage Site and are known for their biodiversity and endemic species of plants and animals.

Q33. Answer: (a) Soil type

The correct answer is Soil type.

Key Points

• Ocean currents are primarily influenced by factors such as wind, temperature differences, salinity variations, and Earth's rotation.

• Wind: Surface ocean currents are majorly driven by winds. The movement of air across the surface of the ocean creates friction, causing water to move and form currents. This factor is essential and has a direct impact on the direction and speed of ocean currents. Hence, this statement is correct.

• Temperature differences: The temperature differences between the equator and the poles cause variations in water density. Warmer water is less dense than colder water, leading to the formation of currents. Hence, this statement is correct.

• Earth's rotation: The rotation of the Earth influences the direction of ocean currents due to the Coriolis effect. In the Northern Hemisphere, currents tend to move clockwise, while in the Southern Hemisphere, they move counterclockwise. Hence, this statement is correct.

• Soil type: The type of soil has no direct impact on the formation or movement of ocean currents. Ocean currents are primarily influenced by factors related to water movement, temperature, and atmospheric forces, not by the soil type. Hence, this statement is incorrect.

Additional Information

• Ocean Currents:

• Ocean currents are large-scale movements of water that circulate throughout the ocean basins.

• They are driven by a combination of winds, temperature differences, salinity, and gravitational forces.

• Ocean currents play a vital role in regulating the Earth's climate by redistributing heat from the equator to the poles.

• Wind:

• Wind is one of the primary driving forces of surface ocean currents.

• Trade winds and westerlies create large circular currents called gyres in the world's oceans.

• Examples include the Gulf Stream in the Atlantic Ocean and the Kuroshio Current in the Pacific Ocean.

• Temperature Differences:

• The temperature difference between tropical and polar regions causes changes in water density.

• Warm water near the equator is less dense and rises, while cold water near the poles is denser and sinks, forming circulation

patterns.

• This mechanism contributes to global thermohaline circulation or the "Global Conveyor Belt."

• Coriolis Effect:

• The Earth's rotation creates the Coriolis effect, which influences the direction of ocean currents.

• In the Northern Hemisphere, currents deflect to the right, while in the Southern Hemisphere, they deflect to the left.

• This effect is crucial for the formation of gyres and helps maintain the balance of oceanic circulation.

• Important Points:

• Ocean currents significantly impact marine ecosystems by distributing nutrients and oxygen.

• They also influence weather patterns and global climates, such as El Niño and La Niña phenomena.

• They affect human activities, including shipping routes, fisheries, and climate-related industries.

• Understanding ocean currents is essential for studying climate change and its impact on the Earth’s ecosystems.

Q34. Answer: (c) Bengaluru

The correct answer is Bengaluru.

Key Points

• Infosys was established in 1981 in Pune, Maharashtra, but later moved its headquarters to Bengaluru, Karnataka, in 1994.

• Bengaluru, often referred to as the Silicon Valley of India, became the hub for Infosys due to its conducive environment for IT growth, availability of skilled professionals, and infrastructure.

• The founders of Infosys, including Narayana Murthy, relocated the company to Bengaluru to take advantage of the city’s emerging IT ecosystem.

• Infosys grew to become one of India’s leading IT services companies, specializing in consulting, technology, outsourcing, and next-generation services.

• Today, Infosys operates globally and is recognized as a pioneer in the IT industry, with its headquarters in Bengaluru.

Additional Information

• Infosys:

• Founded in 1981 by Narayana Murthy and six other engineers.

• The company offers services such as IT consulting, software development, and business process outsourcing.

• Infosys is listed on both the BSE (Bombay Stock Exchange) and NSE (National Stock Exchange) and has a significant presence on the NASDAQ.

• Bengaluru - The Silicon Valley of India:

• Bengaluru is known as the IT capital of India, hosting major tech companies like Infosys, Wipro, and TCS.

• The city’s ecosystem supports innovation, entrepreneurship, and a thriving IT industry.

• It has over 5000 startups and is home to numerous global R&D centers.

• Other Cities Mentioned in the Question:

• Hyderabad: Known for its IT hub, Cyberabad, and companies like Google and Microsoft, but Infosys was not founded here.

• Mumbai: The financial capital of India; home to the headquarters of major corporations but not the birthplace of Infosys.

• Kolkata: A major city in eastern India known for its cultural heritage, but not a hub for Infosys.

• Infosys Headquarters:

• Infosys moved its headquarters to Bengaluru in 1994 to leverage the city’s growing IT influence.

• Its campus in Bengaluru is one of the largest and most advanced tech campuses in India.

Q35. Answer: (b) Kafue River

The correct answer is Kafue River.

Key Points

• The Kafue River, located in Zambia, is one of the most important tributaries of the Zambezi River and plays a significant role in Zambia's water supply and hydroelectric power generation.

• In February 2025, an acid spill occurred in the Kafue River due to a leakage from a Chinese-operated copper mine in Zambia, leading to contamination of water resources.

• The pollution caused by the spill raised serious environmental concerns, as the Kafue River is a lifeline for communities and wildlife in the region, serving as a critical water source and supporting agriculture, fishing, and biodiversity.

• Such industrial accidents can have devastating impacts on ecosystems, leading to water pollution, destruction of aquatic life, and long-term ecological imbalance.

• The incident highlighted the need for stricter regulations on mining practices and greater accountability for international companies operating in environmentally sensitive areas.

Additional Information

• Kafue River:

• The Kafue River is the largest tributary of the Zambezi River and spans approximately 960 km in length.

• It flows entirely within Zambia, making it a vital water resource for domestic, agricultural, industrial, and hydropower purposes.

• The river supports a wide variety of aquatic life and serves as a key source of water for the Kafue Flats, a vast wetland region known for its unique ecosystem.

• The Kafue Gorge Dam and the Itezhi-Tezhi Dam are major hydroelectric projects built on the river, contributing significantly to Zambia's electricity supply.

• Acid Spills and Environmental Impact:

• Acid spills are one of the major environmental risks associated with mining activities, particularly copper mining, which often involves the use of sulfuric acid in processing.

• Such spills can lead to the contamination of water bodies, making water unsafe for drinking, irrigation, and supporting aquatic ecosystems.

• The acidic water can cause the death of aquatic organisms, disrupt the food chain, and affect human populations relying on the contaminated water for daily use.

• Remediation efforts for acid spills typically involve neutralizing the acidity, removing contaminants, and restoring the ecosystem, which can be a time-consuming and costly process.

• Environmental Regulation in Zambia:

• Zambia is one of the world's largest producers of copper, and its mining industry contributes significantly to the country's economy.

• Despite its economic importance, mining activities in Zambia have been criticized for their environmental impact, including deforestation, soil degradation, and water pollution.

• The Zambian government, along with international organizations, has been working to improve environmental regulations and enforce compliance among mining companies.

• Efforts include stricter penalties for environmental violations and better monitoring and assessment systems.

• Other Major Rivers in Zambia:

• Chambeshi River: A major river in northeastern Zambia and one of the longest rivers in the country. It is considered the source of the Zambezi River.

• Luangwa River: Known for its biodiversity, the Luangwa River is a major river in eastern Zambia and a vital resource for wildlife and agriculture in the region.

• Zambezi River: The fourth-longest river in Africa, flowing through several countries, including Zambia. It is a key source of hydroelectric power and supports diverse ecosystems.

Q36. Answer: (d) Altitude and terrain

The correct answer is Altitude and terrain.

Key Points

• Altitude and terrain are critical factors influencing the formation of dispersed settlements in hilly and forested regions of India. The rugged and uneven landscapes make it challenging to establish dense settlements.

• In such regions, the availability of flat land for construction and agriculture is limited, leading to scattered housing and settlements.

• Hilly terrains often have natural barriers, such as steep slopes, dense forests, and rivers, which hinder the development of large, concentrated settlements and promote dispersed habitation.

• Accessibility is another factor; rural areas in hilly regions often lack proper road infrastructure, leading to isolated communities spread across the region.

• These settlements are typically found near water sources, small agricultural patches, or forest areas to support the local population's livelihood. Hence, altitude and terrain are the most influential factors for dispersed settlements in these regions.

Additional Information

• Industrial Development:

• Industrialization typically leads to the development of urban centers and dense settlements.

• In hilly and forested regions, industrial development is limited due to geographical constraints and lack of resources, making this factor less influential in shaping dispersed settlements.

• Language Diversity:

• Language diversity does not directly influence the formation of settlements but can impact the cultural and social structure of a region.

• In India, language diversity is more associated with cultural identity than settlement patterns.

• Railway Networks:

• Railway networks contribute to urbanization and the development of dense settlements along transit routes.

• However, hilly and forested regions often lack extensive railway infrastructure due to terrain challenges, making this factor less relevant for dispersed settlements.

• Altitude and Terrain:

• Regions with high altitudes and rugged terrains, such as the Himalayan region, are characterized by dispersed settlements due to geographic constraints.

• Residents in these areas often rely on agriculture, animal husbandry, and forestry, which require proximity to natural resources.

• Examples include villages in Himachal Pradesh, Uttarakhand, and Arunachal Pradesh, where settlements are dispersed due to the challenging terrain.

• These areas often have harsh climatic conditions, limited transport infrastructure, and a lack of flat land, further contributing to the scattered settlement pattern.

Important Points

• Dispersed settlements:

• Dispersed settlements are characterized by individual houses or small clusters of homes spread over a large area.

• They are typically found in rural areas with challenging terrain or limited resources.

• This type of settlement is prevalent in hilly regions, deserts, and areas with dense forests.

• Factors such as topography, natural resources, climate, and accessibility play a significant role in determining the pattern of settlement.

Q37. Answer: (d) A name

The Correct Answer is A name.

Key Points

• Every file or folder must have a name to be created and saved.

• The name helps the operating system identify and store the file/folder.

• You can rename the file/folder anytime after creation.

• Options like password, shortcut, or email are not required for creating one.

Q38. Answer: (a) Arundhati Roy

The correct answer is Arundhati Roy.

Key Points

• Arundhati Roy, an acclaimed Indian author, released the memoir "Mother Mary Comes to Me" in 2025, reflecting on her relationship with her late mother.

• Arundhati Roy is widely known for her debut novel "The God of Small Things", which won the Booker Prize in 1997.

• This memoir is a personal exploration of the emotional bond between her and her mother, drawing on memories, struggles, and shared experiences.

• Through the book, Roy delves into themes of family, identity, and love, making it a deeply moving literary work.

• It is considered a significant addition to her literary repertoire, showcasing her prowess in blending personal narrative with broader societal insights.

Additional Information

• Arundhati Roy:

• Born on 24 November 1961, in Shillong, Meghalaya, India.

• Her debut novel "The God of Small Things" brought her global recognition and the prestigious Booker Prize.

• Besides her novels, Roy is also known for her activism and essays on various social and political issues.

• She has written works like "Capitalism: A Ghost Story" and "Field Notes on Democracy", which critique social injustices and inequalities.

• Indian Authors and Memoirs:

• Jhumpa Lahiri: A Pulitzer Prize-winning author, known for "Interpreter of Maladies", explores themes of identity and diaspora.

• Kiran Desai: Winner of the 2006 Booker Prize for her novel "The Inheritance of Loss", her works often reflect cultural displacement and identity.

• Anita Desai: A prominent Indian novelist, known for "Clear Light of Day" and "Fasting, Feasting", her writings center around familial relationships and inner conflicts.

• Memoirs by Indian Authors:

• Memoirs are a popular genre among Indian authors, often used to share personal stories and historical accounts.

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• Examples include "My Experiments with Truth" by Mahatma Gandhi and "The Test of My Life" by Yuvraj Singh.

Important Points

• Arundhati Roy's Literary Style:

• Roy is known for her lyrical prose, which often blends political insights with personal storytelling.

• Her works are celebrated for their rich imagery, strong character development, and poignant themes.

• Recognition:

• Her literary contributions have earned her numerous accolades, including the Sydney Peace Prize for her activism.

• She is recognized globally as a prominent voice advocating for social justice and equity.

Q39. Answer: (d) Praveen Kumar

The correct answer is Praveen Kumar.

Key Points

• Praveen Kumar is an Indian para-athlete who specializes in the high jump category in para-athletics.

• He was awarded the Major Dhyan Chand Khel Ratna Award in 2025, the highest sporting honour in India, for his exceptional achievements in the high jump event.

• Praveen Kumar gained significant recognition for his outstanding performance in the 2021 Tokyo Paralympics, where he won a silver medal in the high jump T64 event with a record-breaking jump of 2.07 meters.

• His achievement not only brought pride to India but also highlighted the dedication and determination of para-athletes in the country.

• The Major Dhyan Chand Khel Ratna Award is given to sportspersons who have demonstrated exceptional performance in their respective fields over the past four years and contributed significantly to Indian sports.

Additional Information

• Major Dhyan Chand Khel Ratna Award:

• The award is the highest sporting honour in India, named after the legendary hockey player Major Dhyan Chand, known as the "Wizard of Hockey."

• It was instituted in 1991-1992 and is awarded annually by the Ministry of Youth Affairs and Sports.

• It is given to sportspersons who have shown outstanding performance at the international level over a period of four years.

• The award includes a medal, a certificate, and a cash prize of Rs. 25 lakh.

• Achievements of Praveen Kumar:

• Praveen Kumar competes in the men's T64 category, which is for athletes with a leg amputation who compete with prosthetics in a standing position.

• He made history with his silver medal win at the 2021 Tokyo Paralympics, achieving a personal best and Asian record jump of 2.07 meters.

• His success has inspired many aspiring para-athletes in India to pursue sports and aim for excellence at the international level.

• Other Indian Para-Athletes in High Jump:

• Mariyappan Thangavelu: Gold medalist in the 2016 Rio Paralympics in the T42 high jump category. He is also a recipient of the Major Dhyan Chand Khel Ratna Award (2020).

• Sharad Kumar: Bronze medalist in the 2021 Tokyo Paralympics in the T63 high jump category. He has been an inspiration for many para-athletes.

• Varun Singh Bhati: Bronze medalist in the 2016 Rio Paralympics in the T42 high jump category, showcasing India's prowess in para-athletics.

• About the Paralympics:

• The Paralympics are a major international multi-sport event involving athletes with a range of disabilities.

• The Summer Paralympics are held every four years, following the Olympic Games, and feature a variety of sports adapted for athletes with disabilities.

• India has been an active participant in the Paralympics, with numerous athletes achieving remarkable success and bringing laurels to the nation.

• Important Points:

• The recognition of para-athletes with awards like the Major Dhyan Chand Khel Ratna reflects India's commitment to promoting inclusivity in sports.

• Such achievements encourage more individuals with disabilities to participate in sports, fostering a culture of equality and excellence.

• India has been progressively improving its performance in the Paralympics, showcasing the talent and determination of its para-athletes on the global stage.

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Q40. Answer: (d) Madhya Pradesh

The correct answer is Madhya Pradesh.

Key Points

• The Defence Research and Development Organisation (DRDO) successfully conducted the first flight test of its indigenous Stratospheric Airship Platform (SAP) on 3 May 2025.

• The test was conducted in Rajasthan, leveraging the state's suitable climatic conditions and vast open spaces ideal for such experiments.

• The Stratospheric Airship Platform is an advanced technology designed for high-altitude applications, including surveillance, communication, and disaster management.

• This marks a significant achievement for India's defense and aerospace sectors, showcasing its growing capabilities in developing cutting-edge technologies.

• The platform is aimed at enhancing national security by providing a persistent aerial presence over strategic locations.

Additional Information

• Stratospheric Airship Platform (SAP):

• The SAP operates at high altitudes, typically in the stratosphere, between 20-50 km above the Earth's surface.

• It is designed for long-duration operations and can remain airborne for extended periods without requiring frequent maintenance.

• The platform is equipped with advanced sensors, cameras, and communication systems, making it ideal for military surveillance and border monitoring.

• Its applications extend to disaster management, environmental monitoring, and aiding navigation systems.

• DRDO's Contributions:

• The Defence Research and Development Organisation is India's premier agency for military research and development, operating under the Ministry of Defence.

• DRDO has been instrumental in developing advanced technologies such as missiles, electronic warfare systems, and combat vehicles.

• Its recent achievements include the development of Agni missiles, Tejas fighter jets, and the anti-satellite weapon (ASAT).

• It also plays a crucial role in promoting indigenous research and reducing reliance on foreign technologies.

• Why Rajasthan was chosen:

• Rajasthan provides vast open areas, which are ideal for testing aerial platforms without interference.

• The state’s dry climatic conditions are favorable for conducting high-altitude tests.

• Its proximity to defense establishments and test ranges further contributed to its selection.

• Other Recent DRDO Achievements:

• Development of BrahMos missile systems, a joint collaboration between India and Russia.

• Successful testing of Hypersonic Technology Demonstrator Vehicle (HSTDV), paving the way for hypersonic missiles.

• Advanced radar systems such as Rohini and Rajendra for enhanced air defense capabilities.

• Production of Pinaka missile systems for artillery operations.

Important Points

• Significance of SAP:

• The SAP is a game-changer in the realm of defense and surveillance technologies.

• It offers real-time data collection and analysis, aiding in strategic decision-making during military operations.

• Its ability to operate at high altitudes makes it immune to conventional threats like ground-based air defenses.

• India's Aerospace Advancements:

• India has been focusing on indigenous development of defense technologies under the Make in India initiative.

• The country is investing heavily in research for hypersonic weapons, unmanned aerial systems, and advanced radar technologies.

• Collaboration with private industries and international entities has boosted the pace of innovation.

Q41. Answer: (b) 15%

Shortcut Trick

Discount = Marked Price − Selling Price.

Discount = 500 − 425 = Rs. 75.

Discount % = (Discount ÷ Marked Price) × 100.

Discount % = (75 ÷ 500) × 100 = 15%.

Therefore The correct answer is 15%.

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Alternate Method
Given:
Marked Price (MP) = Rs. 500
Selling Price (SP) = Rs. 425
Formula Used:
Discount = MP − SP
Discount % = (Discount ÷ MP) × 100
Marked Price = Rs. 500
Selling Price = Rs. 425
Rs. 75
Off
Discount % = (75 ÷ 500) × 100 = 15%
Calculations:
=> Discount = 500 − 425 = Rs. 75
=> Discount % = (75 ÷ 500) × 100
=> Discount % = 15%
Therefore The correct answer is 15%.
Additional Information
Successive Discounts
If two successive discounts of a% and b% are given, the equivalent single discount is [a + b − (a × b ÷ 100)]%.
Relation between CP and MP
When Profit % (P) and Discount % (D) are both given, the ratio of Marked Price to Cost Price is MP ÷ CP = (100 + P) ÷ (100 − D).
Mark Up Percentage
Mark up percentage is calculated over the Cost Price. Mark Up % = [(MP − CP) ÷ CP] × 100.

Q42. Answer: (c) 410/11 hours

Shortcut Trick
Let the total capacity of the tank be the LCM of given hours: LCM(15, 27, 10) = 270 units.
Combined efficiency of A, B, and C = (270 ÷ 15) + (270 ÷ 27) + (270 ÷ 10) = 18 + 10 + 27 = 55 units/hour.
Time taken to fill the tank together = Total Capacity ÷ Combined Efficiency = 270 ÷ 55 hours.
On simplifying: 270 ÷ 55 = 54 ÷ 11 = 4 ^(10)⁄11 hours.
Therefore The correct answer is 4 ^(10)⁄11 hours.
Alternate Method
Given:
Time taken by pipe A = 15 hours
Time taken by pipe B = 27 hours
Time taken by pipe C = 10 hours
Formula Used:
Total Work = LCM of time taken
Efficiency = Total Work ÷ Time Taken
Time Taken Together = Total Work ÷ Total Efficiency

Pipe	Hours	Total Work (LCM)	Efficiency (Units/hr)
A	15	270	18
B	27	10	
C	10	27	

Calculations:
=> Total efficiency of pipes (A + B + C) = 18 + 10 + 27 = 55 units/hour
=> Time taken when operating together = Total Work ÷ Total efficiency
=> Time = 270 ÷ 55
=> Time = 54 ÷ 11 = 4 ^(10)⁄11 hours

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Therefore The correct answer is 4 ^(10)⁄11 hours.

Additional Information

Emptying Pipes (Negative Efficiency)

If a pipe empties a full tank in 'y' hours, its efficiency is taken as negative. When combining with a filling pipe, the net efficiency = (1 ÷ x) − (1 ÷ y).

Alternate Working of Pipes

When pipes are opened in alternate hours, calculate the combined work done in 1 cycle (e.g., 2 hours for 2 pipes). Multiply by the closest whole number factor before dealing with the remainder.

Actual Capacity of Tank

If the filling or emptying rate is given (e.g., liters per minute), the exact volume can be found by: Capacity = Time required to fill the tank × Rate of flow.

Q43. Answer: (c) 23.08%

Shortcut Trick

Let the cost price of 100g of wheat be Rs. 100.

Claimed selling price at 20% loss = Rs. 100 − 20% = Rs. 80.

Actual weight given by vendor = 100g − 35% = 65g.

Actual cost price for 65g = Rs. 65.

Profit % = [(SP − Actual CP) ÷ Actual CP] × 100 = [(80 − 65) ÷ 65] × 100 = 23.08%

Therefore The correct answer is 23.08%.

Alternate Method

Given:

=> Claimed loss percentage = 20%

=> Weight reduction by cheating = 35%

Formula Used:

=> Profit % = (Profit ÷ Cost Price) × 100

=> Profit = Selling Price − Cost Price

Actual CP = Rs. 65

SP = Rs. 80

Stated CP = Rs. 100

(65g weight)

(100g weight)

Actual Profit = Rs. 15

20% Loss Claimed

35% Less Weight Used (100g → 65g)

Calculations:

=> Let the true weight be 100g and Cost Price (CP) of 1g be Rs. 1.

=> Therefore, Cost Price of 100g = Rs. 100.

=> Since the vendor claims to sell at a 20% loss, Selling Price (SP) = Rs. 100 − 20% of Rs. 100 = Rs. 80.

=> The vendor uses weights that are 35% less than the stated weight.

=> Actual weight given = 100g − 35g = 65g.

=> Actual Cost Price (CP) incurred by the vendor = CP of 65g = Rs. 65.

=> Actual Profit = SP − Actual CP = 80 − 65 = Rs. 15.

=> Profit Percentage = (15 ÷ 65) × 100

=> Profit Percentage = (3 ÷ 13) × 100 ≈ 23.0769...

=> Rounding off to two decimal places, Profit = 23.08%

Therefore The correct answer is 23.08%.

Additional Information

Dishonest Dealer (Selling at CP)

If a trader professes to sell his goods at cost price, but uses false weights, then Profit % = [Error ÷ (True Value − Error)] × 100.

Dishonest Dealer with Markup or Loss

When a dealer claims to sell at x% profit/loss but also uses false weights, compute the final SP based on the claim and final CP

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based on the actual weight delivered.

Q44. Answer: (b) 54 cm2

Shortcut Trick

Check if the given sides form a Pythagorean triplet:

$9^2 + 12^2 = 81 + 144 = 225$, and $15^2 = 225$.

Since $9^2 + 12^2 = 15^2$, the given triangle is a right-angled triangle.

Area of a right-angled triangle = (1 ÷ 2) × Base × Height

Area = (1 ÷ 2) × 12 × 9 = 54 cm^2.

Therefore The correct answer is 54 cm^2.

Alternate Method

12 cm

9 cm

15 cm

Area = ?

Given:

Sides of the triangle: a = 9 cm, b = 12 cm, c = 15 cm.

Formula Used:

Heron's Formula: Area = √(s × (s − a) × (s − b) × (s − c))

Where s is the semi-perimeter: s = (a + b + c) ÷ 2

Calculations:

=> s = (9 + 12 + 15) ÷ 2

=> s = 36 ÷ 2 = 18 cm

=> Area = √(18 × (18 − 9) × (18 − 12) × (18 − 15))

=> Area = √(18 × 9 × 6 × 3)

=> Area = √(18 × 9 × 18)

=> Area = √($18^2 \times 3^2$)

=> Area = 18 × 3 = 54 cm^2

Therefore The correct answer is 54 cm^2.

Additional Information

Pythagorean Triplets

Sets of three integers (a, b, c) that satisfy $a^2 + b^2 = c^2$ always form a right-angled triangle. Common base triplets include (3, 4, 5), (5, 12, 13), and (8, 15, 17).

Area of an Equilateral Triangle

If all three sides of a triangle are equal (side = a), the area is given by (√3 ÷ 4) × a^2.

Area of an Isosceles Triangle

For a triangle with two equal sides 'a' and a base 'b', the Area = (b ÷ 4) × √($4a^2 - b^2$).

Q45. Answer: (d) −74x + 138

Shortcut Trick

Evaluate coefficients of x^2, x, and constant term independently.

Coefficient of x^2 : 2 × (6 ÷ 2) − 6 × 1 = 6 − 6 = 0

Coefficient of x : 2 × (−22) − 6 × 5 = −44 − 30 = −74

Constant term : 2 × 15 − 6 × (−18) = 30 + 108 = 138

Combining the terms, we directly get −74x + 138.

Therefore The correct answer is −74x + 138.

Alternate Method

Given:

2((6 ÷ 2)x^2 − 22x + 15) − 6(x^2 + 5x − 18)

Calculations:

=> Simplify the fraction inside the first bracket: 6 ÷ 2 = 3

=> The expression becomes: 2(3x^2 − 22x + 15) − 6(x^2 + 5x − 18)

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=> Expand the first bracket by multiplying each term by 2:

=> $(2 \times 3x^2) - (2 \times 22x) + (2 \times 15) = 6x^2 - 44x + 30$

=> Expand the second bracket by multiplying each term by −6:

=> $(-6 \times x^2) - (6 \times 5x) - (-6 \times -18) = -6x^2 - 30x + 108$

=> Combine both expanded parts together:

=> $6x^2 - 44x + 30 - 6x^2 - 30x + 108$

=> Group the like terms:

=> $(6x^2 - 6x^2) + (-44x - 30x) + (30 + 108)$

=> $0x^2 - 74x + 138$

=> $-74x + 138$

Therefore The correct answer is $-74x + 138$.

Additional Information

BODMAS Rule

It dictates the correct order of mathematical operations: Brackets, Orders (powers/roots), Division, Multiplication, Addition, and Subtraction to ensure calculation consistency.

Distributive Property

Multiplying a sum by a number gives the same result as multiplying each addend by the number and then adding the products together: a(b + c) = ab + ac.

Like Terms

Terms in an algebraic expression that have the exact same variable raised to the same power. Only like terms can be simplified by addition or subtraction.

Q46. Answer: (b) Rs. 33.20

Shortcut Trick

Total remaining bulbs = 37 − 19 = 18.

Total Selling Price (SP) = 18 × Rs. 3.90 = Rs. 70.20.

Total Cost Price (CP) = Rs. 37.

Profit = SP − CP = 70.20 − 37 = 33.20.

Therefore The correct answer is Rs. 33.20.

Alternate Method

Given:

Total light bulbs purchased = 37

Total Cost Price (CP) = Rs. 37

Number of broken bulbs = 19

Selling Price (SP) per remaining bulb = Rs. 3.90

Formula Used:

Profit = Total Selling Price − Total Cost Price

CP = Rs. 37.00

Profit = Rs. 33.20

Total Selling Price (SP) = 18 × Rs. 3.90 = Rs. 70.20

Cost of all 37 bulbs

Extra amount earned

Calculations:

=> Remaining light bulbs = 37 − 19 = 18

=> Total Selling Price (SP) = 18 × 3.90

=> Total SP = Rs. 70.20

=> Profit = Total SP − Total CP

=> Profit = 70.20 − 37

=> Profit = Rs. 33.20

Therefore The correct answer is Rs. 33.20.

Additional Information

Profit and Loss Basic Formula

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Profit occurs when Selling Price (SP) > Cost Price (CP). The fundamental formula is: Profit = SP − CP.

Profit Percentage

Profit percentage is always calculated on the base Cost Price (CP) unless specifically mentioned otherwise. Formula: Profit % = (Profit ÷ CP) × 100.

Effective Price of Remaining Items

When certain items are damaged or lost in transit, the overall Cost Price remains unchanged but it must be absorbed entirely by the remaining good items, effectively increasing the Cost Price per unit for the rest.

Q47. Answer: (d) 4

Shortcut Trick

The difference between the ages of two people always remains constant over time.

After 7 years: 6 × (P − Q) = 30 => P − Q = 5.

Given present condition: 3P − Q = 23.

Rewrite as: 2P + (P − Q) = 23 => 2P + 5 = 23 => 2P = 18 => P = 9.

Thus, Q's present age = P − 5 = 9 − 5 = 4.

Therefore The correct answer is 4 years.

Alternate Method

Given:

Three times P's present age exceeds Q's present age by 23 years.

After 7 years, 6 times Q's age is 30 less than 6 times P's age.

Formula Used:

Let the present age of P be P and the present age of Q be Q.

Present Ages

P & Q

• 7 Years

After 7 Years

P + 7 & Q + 7

Age difference remains constant over time

Calculations:

=> From the first condition: 3P − Q = 23.... (Equation 1)

=> From the second condition (after 7 years):

=> 6 × (Q + 7) = 6 × (P + 7) − 30

=> 6Q + 42 = 6P + 42 − 30

=> 6Q = 6P − 30

=> 6P − 6Q = 30

=> P − Q = 5.... (Equation 2)

=> From Equation 2, we get: Q = P − 5

=> Substitute the value of Q in Equation 1:

=> 3P − (P − 5) = 23

=> 3P − P + 5 = 23

=> 2P = 18

=> P = 9 years

=> Q = P − 5 = 9 − 5 = 4 years.

Therefore The correct answer is 4 years.

Additional Information

Constant Age Difference

The difference between the ages of two individuals remains perfectly constant at any point in time (past, present, or future).

Present, Past and Future Ages

If the present age is assumed as x, then the age 'n' years ago is calculated as (x − n) and the age after 'n' years is given by (x + n).

Ratio of Ages Trick

When the ratio of ages at two different timelines is provided, equate the unit difference of the ratio parts to the chronological time

gap to determine the exact age multipliers.

Q48. Answer: (b) 69°

Shortcut Trick

In right-angled triangle BDC, the remaining acute angle is angle C = 90° − 44° = 46°.

By applying the exterior angle theorem on triangle AEC, the exterior angle angle AEB equals the sum of the two opposite interior angles.

angle AEB = angle CAE + angle C

angle AEB = 23° + 46° = 69°.

Therefore The correct answer is 69°.

Alternate Method

A

B

C

D

E

23°

44°

?

Given:

=> In triangle ABC, BD perpendicular to AC at D.

=> angle DBC = 44°

=> angle CAE = 23°

=> Point E is on the line segment BC.

Calculations:

=> In the right-angled triangle BDC, the sum of internal angles is 180°.

=> angle BDC + angle DBC + angle C = 180°

=> 90° + 44° + angle C = 180°

=> 134° + angle C = 180°

=> angle C = 180° − 134° = 46°

=> Now, consider triangle AEC. Since point E lies on the line segment BC, extending side CE to point B forms the exterior angle angle AEB at vertex E.

=> According to the exterior angle theorem, the measure of an exterior angle of a triangle is equal to the sum of the measures of its two remote interior opposite angles.

=> angle AEB = angle CAE + angle C

=> angle AEB = 23° + 46°

=> angle AEB = 69°

Therefore The correct answer is 69°.

Additional Information

Exterior Angle Theorem

The exterior angle of a triangle is exactly equal to the sum of the two opposite interior angles. Formula: angle Exterior = angle Int1 + angle Int2.

Angle Sum Property

The sum of all interior angles of a triangle is always 180°. This fundamental property applies uniformly across all types of triangles in planar geometry.

Right-Angled Triangle

In any right-angled triangle, the sum of the two acute angles is strictly 90°, as the right angle itself accounts for 90° out of the total 180° limit.

Q49. Answer: (b) 3,180

Shortcut Trick

Average of the ratio parts = (3 + 5 + 7) ÷ 3 = 15 ÷ 3 = 5 parts.

Given the average price is Rs. 5,300, which corresponds to the average of the parts.

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=> 5 parts = Rs. 5,300

=> 1 part = 5300 ÷ 5 = Rs. 1,060

Price of the cheapest item (3 parts) = 3 × 1060 = Rs. 3,180.

Therefore The correct answer is Rs. 3,180.

Alternate Method

Given:

Average price of 3 items = Rs. 5,300

Ratio of their prices = 3 : 5 : 7

Formula Used:

Total Sum = Average × Number of items

Total Sum = Rs. 5300 × 3 = Rs. 15,900

Ratio = 3 : 5 : 7 (Total 15 parts)

3x

5x

7x

Cheapest

3 × 1060

Rs. 3180

15x = Rs. 15,900

=> x = Rs. 1060

Calculations:

=> Total price of 3 items = 5300 × 3 = Rs. 15,900

Let the individual prices of the three items be 3x, 5x, and 7x respectively.

=> Total price = 3x + 5x + 7x = 15x

=> 15x = 15900

=> x = 15900 ÷ 15 = 1060

The cheapest item corresponds to the smallest ratio part, which is 3x.

=> Price of the cheapest item = 3 × 1060 = Rs. 3,180

Therefore The correct answer is Rs. 3,180.

Additional Information

Average Concept

The average of a set of numbers is the total sum divided by the number of observations: Average = Sum of Observations ÷ Total Number of Observations.

Dividing a Quantity in a Ratio

When a total quantity T is divided in the ratio a : b : c, the individual share of the first part is calculated directly as [a ÷ (a + b + c)] × T.

Weighted Average

If Group 1 has n1 items with an average of A1, and Group 2 has n2 items with an average of A2, then Combined Average = (n1×A1 + n2×A2) ÷ (n1 + n2).

Q50. Answer: (a) 97

Shortcut Trick

Eliminate options using basic divisibility tests before proceeding to long division.

Option 87 is a multiple of 3 (87 = 29 × 3).

Sum of digits of 541096943 = 5 + 4 + 1 + 0 + 9 + 6 + 9 + 4 + 3 = 41.

Since 41 is not divisible by 3, 541096943 is not divisible by 87.

Testing the remaining primes by direct division: 541096943 ÷ 97 = 5578319 (Remainder 0).

Therefore The correct answer is 97.

Alternate Method

Given:

Number = 541096943

Method Used:

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Long division and divisibility rules.

Calculations:

=> First, check for composite numbers in the options to quickly eliminate them: 87 = 29 × 3.

=> A number is exactly divisible by 3 if the sum of its digits is divisible by 3.

=> Sum of digits = 5 + 4 + 1 + 0 + 9 + 6 + 9 + 4 + 3 = 41.

=> Since 41 is not a multiple of 3, the number cannot be divided by 87.

=> Next, perform direct division for the first prime option, which is 97.

=> 541096943 ÷ 97 = 5578319

=> Since the division leaves a remainder of 0, the number is perfectly divisible by 97.

Therefore The correct answer is 97.

Additional Information

Divisibility Rule of 3

A number is divisible by 3 if the sum of all its individual digits is a multiple of 3.

Checking Divisibility for Large Primes

For large prime divisors like 97, 103, or 107, standard direct division is typically the fastest and most reliable method during an exam, unless specific osculator rules are heavily practiced.

Osculator Rule for 97

The negative osculator for 97 is 29. Multiply the unit digit of the number by 29 and subtract it from the remaining left-over number. Repeat this process until a manageable two-digit or three-digit number is reached.

Q51. Answer: (d) Rs. 576

Shortcut Trick

Since the rate is given per month and time is given in months, we can directly apply the simple interest formula without converting units.

SI = (Principal × Rate × Time) ÷ 100

=> SI = (1200 × 4 × 12) ÷ 100

=> SI = 12 × 48 = 576

Therefore The correct answer is Rs. 576.

Alternate Method

Given:

Principal (P) = Rs. 1200

Rate of Interest (R) = 4% per month

Time (T) = 12 months

P = Rs. 1200

R = 4% per month

T = 12 months

SI = Rs. 576

Formula Used:

Simple Interest (SI) = (P × R × T) ÷ 100

Calculation:

=> SI = (1200 × 4 × 12) ÷ 100

=> SI = 12 × 4 × 12

=> SI = 12 × 48

=> SI = 576

Therefore The correct answer is Rs. 576.

Additional Information

Total Amount (A)

The total amount at the end of the specified term is the sum of the principal and the accrued interest. The formula is A = P + SI = P(1 + RT/100).

Time & Rate Consistency

Always ensure that the unit of Time (T) matches the frequency of the Interest Rate (R). If the rate is per month, the time must be in months. If the rate is per annum, the time must be in years.

Compound Interest (CI)

Unlike Simple Interest, Compound Interest is calculated on the principal plus any accumulated interest from previous periods. The formula used is A = P(1 + R/100)^T.

Q52. Answer: (b) 2

Shortcut Trick

List the odd numbers from 393 to 401: 393, 395, 397, 399, 401.

Eliminate 395 (ends in 5) and multiples of 3 (393 and 399, as their digit sum is divisible by 3).

The only remaining possible primes are 397 and 401.

Check their divisibility by primes up to 19 (since √401 ≈ 20).

Neither 397 nor 401 is divisible by 7, 11, 13, 17, or 19, meaning both are prime numbers.

Therefore The correct answer is 2.

Alternate Method

Given:

Numbers lying between 393 and 401 (inclusive).

Method Used:

Filter out the composite numbers using standard divisibility rules (by 2, 3, and 5) and verify the remaining numbers using the prime divisibility test up to √N.

Calculations:

=> The list of numbers to evaluate: 393, 394, 395, 396, 397, 398, 399, 400, 401

=> Eliminate the even numbers (divisible by 2): 394, 396, 398, 400

=> Eliminate the numbers ending in 5 (divisible by 5): 395

=> Eliminate the numbers whose digit sum is a multiple of 3: 393 (sum = 15) and 399 (sum = 21)

=> The only numbers left to verify are 397 and 401.

=> Check 397: √397 ≈ 19.9. Prime numbers ≤ 19 are 2, 3, 5, 7, 11, 13, 17, 19.

=> 397 is not exactly divisible by any of these primes, making 397 a prime number.

=> Check 401: √401 ≈ 20.0. Prime numbers ≤ 19 are 2, 3, 5, 7, 11, 13, 17, 19.

=> 401 is not exactly divisible by any of these primes, making 401 a prime number.

=> The prime numbers in the given range are exactly two (397 and 401).

Therefore The correct answer is 2.

Additional Information

Prime Number Test

To check if a number N is prime, find the approximate square root of N. Test its divisibility by all prime numbers less than or equal to √N. If none divide it completely, then N is a prime number.

Twin Primes

Twin primes are a pair of prime numbers that differ by exactly 2. Common examples include (3, 5), (11, 13), and (41, 43).

Co-Prime Numbers

Two numbers are called co-prime (or mutually prime) if they do not share any common factor other than 1. Their Highest Common Factor (HCF) is always exactly 1.

Q53. Answer: (b) 22

Shortcut Trick

The product of two consecutive natural numbers lies exactly between their squares.

We know that 212 = 441 and 222 = 484.

The given product 462 lies exactly between 441 and 484.

=> The two consecutive numbers are 21 and 22.

=> 21 × 22 = 462, which satisfies the given condition.

=> Therefore, the greater number of the two is 22.

Therefore The correct answer is 22.

Alternate Method

Given:

The product of two consecutive natural numbers is 462.

Method Used:

Formulate a quadratic equation and solve for its roots using factorisation.

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Calculations:

=> Let the smaller natural number be x.

=> The consecutive greater natural number will be (x + 1).

=> According to the question: x × (x + 1) = 462

=> x2 + x = 462

=> x2 + x − 462 = 0

=> x2 + 22x − 21x − 462 = 0

=> x(x + 22) − 21(x + 22) = 0

=> (x − 21)(x + 22) = 0

=> The roots of the equation are x = 21 and x = −22.

=> Since x must be a natural number, we reject −22 and consider x = 21.

=> The greater number = x + 1 = 21 + 1 = 22.

Therefore The correct answer is 22.

Additional Information

Consecutive Numbers

Numbers that follow each other continuously in order from smallest to largest, with a constant common difference of 1 (e.g., n, n+1, n+2).

Product of Consecutive Numbers

The product of two consecutive integers n and (n+1) is always an even number, because one of the numbers in the pair is strictly even.

Perfect Square Check

The product of two consecutive positive integers always lies strictly between the squares of the two integers. That is, n2 < n(n+1) < (n+1)2.

Q54. Answer: (a) 20%

Shortcut Trick

Discount = MP − SP = 1500 − 1200 = Rs. 300

Discount % = (Discount ÷ MP) × 100

Discount % = (300 ÷ 1500) × 100

Discount % = (1 ÷ 5) × 100 = 20%

Therefore The correct answer is 20%.

Alternate Method

Marked Price (MP) = Rs. 1,500

Selling Price (SP) = Rs. 1,200

Discount

Rs. 300

Given:

Marked Price (MP) = Rs. 1,500

Selling Price (SP) = Rs. 1,200

Formula Used:

Discount = MP − SP

Discount % = (Discount ÷ MP) × 100

Calculations:

=> Discount = 1500 − 1200

=> Discount = Rs. 300

=> Discount % = (300 ÷ 1500) × 100

=> Discount % = (1 ÷ 5) × 100

=> Discount % = 20%

Therefore The correct answer is 20%.

Additional Information

Marked Price & Discount

Discount is always calculated on the Marked Price (MP), while Profit or Loss is calculated on the Cost Price (CP).

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Successive Discounts

If two successive discounts of a% and b% are given, the equivalent single discount is given by: Effective Discount = (a + b − ab ÷ 100)%.

Markup Price

It is the price written on the article to show a higher value before applying a discount. MP = CP + Markup Amount.

Q55. Answer: (a) 50

Shortcut Trick

Total days from 8 Feb to 9 Apr 2024 = 21 (Feb) + 31 (Mar) + 9 (Apr) = 61 days.

Since 2024 is a leap year, time T = 61 ÷ 366 = 1/6 years.

SI = (P × R × T) ÷ 100

SI = 4000 × 7.5 × (1/6) ÷ 100 = 300 ÷ 6 = 50

Therefore The correct answer is Rs. 50.

Alternate Method

Given:

Principal (P) = Rs. 4,000

Rate of interest (R) = 7.5% per annum

Time period = 8 February 2024 to 9 April 2024

Rs. 4,000

Principal (P)

R = 7.5%

T = 61 days

SI = ?

Interest

SI = (P × R × T) ÷ 100

Formula Used:

Simple Interest (SI) = (P × R × T) ÷ 100

Calculations:

=> The year 2024 is divisible by 4, hence it is a leap year with 366 days and February has 29 days.

=> Number of days in February (excluding the deposit day) = 29 − 8 = 21 days

=> Number of days in March = 31 days

=> Number of days in April (including the withdrawal day) = 9 days

=> Total time in days (T) = 21 + 31 + 9 = 61 days

=> Time in years (T) = 61 ÷ 366 = 1/6 years

=> SI = (4000 × 7.5 × 1/6) ÷ 100

=> SI = (40 × 7.5) ÷ 6

=> SI = 300 ÷ 6 = 50

Therefore The correct answer is Rs. 50.

Additional Information

Simple Interest Rule

Simple Interest is always computed on the initial principal amount throughout the entire period. Formula: SI = (P × R × T) ÷ 100.

Leap Year Calculation

A year is a leap year if it is evenly divisible by 4 (and by 400 for century years). A leap year contains 366 days instead of 365 days.

Day Counting Convention

When computing interest between two specific dates, banks generally include either the date of deposit or the date of withdrawal, but not both.

Q56. Answer: (d) 32.25

Shortcut Trick

Calculate both expressions directly using basic simplification techniques:

=> 65% of 65 = (65 × 65) / 100

Using the squaring trick for numbers ending in 5: 65^2 = (6 × 7)25 = 4225. So, 65% of 65 = 42.25

=> 2/5 of 25 = 2 × (25 / 5) = 2 × 5 = 10

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=> Difference = 42.25 − 10 = 32.25

Therefore The correct answer is 32.25.

Alternate Method

Given:

Expression 1 = 65% of 65

Expression 2 = 2/5 of 25

Calculations:

=> Expression 1 = (65 / 100) × 65

=> Expression 1 = 4225 / 100

=> Expression 1 = 42.25

=> Expression 2 = (2 / 5) × 25

=> Expression 2 = 2 × 5

=> Expression 2 = 10

=> Required Difference = Expression 1 − Expression 2

=> Required Difference = 42.25 − 10

=> Required Difference = 32.25

Therefore The correct answer is 32.25.

Additional Information

Square of Numbers Ending in 5

To find the square of a number ending in 5 (e.g., N5), multiply N by (N+1) and append 25 to the result. Example: 65^2 → 6 × 7 = 42 → 4225.

BODMAS Rule

Always follow the sequence: Brackets, Of, Division, Multiplication, Addition, and Subtraction. The word 'Of' represents multiplication but must be evaluated before regular multiplication and division.

Percentage to Fraction Conversion

Converting common percentages to fractions makes calculations easier. Since 20% = 1/5, it follows that 40% = 2/5. Hence, finding 2/5 of a number is exactly the same as finding 40% of it.

Q57. Answer: (c) 4 days

Shortcut Trick

Total man-days = 4 × 10 = 40; Total woman-days = 3 × 16 = 48.

Equating total work: 40 M = 48 W => M / W = 6 / 5.

Total work = 40 × 6 = 240 units.

Target efficiency (6 women + 5 men) = 6 × 5 + 5 × 6 = 60 units/day.

Time required = 240 ÷ 60 = 4 days.

Therefore The correct answer is 4 days.

Alternate Method

Given:

=> 4 men can complete the work in 10 days.

=> 3 women can complete the work in 16 days.

Calculations:

=> Let total work be the LCM of 10 and 16.

Person	Days	Total Work	Efficiency
4 Men	10	80	80 ÷ 10 = 8
3 Women	16	80 ÷ 16 = 5	

=> Efficiency of 4 men = 8 units/day => Efficiency of 1 man = 8 ÷ 4 = 2 units/day.

=> Efficiency of 3 women = 5 units/day => Efficiency of 1 woman = 5 ÷ 3 units/day.

=> Target group = 6 women + 5 men.

=> Combined efficiency = 6 × (5/3) + 5 × 2

=> Combined efficiency = 10 + 10 = 20 units/day.

=> Total days required = Total Work ÷ Combined efficiency

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=> Total days = 80 ÷ 20 = 4 days.

Therefore The correct answer is 4 days.

Additional Information

Chain Rule (MDH Concept)

If M1 persons can do W1 work in D1 days working H1 hours/day, then M1D1H1 ÷ W1 = M2D2H2 ÷ W2.

Work and Wages

Wages are distributed in direct proportion to the work done. If people work for the same number of days, wages are divided in the ratio of their efficiencies.

Alternate Days Work

Find the total work done in a cycle of days and multiply by the maximum possible full cycles, then assign the remaining work to the person whose turn is next.

Q58. Answer: (b) 57.19

Shortcut Trick

Total time taken = (612 ÷ 68) + (312 ÷ 39) + (620 ÷ 62) = 9 + 8 + 10 = 27 hours.

Total distance covered = 612 + 312 + 620 = 1544 km.

Average speed = Total distance ÷ Total time = 1544 ÷ 27

Average speed ≈ 57.19 km/hr.

Therefore The correct answer is 57.19 km/hr.

Alternate Method

Given:

Distance D1 = 612 km, Speed S1 = 68 km/hr

Distance D2 = 312 km, Speed S2 = 39 km/hr

Distance D3 = 620 km, Speed S3 = 62 km/hr

Formula Used:

Average Speed = Total Distance ÷ Total Time

Time = Distance ÷ Speed

612 km 312 km 620 km 68 km/hr 39 km/hr 62 km/hr T = 9 hr T = 8 hr T = 10 hr Average Speed = 1544 ÷ 27 ≈ 57.19 km/hr

Calculations:

=> Total Distance = 612 + 312 + 620 = 1544 km

=> Time for 1st part (T1) = D1 ÷ S1 = 612 ÷ 68 = 9 hours

=> Time for 2nd part (T2) = D2 ÷ S2 = 312 ÷ 39 = 8 hours

=> Time for 3rd part (T3) = D3 ÷ S3 = 620 ÷ 62 = 10 hours

=> Total Time = 9 + 8 + 10 = 27 hours

=> Average Speed = Total Distance ÷ Total Time

=> Average Speed = 1544 ÷ 27 = 57.185...

=> Average Speed ≈ 57.19 km/hr (rounded off to two decimal places)

Therefore The correct answer is 57.19 km/hr.

Additional Information

Average Speed

Average speed is the total distance traveled divided by the total time taken. It provides a single speed value representing the overall journey.

Average Speed for Equal Distances

When a journey consists of two equal distance segments traveled at speeds S1 and S2, the average speed is given by the harmonic mean: (2 × S1 × S2) ÷ (S1 + S2).

Average Speed for Equal Time Intervals

If an object travels at different speeds for exactly equal time intervals, the overall average speed is simply the arithmetic mean of all individual speeds.

Q59. Answer: (d) 13

Shortcut Trick

By eliminating options using basic divisibility rules:

1. The given number ends in 3 (odd), so it is not even. Hence, it is not divisible by 18.

2. Sum of digits = 7 + 1 + 8 + 7 + 5 + 4 + 0 + 2 + 3 = 37, which is not divisible by 3.

3. Because it is not divisible by 3, it cannot be divisible by 3 or 21.

4. The only remaining option is 13.

Therefore The correct answer is 13.

Alternate Method

Given:

Number = 718754023

Method Used:

Divisibility rule of 13: Form alternating blocks of 3 digits from right to left. If the alternating difference of these blocks is divisible by 13, the number is divisible by 13.

Calculation:

=> Split 718754023 into blocks of 3 from right to left: 023, 754, 718

=> Alternating sum = 718 − 754 + 023

=> Alternating sum = 741 − 754

=> Alternating sum = −13

=> Since −13 is a multiple of 13, the entire number is divisible by 13.

Therefore The correct answer is 13.

Additional Information

Divisibility Rule of 3 & 9

A number is divisible by 3 or 9 if the sum of all its digits is completely divisible by 3 or 9 respectively.

Divisibility Rule of 7, 11 & 13

Group the number into blocks of 3 digits starting from the right. If the alternating sum of these blocks is divisible by 7, 11, or 13, then the original number is divisible by that specific number.

Divisibility Rule of 11 (Digit Method)

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 either 0 or a multiple of 11.

Divisibility of Composite Numbers

To check divisibility by a composite number (like 18 or 21), break it into its co-prime factors (like 2 × 9 or 3 × 7). The number must be individually divisible by all those co-prime factors.

Q60. Answer: (b) Rs. 1,010

Shortcut Trick

Ratio of investments A : B : C = 8 : 36 : 76 = 2 : 9 : 19

Total profit parts = 2 + 9 + 19 = 30 parts

Value of 30 parts = Rs. 3,030 => 1 part = Rs. 101

Difference between shares of B and C = 19 − 9 = 10 parts

Difference in amount = 10 × 101 = Rs. 1,010

Therefore The correct answer is Rs. 1,010.

Alternate Method

Given:

Investment ratio of A, B and C = 8 : 36 : 76

Total profit earned at the end of the year = Rs. 3,030

Formula Used:

Profit Share = (Individual Investment Ratio ÷ Total Investment Ratio) × Total Profit

2

A

9

B

19

C

Diff = 10 parts

Total Profit = 30 parts = Rs. 3030

Calculations:

=> Simplified investment ratio of A, B and C = 8 : 36 : 76 = 2 : 9 : 19

=> Total ratio parts = 2 + 9 + 19 = 30 parts

=> B's profit share = (9 ÷ 30) × 3030

=> B's profit share = 9 × 101 = Rs. 909

=> C's profit share = (19 ÷ 30) × 3030

=> C's profit share = 19 × 101 = Rs. 1,919

=> Difference between shares of B and C = 1919 − 909 = Rs. 1,010

Therefore The correct answer is Rs. 1,010.

Additional Information

Partnership Basic Rule

When investments are made for different time periods, the profit is distributed in the ratio of the product of capital and time (Profit Ratio = C1×T1 : C2×T2).

Sleeping vs Working Partner

A sleeping partner only invests capital, while a working partner also manages the business and usually receives a fixed salary or a certain percentage of the profit before the remainder is split according to the investment ratio.

Calculating Unknown Capitals or Time

If the profit ratio and time ratio are given, the ratio of investments can be found by dividing the profit parts by the time parts (Capital Ratio = P1÷T1 : P2÷T2).

Q61. Answer: (a) Rs. 5,400

Shortcut Trick

Given 8A = 4B = 3C.

Ratio of A : B : C can be found directly by hiding one variable and multiplying the coefficients of the other two.

A : B : C = (4 × 3) : (8 × 3) : (8 × 4) = 12 : 24 : 32 = 3 : 6 : 8

Total parts = 3 + 6 + 8 = 17 parts.

17 parts = 30,600 => 1 part = 30,600 ÷ 17 = 1,800

A's share = 3 parts = 3 × 1,800 = 5,400

Therefore The correct answer is Rs. 5,400.

Alternate Method

Total Amount = Rs. 30,600 (17 Parts)

A (3)

B (6)

C (8)

Rs. 5,400

Rs. 10,800

Rs. 14,400

Given:

Total amount to be divided = Rs. 30,600

8 × (Share of A) = 4 × (Share of B) = 3 × (Share of C)

Calculations:

=> Let 8A = 4B = 3C = k

=> A = k/8

=> B = k/4

=> C = k/3

=> The ratio of shares of A, B, and C is A : B : C = 1/8 : 1/4 : 1/3

=> LCM of denominators (8, 4, 3) is 24.

=> Multiplying the ratio by 24, we get:

=> A : B : C = 24/8 : 24/4 : 24/3

=> A : B : C = 3 : 6 : 8

=> Sum of the ratio terms = 3 + 6 + 8 = 17 units

=> 17 units = 30,600

=> 1 unit = 30,600 ÷ 17 = 1,800

=> Share of A = 3 units = 3 × 1,800 = 5,400

Therefore The correct answer is Rs. 5,400.

Additional Information

Inverse Ratio

The inverse ratio of a : b : c is 1/a : 1/b : 1/c. It can be simplified by taking the LCM of a, b, and c and multiplying each term, yielding bc : ac : ab.

Distribution of Amount

If an amount S is to be divided among individuals in the ratio of x : y : z, the share of the first individual is given by (x ÷ (x + y + z)) × S.

Proportion Rule

When two ratios are equal (a : b = c : d), they are said to be in proportion. The fundamental rule states that the product of means equals the product of extremes, meaning a × d = b × c.

Q62. Answer: (d) 62%

Shortcut Trick

Volume of a cylinder is proportional to $r^2 \times h$.

New radius factor = 0.82 (decreased by 18%)

New height factor = 2.41 (increased by 141%)

Net volume factor = 0.82 × 0.82 × 2.41 = 1.620484

Percentage increase = (1.620484 − 1) × 100% = 62.0484% ≈ 62%

Therefore The correct answer is 62%.

Alternate Method

Given:

=> Decrease in the base radius of the cylinder = 18%

=> Increase in the height of the cylinder = 141%

Formula Used:

=> Volume of a cylinder (V) = $\pi r^2 h$

Original Cylinder

V1 = 100%

r

h

New Cylinder

V2 ≈ 162%

0.82r

2.41h

r − 18%

h + 141%

Calculations:

=> Let the original radius of the cylinder be r and the original height be h.

=> Original Volume (V1) = $\pi r^2 h$

=> New radius (r2) = r − (18 ÷ 100)r = 0.82r

=> New height (h2) = h + (141 ÷ 100)h = 2.41h

=> New Volume (V2) = $\pi \times (0.82r)^2 \times (2.41h)$

=> V2 = $\pi \times 0.6724r^2 \times 2.41h = 1.620484\pi r^2 h$

=> Increase in Volume = V2 − V1 = $1.620484\pi r^2 h - \pi r^2 h = 0.620484\pi r^2 h$

=> Percentage Increase = (Increase in Volume ÷ Original Volume) × 100%

=> Percentage Increase = $(0.620484\pi r^2 h \div \pi r^2 h) \times 100\%$

=> Percentage Increase = 62.0484% ≈ 62%

Therefore The correct answer is 62%.

Additional Information

Successive Percentage Change

When a value is subjected to multiple percentage changes consecutively (such as changing r twice due to squaring, and h once), the most efficient approach is to use decimal multiplying factors instead of the standard formula A + B + (A × B ÷ 100).

Volume of a Right Circular Cone

The volume of a right circular cone is exactly one-third of the volume of a cylinder with the same base radius and height. Formula: $V = (1 \div 3)\pi r^2 h$.

Curved Surface Area of a Cylinder

The lateral or curved surface area is determined by the perimeter of the base multiplied by the height. Formula: CSA = 2πrh.

Q63. Answer: (d) 6 hours 45 minutes

Shortcut Trick

Replacing the walking journey with a drive (driving both ways) saves 2 hours.

Conversely, replacing the driving journey with a walk (walking both ways) will add 2 hours to the total time.

Given time to walk one way and drive back = 4 hours 45 minutes.

Time to walk both ways = 4 hours 45 minutes + 2 hours = 6 hours 45 minutes.

Therefore The correct answer is 6 hours 45 minutes.

Alternate Method

Start

Viewpoint

W + C = 4h 45m

Walk (W)

Drive (C)

Drive (C)

Drive (C)

2C = 4h 45m − 2h = 2h 45m

Given:

Time to walk one way and drive back (W + C) = 4 hours 45 minutes = 285 minutes.

Time saved by driving both ways = 2 hours = 120 minutes.

Time to drive both ways (2C) = 285 − 120 = 165 minutes.

Formula Used:

Total time for a round trip logic: 2W + 2C = 2 × (W + C)

Calculations:

=> 2 × (W + C) = 2 × 285 = 570 minutes

=> 2W + 2C = 570 minutes

=> 2W + 165 = 570

=> 2W = 570 − 165 = 405 minutes

=> 405 minutes = 6 hours 45 minutes

Therefore The correct answer is 6 hours 45 minutes.

Additional Information

Average Speed (Equal Distances)

When a person travels a certain distance at speed x and returns at speed y, the average speed for the whole journey is calculated using the formula 2xy ÷ (x + y).

Relative Speed Concept

When two objects move in the same direction, their relative speed is the difference of their individual speeds (S1 − S2). When moving in opposite directions, it is the sum of their speeds (S1 + S2).

Inverse Relation of Speed and Time

For a constant distance, speed and time are inversely proportional. If the ratio of speeds of two vehicles is a : b, then the ratio of the time taken by them to cover the same distance will be b : a.

Q64. Answer: (b) 34.21

Shortcut Trick

Assume the base average is 14 (from the 10 matches).

Deviation of the first 23 matches = 43 − 14 = +29 runs per match.

Total net deviation = 29 × 23 = +667 runs.

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Change in overall average = 667 ÷ 33 matches ≈ +20.21.

Combined average = Base average + Net change = 14 + 20.21 = 34.21.

Therefore The correct answer is 34.21.

Alternate Method

Given:

Average runs scored in the first 23 matches = 43

Average runs scored in the next 10 matches = 14

Formula Used:

Combined Average = (N1A1 + N2A2) ÷ (N1 + N2)

Total 33 Matches (Combined Average)

23 Matches

Average: 43 runs

10 Matches

Average: 14 runs

Total Runs = (23 × 43) + (10 × 14)

Calculations:

=> Total runs scored in first 23 matches = 23 × 43 = 989

=> Total runs scored in next 10 matches = 10 × 14 = 140

=> Total matches played = 23 + 10 = 33

=> Total runs scored in all 33 matches = 989 + 140 = 1129

=> Combined average of 33 matches = 1129 ÷ 33

=> Combined average ≈ 34.2121...

Therefore The correct answer is 34.21.

Additional Information

Combined Average Formula

When two groups of sizes N1 and N2 have averages A1 and A2 respectively, the overall combined average is calculated as (N1A1 + N2A2) ÷ (N1 + N2).

Deviation Method for Averages

Instead of multiplying large numbers, you can assume a base average and find the net deviation. The final average is simply the assumed base average plus the net deviation divided by the total number of entities.

Weighted Average

It represents an average where each component has a specific weight based on its frequency. Here, the number of matches acts as the weights for their respective average scores.

Q65. Answer: (a) 3

Shortcut Trick

Apply the BODMAS rule directly to the expression.

135 ÷ {25 + 5 × (7 − 3)}

=> 135 ÷ {25 + (5 × 4)}

=> 135 ÷ (25 + 20) = 135 ÷ 45 = 3

Therefore The correct answer is 3.

Alternate Method

Given:

Expression: [135 ÷ {25 + 5 × (7 − 3)}]

Formula Used:

BODMAS Rule: Brackets (B), Of (O), Division (D), Multiplication (M), Addition (A), Subtraction (S).

Calculations:

=> 135 ÷ {25 + 5 × (7 − 3)}

Solve the innermost bracket () first:

=> 135 ÷ {25 + 5 × 4}

Solve the multiplication inside the curly bracket { }:

=> 135 ÷ {25 + 20}

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Solve the addition inside the curly bracket { }:

=> 135 ÷ 45

Perform the final division:

=> 3

Therefore The correct answer is 3.

Additional Information

BODMAS Rule

It dictates the mathematical order of operations: Brackets first, then Of (powers/roots), followed by Division, Multiplication, Addition, and Subtraction.

Order of Brackets

When simplifying expressions with multiple brackets, always follow this order from inside to outside: Bar/Vinculum, Round/Small (), Curly { }, and finally Square [].

Continuous Division

When dealing with multiple continuous division signs, proceed systematically from left to right, or convert each division to multiplication by writing the reciprocal: a ÷ b ÷ c = a × (1/b) × (1/c).

Q66. Answer: (d) 200√3 m

Shortcut Trick

When two objects are on opposite sides of a tower of height h, the distance between them is directly given by:

Distance = h × (cot θ1 + cot θ2)

=> Distance = 150 × (cot 30° + cot 60°)

=> Distance = 150 × (√3 + 1/√3)

=> Distance = 150 × (4 / √3) = 200√3 m

Therefore The correct answer is 200√3 m.

Alternate Method

Given:

Height of the lighthouse (AB) = 150 m

Angle of depression of Boat 1 (at C) = 30°

Angle of depression of Boat 2 (at D) = 60°

30°

60°

30°

60°

A

B

C (Boat 1)

D (Boat 2)

150 m

Formula Used:

tan θ = Perpendicular ÷ Base

Since alternate interior angles are equal, the angle of elevation of the top of the lighthouse from Boat 1 (C) is 30° and from Boat 2 (D) is 60°.

Calculations:

In right-angled triangle ABC:

=> tan 30° = AB ÷ BC

=> 1 / √3 = 150 ÷ BC

=> BC = 150√3 m

In right-angled triangle ABD:

=> tan 60° = AB ÷ BD

=> √3 = 150 ÷ BD

=> BD = 150 ÷ √3

=> BD = (150 × √3) ÷ 3 = 50√3 m

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Total distance between the two boats (CD) = BC + BD

=> CD = 150√3 + 50√3

=> CD = 200√3 m

Therefore The correct answer is 200√3 m.

Additional Information

Distance Formula for Same Side

If two objects are on the same side of a vertical tower of height h, the distance between them is given by h × |cot θ1 − cot θ2|.

Angle of Elevation vs Depression

The angle of elevation refers to looking upward from the horizontal line of sight, while the angle of depression refers to looking downward. Geometrically, both angles are equivalent due to alternate interior properties along parallel horizontal lines.

Key Trigonometric Standard Values

Memorise standard tangent ratios for exams: tan 30° = 1/√3, tan 45° = 1, tan 60° = √3. Cotangent values are simply their reciprocals.

Q67. Answer: (b) 16%

Shortcut Trick

Successive percentage change can be calculated directly using the formula: x + y + (x × y) / 100

Here, reduction x = −25% and raise y = +12%

=> Net Change = −25 + 12 + (−25 × 12) / 100

=> Net Change = −13 − (300 / 100)

=> Net Change = −13 − 3 = −16%

The negative sign indicates an overall decrease of 16%.

Therefore The correct answer is 16%.

Alternate Method

Given:

First percentage change = 25% reduction

Second percentage change = 12% raise

Formula Used:

Final Value = Initial Value × (1 − Reduction / 100) × (1 + Raise / 100)

100

Initial

−25%

75

Reduced

+12%

84

Final

Net Decrease: 100 − 84 = 16%

Calculations:

=> Let Salil's initial salary be 100 units.

=> Salary after 25% reduction = 100 × (1 − 25 / 100) = 100 × 0.75 = 75 units

=> Salary after subsequent 12% raise = 75 × (1 + 12 / 100) = 75 × 1.12

=> Final Salary = 75 + (12% of 75) = 75 + 9 = 84 units

=> Overall decrease = Initial Salary − Final Salary = 100 − 84 = 16 units

=> Percentage decrease = (16 / 100) × 100% = 16%

Therefore The correct answer is 16%.

Additional Information

Successive Percentage Change

When a number is changed successively by x% and y%, the net percentage change is given by x + y + (x × y) / 100. Use positive signs for an increase and negative signs for a decrease.

Base Change Principle

In consecutive percentage changes, the second percentage change is always calculated on the new updated base (the

intermediate value), not on the original starting value.

Multiplying Factor Method

For quick calculation, convert percentages to decimal multipliers. A 25% decrease means multiplying the value by 0.75, and a 12% increase means multiplying the value by 1.12. The net multiplier is 0.75 × 1.12 = 0.84, which directly indicates a 16% overall drop from the base 1.00.

Q68. Answer: (c) 9.4

Shortcut Trick

Make the number of decimal places equal: 4.70 and 0.04

Remove the decimal points to treat them as whole numbers: 470 and 4

Find the LCM of 470 and 4: LCM(470, 4) = 940

Place the decimal point back exactly 2 places from the right: 9.40

Therefore The correct answer is 9.4.

Alternate Method

Given:

Numbers to find LCM: 4.7 and 0.04

Formula Used:

LCM of fractions = LCM of Numerators ÷ HCF of Denominators

Calculations:

=> First, express each decimal as a fraction in its simplest form.

=> 4.7 = 47/10

=> 0.04 = 4/100 = 1/25

=> The simplified fractions are 47/10 and 1/25.

=> Numerators: 47 and 1

=> Denominators: 10 and 25

=> LCM of numerators (47, 1) = 47

=> HCF of denominators (10, 25) = 5

=> LCM of the fractions = 47 ÷ 5 = 9.4

Therefore The correct answer is 9.4.

Additional Information

LCM of Decimals

To find the LCM of decimal numbers without fractions, equalize the decimal places, treat them as integers to find the LCM, and put the decimal back at the same place.

HCF of Fractions

HCF = (HCF of Numerators) ÷ (LCM of Denominators). Always reduce fractions to their simplest form before applying this formula.

Relation between LCM and HCF

For any two given numbers 'a' and 'b', Product of the numbers (a × b) = LCM(a, b) × HCF(a, b).

Q69. Answer: (d) 100

Shortcut Trick

If x is the third proportional to a and b, it is given directly by the formula $x = b^2 \div a$.

Here, a = 16 and b = 40.

x = (40 × 40) ÷ 16

x = 1600 ÷ 16 = 100

Therefore The correct answer is 100.

Alternate Method

Given:

The numbers are 16 and 40.

Third proportional = x

Formula Used:

For three numbers to be in continuous proportion a, b, and x:

a : b :: b : x => a × x = b × b (Product of Extremes = Product of Means)

16

:
40
::
40
:
x
Product of Extremes (16 × x)
Product of Means (40 × 40)
Calculations:
=> 16 : 40 :: 40 : x
=> 16 × x = 40 × 40
=> 16x = 1600
=> x = 1600 ÷ 16
=> x = 100
Therefore The correct answer is 100.
Additional Information
Mean Proportional
The mean proportional between two numbers a and b is given by √(a × b).
Fourth Proportional
If a : b :: c : d, then d is the fourth proportional to a, b, and c. It is calculated as d = (b × c) ÷ a.
Continued Proportion
Three quantities a, b, and c are in continued proportion if a : b = b : c, where b is the mean proportional and c is the third proportional.

Q70. Answer: (d) 1.01

Shortcut Trick
The number 1.0201 has 4 decimal places, so its square root will have 4 ÷ 2 = 2 decimal places.
Ignoring the decimal point, we find the square root of 10201.
Since $100^2 = 10000$, we can easily estimate and confirm that $101^2 = 10201$.
Placing the decimal point 2 positions from the right gives 1.01.
Therefore The correct answer is 1.01.
Alternate Method
Given:
Expression = √1.0201
Calculation:
=> √1.0201
=> Convert the decimal into a fraction
=> √(10201 ÷ 10000)
=> Separate the square roots for the numerator and the denominator
=> √10201 ÷ √10000
=> We know that 101 × 101 = 10201 and 100 × 100 = 10000
=> 101 ÷ 100
=> Convert the fraction back to a decimal
=> 1.01
Therefore The correct answer is 1.01.
Additional Information
Square Root of Decimals
If a perfect square has an even number of decimal places (e.g., 2n), its square root will always have exactly half that number of decimal places (n).
Squares of Numbers near 100
For a number expressed as (100 + x), its square is calculated using the formula 10000 + 200x + x^2. For example, $101^2 = 10000 + 200(1) + 1^2 = 10201$.

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Fraction to Decimal Conversion

When dividing any whole number by a power of 10 (such as 10, 100, 1000), simply shift the decimal point to the left by the number of zeros present in the denominator.

Q71. Answer: (a) Three

Given : (Left) @ + 1 < 9 6 9 2 % \ + 2 3 2 ^ 9 9 (Right)

Required condition: Symbol - Number - Another number.

(Left) @ + 1 < 9 6 9 2 % \ + 2 3 2 ^ 9 9 (Right)

Thus, there are two such numbers that are immediately preceded by a symbol and immediately followed by another number.

Hence, the correct answer is "Option 1"

Q72. Answer: (d) 11

Given : 75 × 5 + 11 − 2 ÷ 18 = ?

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

New Equation : 75 ÷ 5 - 11 × 2 + 18 = ?

BODAMAS Rule

75 ÷ 5 - 11 × 2 + 18 = ?

15 - 11 × 2 + 18 = ?

15 - 22 + 18 = ?

33 - 22 = ?

11.

Hence, the correct answer is "Option 4"

Q73. Answer: (d) PJ-RI

The logic followed here is:

All follows same logic except PJ - RI.

Hence, the correct answer is "Option 4"

Q74. Answer: (c) Mother's father

D is father of K and K is mother of S.

Hence, the correct answer is "Option 3"

Q75. Answer: (a) Two

Given number: '5341289'

After arranged in ascending order:

Digits	5	3	4	1	2	8	9
Ascending order	1	2	3	4	5	8	9

Now,

There is two digit "8, 9" will remain unchanged if each of the digits in the number '5341289' is arranged in ascending order

Hence, the correct answer is "Option 1".

Q76. Answer: (b) 237

The logic follows here,

Hence, the correct answer is "Option 2"

Q77. Answer: (a) (48, 60, 84)

LOGIC:

(First Number + 12) = (Second Number + 24) = Third Number

Similarly,

Hence, the correct answer is "Option 1 "

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Q78. Answer: (b) 5

Given: '+' means 'subtraction', '−' means '×', '×' means '÷' and '÷' means 'addition'.

BODMAS Rule:

New Equation: 64 ÷ 8 − 6 × 6 + 33 = ?

64 ÷ 8 − 6 × 6 + 33 = ?

8 − 6 × 6 + 33 = ?

8 − 36 + 33 = ?

41 - 36 = ?

= 5.

Hence, the correct answer is "Option 2"

Q79. Answer: (c) 30

The logic follows,

Hence, the correct answer is "Option 3"

Q80. Answer: (c) CXS

The logic followed here is:

Hence, the correct answer is "Option 3"

Q81. Answer: (c) DUSK – KDSU – DKUS

The logic followed here is:

Similarly,

Hence, the correct answer is "Option 3 "

Q82. Answer: (b) UHS : VIU

The logic followed here is:

Similarly,

Hence, the correct answer is "Option 2"

Q83. Answer: (a) LHPM

The logic followed here is:

Similarly,

Hence, the correct answer is "Option 1"

Q84. Answer: (c) NSL

The logic followed here is:

Hence, the correct answer is "Option 3"

Q85. Answer: (b) 2 km to west

- Gautam starts from Point A and drives 9 km towards south.
- He then takes a right turn, drives 4 km, turns right and drives 11 km.
- He then takes a right turn and drives 6 km.
- He takes a final right turn, drives 2 km and stops at Point P

The final Arrangement is

Hence, the correct answer is "Option 2"

Q86. Answer: (a) JI 19

The logic followed here is:

Hence, the correct answer is "Option 1"

Q87. Answer: (a) 1

Given: Seven boxes, A, B, C, D, E, F, and G, are kept one over the other but not necessarily in the same order.

- G is kept immediately above F.
- C is kept immediately above A.
- Only E is kept above B.

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• Only two boxes are kept above G.

• C is not kept at the third position from the bottom.

The final Arrangement is

• | E |

B
G
F
D
C
A

• E is kept above B.

Hence, the correct answer is "Option 1."

Q88. Answer: (b) Both conclusions (I) and (II) follow.

The least possible diagram for the given statements is as follows

Conclusions:

(I) Some cans are mugs. - True (All mugs are cans; that means some cans are mugs, and also some mugs are cans. Hence, it is true.

(II) All buckets are cans. - True (All Buckets are mugs, and all mugs are cans; that means All buckets are cans. Hence, it is true.

Both conclusions (I) and (II) follow.

Hence, the correct answer is "Option 2"

Q89. Answer: (c) Two

Given series of three-digit numbers:

(Left) 629 189 586 643 746 (Right)

If 2 is added to the first digit of every number.

New Series: (Left) 829 389 786 843 946 (Right)

If 2 is added to the first digit of every number, in how many numbers thus formed will the first digit be exactly divisible by the second digit

New Series: (Left) 829 389 786 843 946 (Right).

Hence, the correct answer is "Option 3"

Q90. Answer: (d) 2

The logic followed here is:-

Code of R is 2.

Hence, the correct answer is "Option 4"

Q91. Answer: (c) Two

Given: Seven people, G, H, I, J, K, L and S, are sitting around a circular table facing the centre of the table.

• I sits third to the left of J.

• Only two people sit between J and G.

• Only three people sit between I and L.

• K sits to the immediate left of H.

The final Arrangement is

Hence, the correct answer is "Option 3"

Q92. Answer: (d) 57

Given : Pranay ranked 14th from the top and 44th from the bottom in his class

Total persons = (Rank from one end) + (Rank from other end) - 1

= 44 + 14 - 1

= 58 - 1

= 57

Hence, the correct answer is "Option 4."

Q93. Answer: (a) 5

Given :

'CAME' is coded as '6781'.

'RACE' is coded as '5618'

Code for R is 5.

Hence, the correct answer is "Option 1"

Q94. Answer: (d) 10

Each of the digits in the number 7314685 is arranged in ascending order from left to right.

New Number: 1 3 4 5 6 7 8.

Sum of the digits that are third from the left and third from the right in the new number: New Number: 1 3 4 5 6 7 8

4 + 6

= 10.

Hence, the correct answer is "Option 4"

Q95. Answer: (b) Only conclusion (II) follows.

The least possible Venn diagram is shown below according to the given information.

Conclusions:

(I) Some triangles are squares. - Does not follow [As no definite relation given between triangles and square, so it can be possible only]

(II) Some compasses are squares.- Follow (All squares are compasses means some squares are compasses and Some compasses are squares)

Only conclusion (II) follows.

Hence, the correct answer is "Option 2"

Q96. Answer: (c) Three

Given: Seven boxes U, V, W, X, E, F and G are kept one over the other but not necessarily in the same order.

• U is kept immediately above V.

• X is kept immediately above W. Only E is kept above G.

• Only two boxes are kept above U. X is not kept at the third position from the bottom.

• The final Arrangement is

• | E |

G
U
V
F
X
W

• G,U and V three boxes are kept between E and F.

Hence, the correct answer is "Option 3"

Q97. Answer: (a) One

Given : Seven people, I, J, K, L, P, Q and R, are sitting in a row, facing north.

• Only two people sit to the left of K.

• Only three people sit between K and L.

• Only one person sits between L and J.

• P sits to the immediate left of I.

• Q is not an immediate neighbour of L

• The final Arrangement is

• Only one person L, sits to the right of R.

Hence, the correct answer is "Option 1"

Q98. Answer: (a) 7 km north

Given :

• Divesh starts from point D and runs 3 km towards south.
• He then takes a right turn and runs 4 km.
• He then takes a left turn and runs 3 km.
• He takes another left turn and runs 4 km.
• He takes a final right turn and runs 1 km to reach point E.

Hence, the correct answer is "Option 1".

Q99. Answer: (a) BEKR

The logic followed here is:

All follow the same logic except BEKR.

Hence, the correct answer is "Option 1"

Q100. Answer: (d) 206

The logic follows here,

Hence, the correct answer is "Option 4"

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