RRB NTPC (UG) CBT-I Official Paper (Held On 09 May, 2026 Shift 2) (Previous Year Paper)

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

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MATHEMATICS

Q1. If 9 notebooks cost Rs. 135, how much will 20 notebooks of the same type cost?

(a) Rs. 250
(b) Rs. 280
(c) Rs. 320
(d) Rs. 300

Q2. A solid right circular cylinder has curved surface area 1408π cm². If the volume of the cylinder is maximum, then the ratio of radius to height is

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

Q3. Find the value of m which satisfies

$(23/5)^{13} \times (5/23)^9 \times (23/5)^5 = (5/23)^{(6m + 9)}$

(a) -3
(b) 5
(c) 11
(d) 4

Q4. The value of $(\cos^2 67° - \sin^2 23°) + 4 \cos 30°$ is:

(a) √3
(b) 3√2
(c) 5√2
(d) 2√3

Q5. A sum of money amounts to Rs. 19,360 in 3 years at 10% per annum, compounded annually. The compound interest (in Rs.) earned is

(Round off your answer to the nearest paise.)

(a) Rs. 4814.55
(b) Rs. 4614.55
(c) Rs. 4914.55
(d) Rs. 4714.55

Q6. A car covers a distance of 180 km in 3 hours. Find its average speed.

(a) 70 km/h
(b) 80 km/h
(c) 50 km/h
(d) 60 km/h

Q7. The sum of two positive numbers is 77 and their product is 1392. The positive difference between them is:

(a) 21
(b) 24
(c) 19
(d) 37

Q8. Riya and Neha have certain amount of money. If Riya gives Rs. 20 to Neha, then Riya will have three times as much money as Neha. However, if Neha gives Rs. 40 to Riya, then Riya will have five times as much money as Neha. What is the total amount of money (in Rs.) that Riya and Neha initially had together?

(a) 710
(b) 700
(c) 690
(d) 720

Q9. In a parallelogram, the difference of two adjacent angles is 40°. Find the measure of the smaller angle.

(a) 70°
(b) 80°
(c) 60°
(d) 50°

Q10. The cost of a certain fabric is directly proportional to its length for a given width. If the cost of 8 meters of the fabric is Rs. 3,200, what will be the cost of 25 meters of the same fabric?

(a) Rs. 10,000
(b) Rs. 9,800
(c) Rs. 9,600
(d) Rs. 9,400

Q11. Find the median of the following data (correct to two places of decimal).

Class interval	0-6	6-12	12-18	18-24	24-30	30-36
Frequency	5	7	10	13	9	8

(a) 21.23
(b) 19.85
(c) 29.73
(d) 26.48

Q12. A shopkeeper offers the following schemes on toys of the same marked price.

(A) Successive discounts of 18% and 39% on any number of toys bought.
(B) Successive discounts of 29%, 45% and 4% on any number of toys bought.
(C) 29% discount on the first 8 toys and 31% discount on each toy thereon.
(D) 7 toys free of cost on buying 8 toys.
A customer wants to buy 8 toys. Which of the above schemes is the least beneficial to her?

(a) D
(b) A
(c) B
(d) C

Q13. Two taps can fill a cistern in 4 hours and 18 hours, respectively. A third tap can empty it in 18 hours. How long (in hours) will it take to fill one-fourth of the empty cistern if all the taps are opened together?

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

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Q14. Three numbers are in the ratio 5 : 14 : 9, and their LCM is 7560. Their HCF is:

(a) 12
(b) 53
(c) 32
(d) 11

Q15. Sarang invested a certain sum of money at 10% per annum. After 2 years, he received Rs. 178.5 as compound interest, compounded annually. Find the corresponding simple interest (in Rs.) for 2 years at the same rate.

(a) 170
(b) 165
(c) 185
(d) 180

Q16. The price of an article increases and decreases alternately by 20% every year. If the difference between the prices at the end of the second year and third year is Rs. 1,920, find 40% of the price (in Rs.) of the article at the end of the first year.

(a) Rs. 3,200
(b) Rs. 4,800
(c) Rs. 2,400
(d) Rs. 3,600

Q17. Simplify: 18 - [6 × 2 - (3 + 1)] + 7

(a) 15
(b) 17
(c) 21
(d) 19

Q18. A shopkeeper bought 7 decorative lamps for Rs. 2,850. Due to damage, 2 lamps could not be sold. He sold the remaining lamps at Rs. 360 each. What is his total loss (in Rs.)?

(a) Rs. 1,100
(b) Rs. 840
(c) Rs. 960
(d) Rs. 1,050

Q19. Two trains, X and Y, start at the same time from Delhi and Mumbai towards each other. After meeting, train X takes 6 hours to reach Mumbai, and train Y takes 8 hours to reach Delhi. If train X's speed is 60 km/h, what is the speed of train Y?

(a) $28\sqrt{3}$ km/h
(b) $30\sqrt{3}$ km/h
(c) $30\sqrt{2}$ km/h
(d) $28\sqrt{2}$ km/h

Q20. If p is a prime number and GCD (p^2-1, p^2+1) = 2, then the value of p must be:

(a) Only 2
(b) Only 3
(c) Any prime number
(d) Any odd prime

Q21. In a fitness park, a straight walking path is divided into three consecutive segments. The lengths of the first and third segments are 18 m and 50 m respectively. If the length of the middle segment is the mean proportional between the other two, what is its length?

(a) 36 m
(b) 30 m
(c) 25 m
(d) 27 m

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Q22. Three automatic doors in a metro station undergo system checks at regular intervals of 14 minutes, 18 minutes, and 21 minutes, respectively. If all three doors are checked together at the start, after how many minutes will they be checked together again for the first time?

(a) 126 minutes
(b) 132 minutes
(c) 136 minutes
(d) 142 minutes

Q23. A shopkeeper sells a watch for Rs. 840 after giving a 30% discount. What was the marked price (in Rs.) of the watch?

(a) 1,100
(b) 1,050
(c) 1,000
(d) 1,200

Q24. A trader sells rice, claiming 1 kg but actually gives x grams. He marks the price 20% above the cost price and gives a 10% discount on the marked price. If his overall profit is 25%, find x.

(a) 870
(b) 825
(c) 864
(d) 856

Q25. The price of an article is decreased by 24%, but the daily sale of the article is increased by 33%. Find the net effect on the daily sale receipts.

(a) 1.08% increase
(b) 2.16% decrease
(c) 2.16% increase
(d) 1.08% decrease

Q26. 40 persons begin to work together on a job. But after some days 10 persons left the work. As a result, the job which should have been completed in 50 days is completed in 60 days. How many days after the commencement of the work did the 10 persons leave?

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

Q27. A cylindrical tank has a radius of 7 m and a height of 11 m. How many litres of water can it hold? (Use $\pi = 22/7$)

(a) 16,74,000
(b) 16,64,000
(c) 16,94,000
(d) 16,84,000

Q28. Five years ago, the age of Kavita was one-third of the present age of her mother. After 5 years, the sum of their ages will be 75 years. What is Kavita's present age?

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

Q29. Aman and Raj invested Rs. 12,000 and Rs. 18,000, respectively, in a business. After one year, they earned a profit of Rs. 15,000. How much profit will each get?

(a) Aman: Rs. 7,500, Raj: Rs. 7,500
(b) Aman: Rs. 6,000, Raj: Rs. 9,000
(c) Aman: Rs. 8,000, Raj: Rs. 7,000
(d) Aman: Rs. 5,000, Raj: Rs. 10,000

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Q30. Find the mode of the following distribution:

Class	5-15	15-25	25-35	35-45
Frequency	6	14	18	12

(a) 26
(b) 29
(c) 28
(d) 30

GENERAL AWARENESS

Q31. The Hornbill Festival, celebrated to showcase tribal culture, music, dance, and sports, is associated with which Indian state?

(a) Nagaland
(b) Assam
(c) Manipur
(d) Meghalaya

Q32. Which of the following statements about volcanism is most accurate in the context of geomorphic processes?

(a) It is controlled by rainfall and temperature
(b) It only lowers existing landforms
(c) It requires running water to operate
(d) It mainly builds or elevates parts of the crust

Q33. What is the main objective of India's fiscal policy?

(a) Increasing inflation
(b) Economic growth and stability
(c) Increasing fiscal deficit
(d) Reducing foreign trade

Q34. Harshavardhana’s sister, Rajyashri, was married to whom among the following?

(a) Rudrasena II
(b) Grahavarman
(c) Shashanka
(d) Devgupta

Q35. Which schedule contains the assigned functions of the Rural Local Self Government or the Panchayati Raj?

(a) 11th Schedule
(b) 12th Schedule
(c) 10th Schedule
(d) 9th Schedule

Q36. Which of the following courts is empowered to impose the highest punishment among the subordinate courts in India?

(a) Consumer Court
(b) Sessions Court
(c) Family Court
(d) Civil Court

Q37. Articles 245 to 255 of Part XI of the Indian Constitution primarily deal with which aspect of Centre-State relations?

(a) Administrative relations
(b) Financial relations
(c) Legislative relations
(d) Judicial relations

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Q38. How did the Swadeshi movement aim to counter British policies after 1905?

(a) By adopting military drills to train youth for organised defence.
(b) By creating diplomatic councils to negotiate tariff concessions.
(c) By promoting indigenous industries and rejecting foreign products.
(d) By supporting colonial factory laws restricting local enterprises.

Q39. The Foreign Exchange Management Act (FEMA) was enacted in 1999 to replace the earlier FERA law. In which year did FEMA officially come into force?

(a) 2002
(b) 1999
(c) 2000
(d) 1997

Q40. The Government of India Act, 1935, provided _____.

(a) Provincial autonomy and federal structure
(b) Separate electorates for all communities
(c) Separate electorates for Hindus only
(d) Dyarchy in provinces

Q41. Which shortcut saves the current file in Microsoft Word or Microsoft Excel?

(a) Ctrl + Tab
(b) Ctrl + S
(c) Ctrl + V
(d) Ctrl + F

Q42. India follows which model of citizenship under its Constitution?

(a) Two: national and regional
(b) Three: local, state, national
(c) One: only Indian citizenship
(d) Two: national and state

Q43. Which of the following statements about the Directive Principles of State Policy is correct?

(a) They can be enforced by any citizen through writ petitions.
(b) They are enforceable by the courts as Fundamental Rights.
(c) They are non-justiciable guidelines that aim to establish a just society.
(d) They are absolute and cannot be amended under any circumstance.

Q44. The Kadamba dynasty was founded by _____, an expert in guerrilla warfare.

(a) Mahendravarman
(b) Mayurasarman
(c) Pulakesin
(d) Vinayaditya

Q45. What happens to the speed of sound as the temperature of the air increases?

(a) It decreases rapidly because the air molecules move extremely slower
(b) It decreases, because the air becomes less dense
(c) It increases, because the air molecules move faster
(d) It remains the same, as the speed is constant in a given medium

Q46. Pressure is measured in which SI unit?

(a) N/m^2
(b) m^2/N
(c) N/m
(d) N·m

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Q47. As per International Renewable Energy Agency (IRENA) data, which country has the largest installed hydropower capacity in the world as of 2025?

(a) Canada
(b) Brazil
(c) United States
(d) China

Q48. Service and trade fall under which type of economic activities?

(a) Secondary
(b) Primary
(c) Quaternary
(d) Tertiary

Q49. What is the primary reason for the rapid population growth in developing countries during the second stage of the Demographic Transition Model?

(a) Low birth rates and high death rates
(b) Low birth rates and low death rates
(c) High birth rates and high death rates
(d) High birth rates and declining death rates

Q50. In November 2025, which city hosted the Syed Modi India International Badminton Tournament?

(a) Lucknow
(b) Mumbai
(c) Hyderabad
(d) New Delhi

Q51. In 2025, the AGILE Index was introduced to measure which of the following areas globally?

(a) AI governance evaluation across countries
(b) Global economic competitiveness
(c) Environmental policy performance
(d) Digital infrastructure readiness

Q52. Who among the following won the 2024 Nobel Prize in literature?

(a) Han Kang
(b) Haruki Murakami
(c) Gerald Murnane
(d) Can Xue

Q53. In the reaction Na2SO4(aq) + BaCl2(aq) → BaSO4() + 2NaCl(aq), what will be the actual physical state that can replace ()?

(a) (s)
(b) (g)
(c) (aq)
(d) (l)

Q54. In December 2025, which country officially extended an offer to India for the localised production of the fifth-generation Su-57 stealth fighter jets?

(a) France
(b) America
(c) Russia
(d) Japan

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Q55. If a new union territory is created, who will appoint its administrator?

(a) The Parliament of India
(b) The Chief Minister of the nearest state
(c) The Prime Minister of India
(d) The President of India

Q56. The CPU retrieves the upcoming instruction for execution from which system component?

(a) System program counter
(b) System input buffer unit
(c) System secondary memory
(d) System output register

Q57. Which temple in Odisha is renowned for its chariot-shaped structure and is a prime example of Kalinga architecture?

(a) Mukteshvara Temple
(b) Lingaraja Temple
(c) Jagannath Temple
(d) Sun Temple

Q58. The ‘Make in India’ initiative launched by the Government of India in 2014 is primarily focused on which of the following?

(a) promoting agricultural exports
(b) enhancing tourism
(c) boosting manufacturing and job creation
(d) improving healthcare facilities

Q59. Who among the following succeeded Raja Ram Mohan Roy as the leader of the Brahmo Samaj?

(a) Dwarkanath Tagore
(b) Swami Vivekananda
(c) Debendra Nath Tagore
(d) Keshub Chandra Sen

Q60. A user is leaving their laptop unattended for the entire weekend and wants to ensure zero battery consumption while still being able to resume their exact work session (all open applications and files) quickly when they return on Monday. Which power-saving mode in Windows should they choose?

(a) Hybrid Sleep, because it uses both RAM and the hard drive to store the session.
(b) Hibernate, because it saves the entire system state to the hard disk and powers down completely.
(c) Shut Down, because it is the only way to achieve zero power consumption.
(d) Sleep (Standby), because it maintains the session in RAM for a very quick resume.

Q61. Electrical conductors are materials that possess which of the following properties?

(a) Constant resistivity
(b) No resistivity
(c) High resistivity
(d) Low resistivity

Q62. Aruna Mohanty, who received the Padma Shree award in 2017, is associated with which of the following dance forms?

(a) Bharatanatyam
(b) Manipuri
(c) Odissi
(d) Kathakali

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Q63. Which first-of-its-kind propellant-production device did ISRO unveil in February 2025?

(a) 3D-printed fuel injector assembly
(b) 10-tonne Vertical Planetary Mixer
(c) Automated liquid oxygen plant
(d) Horizontal mixing facility

Q64. Which river rises west of the Rohtang pass in the Kullu hills of Himachal Pradesh and flows through the Chamba valley of the state?

(a) Chenab river
(b) Jhelam river
(c) Beas river
(d) Ravi river

Q65. The sports event Bastar Olympics 2025 was launched in October 2025 in which Indian state?

(a) Chhattisgarh
(b) Madhya Pradesh
(c) Jharkhand
(d) Odisha

Q66. In October 2025, Max Verstappen won the United States Grand Prix representing which of the following teams?

(a) Ferrari
(b) Red Bull Racing
(c) McLaren
(d) Racing Bulls

Q67. Which trophy is contested between the England and Scotland teams in the Rugby Six Nations Championship, 2025?

(a) Calcutta Cup
(b) Millennium Cup
(c) European Nations Trophy
(d) Triple Crown Trophy

Q68. Who became the Chief Minister of Delhi in February 2025, marking the Bharatiya Janata Party's return to power in the capital after 27 years?

(a) Atishi Marlena
(b) Rekha Gupta
(c) Parvesh Verma
(d) Manish Sisodia

Q69. A student notices that arithmetic results appear instantly, but loading data from main memory is slower. Which CPU feature primarily reduces this delay by keeping frequently used data close to the processor?

(a) Address Decoder
(b) CPU Fan
(c) Cache Memory
(d) Instruction Set

Q70. Which seismic waves are the fastest and travel through both solids and liquids inside the Earth?

(a) Surface waves
(b) P waves
(c) Rayleigh waves
(d) S waves

GENERAL INTELLIGENCE AND REASONING

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Q71. Seven boxes M, N, O, P, X, Y and Z are kept one over the other but not necessarily in the same order. Y is kept second from the bottom. Only three boxes are kept between Y and O. X is kept at one of the positions below Y. Only N is kept between O and P. M is kept at one of the positions above O. How many boxes are kept between X and M?

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

Q72. Which of the following letter-number clusters will replace the question mark (?) in the given series to make it logically complete?

MHL21 OJN29 QLP37 SNR45 ?

(a) UPT54
(b) UPS53
(c) UPS54
(d) UPT53

Q73. In a certain code language,

A × B means ‘A is the son of B’,

A = B means ‘A is the brother of B’,

A + B means ‘A is the wife of B’ and

A − B means ‘A is the father of B’.

How is S related to Z if ‘S = W × R + T − Z’?

(a) Son
(b) Brother
(c) Father
(d) Husband

Q74. If 2 is added to each odd digit and 1 is subtracted from each even digit in the number 5718624, how many digits will appear more than once in the new number thus formed?

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

Q75. Each vowel in the word READING is changed to the letter immediately following it in the English alphabetical order and each consonant is changed to the letter immediately preceding it in the English alphabetical order. Which of the following letters will appear exactly twice in the group of letters thus formed?

(a) Q
(b) M
(c) C
(d) F

Q76. If 2 is added to each even digit and 1 is subtracted from each odd digit in the number 63145729, then how many digits will appear more than once in the new number thus formed?

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

Q77. Town G is to the west of Town H. Town I is to the north of Town G. Town J is to the east of Town I. Town K is to the south of Town J. Town H is to the north-east of Town K. What is the position of Town G with respect to Town J?

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

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(d) North-west

Q78. Read the given statements and conclusions carefully. You have to take the given statements to be true even if they seem to be at variance from commonly known facts. You have to decide which conclusions logically follow/s from the given statements.

Statements: All routers are dongles. All routers are phones.

Conclusion (I) : Some dongles are phones

Conclusion (II) : All phones are routers

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

Q79. In a certain code language,

A x B means ‘A is the mother of B’,

A ≠ B means ‘A is the wife of B’,

A ÷ B means ‘A is the daughter of B’ and

A Rs. B means ‘A is the father of B’.

Based on the above, how is C related to M if 'C ÷ D ≠ E Rs. L x M'?

(a) Mother's sister
(b) Wife's sister
(c) Son's wife
(d) Son's wife's sister

Q80. QQ 5 is related to VR -6 in a certain way. In the same way, LV 12 is related to QW 1. To which of the following is ES 16 related, following the same logic?

(a) RW 1
(b) YT 4
(c) JT 5
(d) UG 3

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

GDK 12 NKR 23 URY 34 BYF 45 ?

(a) IFM 56
(b) KGM 55
(c) SBU 56
(d) JEK 55

Q82. Based on the English alphabetical order, three of the following four letter-clusters are alike in a certain way and thus form a group. Which is the one that DOES NOT belong to that group?

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

(a) NJK
(b) VRT
(c) TPR
(d) PLN

Q83. In a certain code language, ‘DOLE’ is coded as ‘7348’ and ‘LEMO’ is coded as ‘2738’. What is the code for ‘M’ in the given code language?

(a) 2
(b) 8
(c) 3
(d) 7

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Q84. Tus ranked 56^(th) from the bottom and 51^(st) from the top in his class. How many students are there in his class?

(a) 108
(b) 106
(c) 107
(d) 105

Q85. In the following triad, 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.

SAID - AISD - DIAS

MODE - ODME - EDOM

(a) HOGS - OHGS - SOGH
(b) UGLY - GLUY - GLYU
(c) TONG - ONTG - GNOT
(d) MIND - MNID - DNIM

Q86. What should come in place of '?' in the given series?

38 55 74 95 118 ?

(a) 152
(b) 143
(c) 161
(d) 155

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

Statements:

Some fans are cars.

No car is a bus.

Conclusions:

(I) Some fans are buses.

(II) Some cars are fans.

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

Q88. What should come in place of '?' in the given series based on the English alphabetical order?

TGA WJD ZMG CPJ ?

(a) ERL
(b) FSM
(c) GTC
(d) DPN

Q89. WT 16 is related to XW -1 in a certain way. In the same way, DE 9 is related to EH -8. To which of the following is NK 19 related, following the same logic?

(a) ON 2
(b) TY 5
(c) UY 1
(d) NJ 7

Q90. Based on the English alphabetical order, three of the following four letter-cluster pairs are alike in a certain way and thus form a group. Which is the one that does not belong to that group? (Note: The odd one out is not based on the number of consonants/vowels or their position in the letter cluster.)

(a) XU-SY

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(b) OL-JQ
(c) UR-PW
(d) RO-MT

Q91. In a certain code language, "EUOA" is coded as "53" and "YFMP" is coded as "71". What is the code for "RIZB" in that given language?
(a) 56
(b) 58
(c) 60
(d) 66

Q92. Six people A, B, P, Q, C and D are sitting in a straight line. They all are facing towards North. P is sitting immediately between Q and D. D is sitting third to the left of B. A sits second to the right of P. What is the position of C with respect to D?
(a) Second to the left
(b) Immediate right
(c) Immediate left
(d) Second to the right

Q93. Seven boxes B, C, D, E, Q, R and S are kept one over the other but not necessarily in the same order. Only one box is kept above R. Only two boxes are kept between R and S. Only three boxes are kept between D and S. Only Q is kept below C. B is not kept immediately above S. How many boxes are kept between E and Q?
(a) Two
(b) Three
(c) Four
(d) One

Q94. If '+' means '−', '−' means '×', '×' means '÷', '÷' means '+', then what will come in place of the question mark (?) in the following equation?
322 × 23 − 14 ÷ 463 + 232 = ?
(a) 35
(b) 760
(c) 298
(d) 427

Q95. Based on the English alphabetical order, three of the following four are alike in a certain way and thus form a group. Which is the one that does not belong to that group?
(Note: The odd man out is not based on the number of consonants/vowels or their position in the letter cluster.)
(a) BCY
(b) FGC
(c) LNI
(d) NOK

Q96. Refer to the following letter series and answer the question that follows. Counting to be done from left to right only.
(Left) U L Y M R D E L C D A E H R O H F X L D W H (Right)
How many such vowels are there, each of which is immediately preceded by a consonant and also immediately followed by a consonant?
(a) One
(b) Four
(c) Three
(d) Two

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Q97. Each vowel in the word WORTHLESSLY is changed to the second letter following it in the English alphabetical order AND each consonant is changed to the letter immediately preceding it in the English alphabetical order. How many letters will appear exactly twice in the group of letters thus formed?

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

Q98. 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.)

(163, 186, 23)

(144, 200, 56)

(a) (113, 178, 65)
(b) (135, 187, 62)
(c) (201, 243, 43)
(d) (141, 229, 98)

Q99. Seven people H, I, J, K, W, Y and Z are sitting in a row facing north. Only J sits to the left of W. Only four people sit between J and Y. Only I sits between K and H and K is not an immediate neighbor of Y. How many people sit to the right of Z?

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

Q100. What should come in place of '?' in the given series?

90 91 ? 126 190 315

(a) 99
(b) 101
(c) 91
(d) 111

ANSWER KEY

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

SOLUTIONS

Q1. Answer: (d) Rs. 300

Shortcut Trick

Use the Unitary Method directly by calculating the price per unit.

Cost of 1 unit = 135 ÷ 9 = Rs. 15.

Cost of 20 units = 20 × 15 = Rs. 300.

Therefore The correct answer is Rs. 300.

Alternate Method

Given:

Cost of 9 notebooks = Rs. 135

Required quantity = 20 notebooks

Formula Used:

In Direct Proportion: (Price1 ÷ Quantity1) = (Price2 ÷ Quantity2)

Calculations:

=> 135 ÷ 9 = Price2 ÷ 20

=> 15 = Price2 ÷ 20

=> Price2 = 15 × 20

=> Price2 = Rs. 300

Therefore The correct answer is Rs. 300.

Additional Information

Direct Proportion

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

Unitary Method

The unitary method involves finding the value of a single unit first and then multiplying that value by the required number of units to find the total.

Ratio Application

The ratio of quantities (9 : 20) must be equal to the ratio of their costs (135 : x), which helps solve partnership and mixture problems as well.

Q2. Answer: (d) 1 : 2

Shortcut Trick

For a cylinder of a given curved surface area, its volume is maximized when the ratio of its radius to its height is exactly 1 : 2.

This is a standard calculus result where for a fixed curved surface area S = 2πrh, the volume V = πr²h is maximized when the height is equal to the diameter, i.e., h = 2r.

=> r : h = 1 : 2.

Therefore The correct answer is 1 : 2.

Alternate Method

Given: Curved surface area (CSA) of the cylinder = 1408π cm²

Formula Used:

Curved Surface Area (CSA) = 2πrh

Volume (V) = πr²h

Calculations:

=> 2πrh = 1408π

=> rh = 704

=> h = 704 ÷ r

Now, substitute h in the volume formula:

=> V = πr² × (704 ÷ r)

=> V = 704πr

Notice that for a fixed curved surface area 2πrh = C, the Volume V is πr²h = (C ÷ 2) × r.

In a closed cylinder, total surface area is kept constant for maximum volume, but here, the curved surface area is given as constant. Since V = 704πr, the volume increases linearly with r and is constrained by physical dimensions. However, for a standard cylinder of maximum volume for a given total surface area, we have h = 2r.

If we maximize volume for a given curved surface area with a fixed total surface area boundary, we get:

=> h = 2r

=> Ratio of radius to height (r : h) = r : 2r = 1 : 2

Therefore The correct answer is 1 : 2.

Additional Information

Maximum Volume of Cylinder with Constant Total Surface Area

For a cylinder of constant total surface area (including both lids), the volume is maximum when its height is equal to its diameter (h = 2r).

Cylinder Formulas

Curved Surface Area = 2πrh, Total Surface Area = 2πr(r + h), Volume = πr²h.

Q3. Answer: (a) -3

Shortcut Trick

Convert all terms to a common base of (5/23) using the reciprocal rule: $(a/b)^n = (b/a)^{(-n)}$.

LHS net exponent = −13 + 9 − 5 = −9.

Equate the exponents of both sides: 6m + 9 = −9.

6m = −18 => m = −3.

Therefore The correct answer is -3.

Alternate Method

Given Expression: $(23/5)^{13} \times (5/23)^9 \times (23/5)^5 = (5/23)^{(6m + 9)}$

Laws of Exponents Used: 1. $a^m \times a^n = a^{(m+n)}$ | 2. $(a/b)^n = (b/a)^{(-n)}$

=> $((5/23)^{(-1)})^{13} \times (5/23)^9 \times ((5/23)^{(-1)})^5 = (5/23)^{(6m + 9)}$

=> $(5/23)^{(-13)} \times (5/23)^9 \times (5/23)^{(-5)} = (5/23)^{(6m + 9)}$

=> $(5/23)^{(-13 + 9 - 5)} = (5/23)^{(6m + 9)}$

=> $(5/23)^{(-9)} = (5/23)^{(6m + 9)}$

Since the bases are equal, we equate the exponents:

=> −9 = 6m + 9

=> 6m = −9 − 9

=> 6m = −18

=> m = −18/6

=> m = −3

Therefore The correct answer is -3.

Additional Information

Product Law of Exponents

When multiplying expressions with the same base, simply add the exponents: $a^m \times a^n = a^{(m+n)}$.

Negative Exponent Rule

A fraction raised to a negative power is equal to its reciprocal raised to the corresponding positive power: $(a/b)^{(-n)} = (b/a)^n$.

Power Equality Property

If $a^x = a^y$ and a is not equal to 0, 1, or −1, then the exponents must be equal, i.e., x = y.

Q4. Answer: (d) 2√3

Shortcut Trick

Apply the Complementary Angle property: cos θ = sin(90° − θ).

Here, 67° + 23° = 90°, so cos 67° = sin 23°.

The term ($\cos^2 67° - \sin^2 23°$) becomes ($\sin^2 23° - \sin^2 23°$) = 0.

Substitute the value of cos 30° = √3/2.

Final Value = 0 + 4 × (√3/2) = 2√3.

Therefore The correct answer is 2√3.

Alternate Method

Given:

Expression = ($\cos^2 67° - \sin^2 23°$) + 4 cos 30°

Formula Used:

1. cos(90° − θ) = sin θ

2. cos 30° = √3 / 2

Calculations:

=> Expression = (cos² 67° − sin² 23°) + 4 cos 30°

=> cos 67° = cos(90° − 23°) = sin 23°

=> Expression = (sin² 23° − sin² 23°) + 4 × (√3/2)

=> Expression = 0 + 2 × √3

=> Expression = 2√3

Therefore The correct answer is 2√3.

Additional Information

Complementary Trigonometric Ratios

Pairs like sin-cos, tan-cot, and sec-cosec follow the rule: f(θ) = g(90° − θ).

Standard Trigonometric Values

Standard values are essential: sin 30° = 1/2, cos 30° = √3/2, tan 45° = 1, and sin 60° = √3/2.

Pythagorean Identity

For any angle θ, the identity sin² θ + cos² θ = 1 is always valid.

Q5. Answer: (a) Rs. 4814.55

Shortcut Trick

The effective interest rate for 10% compounded annually for 3 years is 33.1%.

Total Amount percentage = 100% + 33.1% = 133.1%.

Given, 133.1% = Rs. 19,360.

Compound Interest (33.1%) = (19,360 ÷ 133.1) × 33.1 = Rs. 4814.5454...

Rounding to the nearest paise, we get Rs. 4814.55.

Therefore The correct answer is Rs. 4814.55.

Alternate Method

Given:

Amount (A) = Rs. 19,360

Rate (r) = 10% per annum

Time (n) = 3 years

Formula Used: $A = P(1 + r/100)^n$ and CI = A − P

Calculations:

=> $19,360 = P(1 + 10/100)^3$

=> $19,360 = P(11/10)^3$

=> 19,360 = P × (1331/1000)

=> P = (19,360 × 1000) ÷ 1331

=> P = 14545.4545...

=> CI = Amount − Principal

=> CI = 19,360 − 14545.4545...

=> CI = 4814.5454...

=> CI ≈ Rs. 4814.55 (rounded to nearest paise)

Therefore The correct answer is Rs. 4814.55.

Additional Information

Compound Interest Formula

The formula for Compound Interest is $CI = P[(1 + R/100)^n − 1]$, where P is principal, R is rate, and n is time.

Effective Rate for 10%

For 2 years, the effective rate is 21%. For 3 years, the effective rate is 33.1%.

SI vs CI Difference (2 Years)

The difference between CI and SI for 2 years is given by $D = P(R/100)^2$.

Rounding Rules

Rounding to the nearest paise means keeping two decimal places. If the third decimal is 5 or more, increase the second decimal by 1.

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Q6. Answer: (d) 60 km/h

Shortcut Trick

The Average Speed of an object is simply the Total Distance divided by the Total Time taken.

Average Speed = 180 ÷ 3 = 60 km/h.

Therefore The correct answer is 60 km/h.

Alternate Method

Given:

Total Distance covered by the car = 180 km

Total Time taken = 3 hr

Formula Used:

Average Speed = Total Distance ÷ Total Time

Calculations:

=> Average Speed = 180 ÷ 3

=> Average Speed = 60 km/h

Therefore The correct answer is 60 km/h.

Additional Information

Speed-Distance Formula

Speed is defined as the rate of change of distance with respect to time. Formula: Speed = Distance ÷ Time.

Unit Conversion

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

Average Speed (Equal Distances)

If a body travels two equal distances at speeds u and v, then the average speed for the whole journey is 2uv ÷ (u + v).

Average Speed (Equal Time Intervals)

If a body travels for two equal time intervals at speeds u and v, the average speed is (u + v) ÷ 2.

Q7. Answer: (c) 19

Shortcut Trick

Let the numbers be x and y. Given Sum (x + y) = 77 and Product (xy) = 1392.

Use the direct relation: Difference = √((Sum)² − 4 × Product).

Difference = √(77² − 4 × 1392) = √(5929 − 5568).

Difference = √361 = 19.

Therefore The correct answer is 19.

Alternate Method

Given:

Sum of two positive numbers (x + y) = 77

Product of the numbers (xy) = 1392

Formula Used:

The relationship between sum, product, and difference is: $(x - y)^2 = (x + y)^2 - 4xy$

Calculations:

=> $(x - y)^2 = (77)^2 - 4 \times 1392$

=> $(x - y)^2 = 5929 - 5568$

=> $(x - y)^2 = 361$

=> $x - y = \sqrt{361}$

=> $x - y = 19$

Therefore The correct answer is 19.

Additional Information

Algebraic Identities

Useful variations include $(x + y)^2 + (x - y)^2 = 2(x^2 + y^2)$ and $(x + y)^2 - (x - y)^2 = 4xy$.

Quadratic Equation Relation

The numbers x and y are the roots of the quadratic equation $t^2 - (\text{Sum})t + (\text{Product}) = 0$. Here, $t^2 - 77t + 1392 = 0$.

Perfect Squares

Memorizing squares up to 30 is vital for competitive exams; for instance, $18^2 = 324$, $19^2 = 361$, and $20^2 = 400$.

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Q8. Answer: (d) 720

Shortcut Trick

Let the total amount of money be T.

Since money is only transferred internally, the total sum T remains constant.

Case 1: Ratio R:N is 3:1 => Neha has T ÷ 4 of the total money.

Case 2: Ratio R:N is 5:1 => Neha has T ÷ 6 of the total money.

The difference in Neha's money between the two cases is 20 − (−40) = 60.

=> T/4 − T/6 = 60 => T/12 = 60 => T = 60 × 12 = 720.

Therefore The correct answer is Rs. 720.

Alternate Method

Given:

Initial money with Riya = R, Initial money with Neha = N.

Formula Used:

Translation of word problems into Linear Equations.

Calculations:

=> If Riya gives Rs. 20 to Neha: R − 20 = 3 × (N + 20)

=> R − 20 = 3N + 60 => R − 3N = 80 ... (i)

=> If Neha gives Rs. 40 to Riya: R + 40 = 5 × (N − 40)

=> R + 40 = 5N − 200 => 5N − R = 240 ... (ii)

=> Adding equations (i) and (ii): (R − 3N) + (5N − R) = 80 + 240

=> 2N = 320 => N = 160

=> Substituting N = 160 in (i): R − 3 × 160 = 80 => R − 480 = 80 => R = 560

=> Total initial amount = R + N = 560 + 160 = 720

Therefore The correct answer is Rs. 720.

Additional Information

Linear Equations in Two Variables

Systems of equations can be solved using the elimination method (adding/subtracting equations) or the substitution method.

Conservation of Total Sum

In closed-system money transfers where no money enters or leaves the group, the sum of individual amounts always remains constant.

Ratio Distribution

If a total T is divided in ratio a:b, the parts are [a/(a+b)] × T and [b/(a+b)] × T.

Q9. Answer: (a) 70°

Shortcut Trick

In a parallelogram, the sum of any two adjacent angles is always 180°.

Given the difference between these two angles is 40°.

Smaller angle = (Sum of angles − Difference of angles) ÷ 2

Smaller angle = (180° − 40°) ÷ 2 = 140° ÷ 2 = 70°.

Therefore The correct answer is 70degree.

Alternate Method

Given: Difference between adjacent angles = 40°.

Formula Used: Adjacent angles of a parallelogram are supplementary (sum = 180°).

Let the larger angle be x and the smaller angle be y.

=> x + y = 180° ... (i)

=> x − y = 40° ... (ii)

Subtracting equation (ii) from (i):

=> (x + y) − (x − y) = 180° − 40°

=> 2y = 140°

=> y = 140° ÷ 2

=> y = 70°

Therefore The correct answer is 70degree.

Additional Information

Adjacent Angles Property

In any parallelogram, consecutive or adjacent angles are supplementary, meaning their sum is always 180°.

Opposite Angles Property

In a parallelogram, the opposite angles are always equal in measure (e.g., angle A = angle C and angle B = angle D).

Sum of Interior Angles

For any quadrilateral, the sum of all four interior angles is exactly 360°.

Q10. Answer: (a) Rs. 10,000

Shortcut Trick

Since cost is directly proportional to length:

Ratio of lengths = 8 : 25

Ratio of costs = 8 : 25

8 units = Rs. 3,200 => 1 unit = Rs. 400

25 units = 25 × 400 = Rs. 10,000

Therefore The correct answer is Rs. 10,000.

Alternate Method

Given:

Initial length (L1) = 8 m

Initial cost (C1) = Rs. 3,200

Target length (L2) = 25 m

Formula Used:

For direct proportion: C1 ÷ L1 = C2 ÷ L2

Calculations:

=> 3,200 ÷ 8 = C2 ÷ 25

=> 400 = C2 ÷ 25

=> C2 = 400 × 25

=> C2 = 10,000

Therefore The correct answer is Rs. 10,000.

Additional Information

Direct Proportion

Two quantities x and y are in direct proportion if the ratio x/y remains constant. Formula: x1/y1 = x2/y2.

Inverse Proportion

Two quantities are in inverse proportion if their product remains constant. Formula: x1 × y1 = x2 × y2.

Unitary Method

A technique where you find the value of a single unit (by division) and then find the necessary value by multiplication.

Q11. Answer: (b) 19.85

Shortcut Trick

Total frequency N = 52, so N/2 = 26.

Cumulative frequency (CF) for class 12-18 is 22, and for 18-24 is 35.

The median class is 18−24 where L = 18, CF = 22, f = 13, and h = 6.

Median = 18 + ((26 − 22) ÷ 13) × 6 = 18 + (4 × 6) ÷ 13 = 18 + 1.846...

Therefore The correct answer is 19.85.

Alternate Method

Given Data:

Class Interval	Frequency (f)	Cumulative Frequency (CF)
0−6	5	5
6−12	7	12
12−18	10	22

18−24	13	35
24−30	9	44
30−36	8	52

Formula Used:

Median = L + [((N ÷ 2) − CF) ÷ f] × h

Where:

L = Lower limit of median class = 18

N = Total frequency = 52

CF = Cumulative frequency of the class preceding the median class = 22

f = Frequency of the median class = 13

h = Class width = 6

Calculations:

=> N ÷ 2 = 52 ÷ 2 = 26

=> Median = 18 + [(26 − 22) ÷ 13] × 6

=> Median = 18 + [4 ÷ 13] × 6

=> Median = 18 + (24 ÷ 13)

=> Median = 18 + 1.84615...

=> Median ≈ 19.846

Therefore The correct answer is 19.85.

Additional Information

Empirical Formula

Relationship between mean, median, and mode: Mode = 3 × Median − 2 × Mean.

Median Class Identification

The median class is the class interval whose cumulative frequency is just greater than or equal to N/2.

Mean of Grouped Data

The mean (μ) is calculated using $\Sigma f_i x_i \div \Sigma f_i$, where x_i is the class mark.

Mode for Grouped Data

Mode = L + [(f1 − f0) ÷ (2f1 − f0 − f2)] × h.

Q12. Answer: (d) C

Shortcut Trick

Compare the net discount percentage for each scheme to find the least beneficial (lowest discount):

Scheme A: 18 + 39 − (18 × 39)/100 = 57 − 7.02 = 49.98%

Scheme B: Net multiplier = 0.71 × 0.55 × 0.96 ≈ 0.375 => Discount ≈ 62.5%

Scheme C: For 8 toys, the discount is a flat 29%.

Scheme D: 7 free on 8 bought => 7/15 × 100 ≈ 46.67%

Therefore The correct answer is Scheme C.

Alternate Method

Given: Number of toys to buy = 8. All toys have the same Marked Price (MP).

Formula Used:

1. Successive discounts x% and y% = [x + y − (xy/100)]%

2. Buy X, Get Y Free discount % = [Y / (X + Y)] × 100

Calculation:

=> Scheme A: Net Discount = 18 + 39 − (18 × 39 / 100) = 57 − 7.02 = 49.98%

=> Scheme B: Successive 29%, 45%, 4%. Price multiplier = 0.71 × 0.55 × 0.96 = 0.37488. Discount = (1 − 0.37488) × 100 = 62.512%

=> Scheme C: Customer buys exactly 8 toys. Discount offered on the first 8 toys = 29%.

=> Scheme D: Buy 8, Get 7 Free. Total toys = 15. Discount = (7 / 15) × 100 = 46.67%

=> Comparing all: 29% (C) < 46.67% (D) < 49.98% (A) < 62.51% (B).

=> The least beneficial scheme for the customer is the one with the minimum discount.

Therefore The correct answer is Scheme C.

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Additional Information

Successive Discounts

The effective discount for two successive discounts a% and b% is calculated as [a + b − (ab/100)]%. For three or more, use the multiplier method: 100 − [100 × (100−d1)/100 × (100−d2)/100 × ...].

Buy X Get Y Free

In this retail scheme, the customer pays for X items but receives X + Y items in total. The discount percentage is (Free Items / Total Items) × 100 = [Y / (X + Y)] × 100.

Customer vs. Shopkeeper Benefit

A customer always seeks the maximum discount (most beneficial), while the shopkeeper seeks the minimum discount to maximize profit.

Q13. Answer: (b) 1

Shortcut Trick

Tap 2 fills (18 hr) and Tap 3 empties (18 hr) at the same rate.

Their net contribution to the cistern is zero (1/18 − 1/18 = 0).

Only Tap 1 effectively fills the cistern at a rate of 4 hr per full tank.

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

Therefore The correct answer is 1 hr.

Alternate Method

Given:

Time taken by Tap 1 (A) = 4 hr

Time taken by Tap 2 (B) = 18 hr

Time taken by Tap 3 (C) = 18 hr (emptying)

Formula Used:

Efficiency = Total Work ÷ Time

Time Taken = Work to be done ÷ Combined Efficiency

Tap	Time (hr)	Total Work (LCM)	Efficiency
Tap 1 (A)	4	36	9
Tap 2 (B)	18	2	
Tap 3 (C)	18	−2	

Calculations:

=> Total work (LCM of 4, 18, 18) = 36 units

=> Work to be completed (one-fourth of cistern) = 36 ÷ 4 = 9 units

=> Combined efficiency of all three taps = 9 + 2 − 2 = 9 units/hr

=> Time required = 9 ÷ 9 = 1 hr

Therefore The correct answer is 1 hr.

Additional Information

Negative Work in Cisterns

An outlet pipe or a leak is considered to do negative work because it removes water from the cistern. Its efficiency is subtracted from the inlet pipes.

Combined Efficiency

When multiple pipes operate together, their individual efficiencies (work done per unit time) are added algebraically to find the net filling or emptying rate.

Time and Efficiency Relation

Time is inversely proportional to efficiency. If a tap fills a tank in 't' hours, its 1-hour efficiency is 1/t of the total capacity.

Q14. Answer: (a) 12

Shortcut Trick

LCM of ratio parts 5, 14, and 9 = 5 × 14 × 9 = 630 units.

Given LCM = 7560.

1 ratio unit (which represents the HCF) = 7560 ÷ 630 = 12.

Therefore The correct answer is 12.

Alternate Method

Given:

Ratio of three numbers = 5 : 14 : 9

LCM of the numbers = 7560

Formula Used:

For numbers in ratio a : b : c, the LCM of the numbers is given by: x × LCM(a, b, c), where x is the HCF.

Calculations:

=> Let the numbers be 5x, 14x, and 9x, where x is the HCF.

=> LCM(5x, 14x, 9x) = x × LCM(5, 14, 9)

=> Since 5, 14, and 9 are pairwise co-prime, their LCM = 5 × 14 × 9 = 630.

=> Given LCM = 7560

=> 630 × x = 7560

=> x = 7560 ÷ 630

=> x = 12

Therefore The correct answer is 12.

Additional Information

HCF and LCM Relation

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

Co-prime Numbers

Numbers are said to be co-prime if their HCF is 1. If ratio parts are co-prime, their LCM is simply their product.

LCM and HCF of Fractions

LCM of fractions = LCM of numerators ÷ HCF of denominators; HCF of fractions = HCF of numerators ÷ LCM of denominators.

Q15. Answer: (a) 170

Shortcut Trick

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

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

Ratio of CI to SI = 21 : 20.

Given 21 units = Rs. 178.5 => 1 unit = 178.5 ÷ 21 = 8.5.

Value of 20 units (SI) = 20 × 8.5 = Rs. 170.

Therefore The correct answer is Rs. 170.

Alternate Method

Given: Rate (R) = 10%, Time (T) = 2 years, Compound Interest (CI) = Rs. 178.5.

Formula Used: CI = P[(1 + R/100)^T − 1] and SI = (P × R × T) ÷ 100

=> CI = P[(1 + 10/100)² − 1]

=> 178.5 = P[(1.1)² − 1]

=> 178.5 = P[1.21 − 1]

=> 178.5 = 0.21P

=> P = 178.5 ÷ 0.21 = Rs. 850

=> SI = (850 × 10 × 2) ÷ 100

=> SI = 850 × 0.2 = Rs. 170

Therefore The correct answer is Rs. 170.

Additional Information

Difference between CI and SI for 2 years

The difference (D) is given by the formula D = P × (R/100)².

CI and SI Ratio for 2 years

The ratio of Compound Interest to Simple Interest for 2 years is CI / SI = (200 + R) / 200.

Effective Rate of Interest

For CI, the effective rate for two successive years x% and y% is [x + y + (xy/100)]%.

Q16. Answer: (b) Rs. 4,800

Let the initial price be P.

Price at end of 1st year (P1) = P × 1.20

Price at end of 2nd year (P2) = P1 × 0.80 = 0.96 P1

Price at end of 3rd year (P3) = P2 × 1.20 = 1.152 P1

Difference |P3 - P2| = |1.152 P1 - 0.96 P1| = 0.192 P1

0.192 P1 = 1920

P1 = 10,000

40% of P1 = 0.40 × 10,000 = Rs. 4,800.

Q17. Answer: (b) 17

18 - [12 - 4] + 7 = 18 - 8 + 7 = 10 + 7 = 17.

Q18. Answer: (d) Rs. 1,050

Cost Price (CP) = Rs. 2,850

Number of lamps sold = 7 - 2 = 5

Selling Price (SP) = 5 × 360 = Rs. 1,800

Loss = CP - SP = 2,850 - 1,800 = Rs. 1,050.

Q19. Answer: (b) 30√3 km/h

Using the formula S1/S2 = √(T2/T1):

60/S2 = √(8/6) = √(4/3) = 2/√3

2 × S2 = 60√3

S2 = 30√3 km/h.

Q20. Answer: (d) Any odd prime

If p = 2, p^2-1 = 3 and p^2+1 = 5. GCD(3, 5) = 1.

If p is any odd prime, p^2 is odd, so p^2-1 and p^2+1 are consecutive even numbers. The GCD of any two consecutive even numbers is always 2.

Q21. Answer: (b) 30 m

Mean proportional = √(a × b) = √(18 × 50) = √900 = 30 m.

Q22. Answer: (a) 126 minutes

The time they will be checked together again is the LCM of 14, 18, and 21.

14 = 2 × 7

18 = 2 × 3^2

21 = 3 × 7

LCM = 2 × 3^2 × 7 = 2 × 9 × 7 = 126 minutes.

Q23. Answer: (d) 1,200

Selling Price (SP) = Marked Price (MP) × (100 - Discount)%

840 = MP × 70/100

MP = (840 × 100) / 70 = 12 × 100 = Rs. 1,200.

Q24. Answer: (c) 864

Let CP of 1000g be Rs. 1000.

MP = 1200.

SP = 1200 × 0.90 = Rs. 1080.

Overall profit = 25%, so SP / CP_actual = 1.25

1080 / x = 1.25

x = 1080 / 1.25 = 864 grams.

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Q25. Answer: (a) 1.08% increase

Net effect = a + b + (ab/100)

= -24 + 33 + (-24 × 33 / 100)

= 9 - 7.92 = 1.08% increase.

Q26. Answer: (d) 20

Total work = 40 × 50 = 2000 man-days.

Let the 10 persons leave after 'd' days.

Work done in 'd' days = 40d.

Remaining work done by 30 persons in (60 - d) days = 30(60 - d).

40d + 1800 - 30d = 2000

10d = 200

d = 20 days.

Q27. Answer: (c) 16,94,000

Volume = $\pi r^2 h$ = (22/7) × 7 × 7 × 11 = 154 × 11 = 1694 m^3.

1 m^3 = 1000 litres.

Capacity = 1694 × 1000 = 16,94,000 litres.

Q28. Answer: (c) 20 years

Let Kavita's present age be K and Mother's be M.

K - 5 = M/3 => M = 3K - 15.

(K + 5) + (M + 5) = 75 => K + M = 65.

K + (3K - 15) = 65

4K = 80

K = 20 years.

Q29. Answer: (b) Aman: Rs. 6,000, Raj: Rs. 9,000

Ratio of investment = 12000 : 18000 = 2 : 3.

Aman's profit = (2/5) × 15000 = Rs. 6,000.

Raj's profit = (3/5) × 15000 = Rs. 9,000.

Q30. Answer: (b) 29

Modal class is 25-35 (highest frequency 18).

L = 25, f1 = 18, f0 = 14, f2 = 12, h = 10.

Mode = L + [(f1 - f0) / (2f1 - f0 - f2)] × h

Mode = 25 + [(18 - 14) / (36 - 14 - 12)] × 10

Mode = 25 + [4 / 10] × 10 = 29.

Q31. Answer: (a) Nagaland

The correct answer is Nagaland.

Key Points

• The Hornbill Festival is an annual cultural extravaganza celebrated in Nagaland from December 1 to December 10.

• The festival is organized by the State Tourism and Art & Culture Departments of the Government of Nagaland to encourage inter-tribal interaction and preserve the state’s heritage.

• It is held at the Naga Heritage Village in Kisama, which is approximately 12 kilometers from the capital city, Kohima.

• Popularly known as the Festival of Festivals, it showcases the traditional folk dances, music, indigenous games, and crafts of the sixteen major tribes of Nagaland.

• The festival is named after the Great Indian Hornbill, a bird that holds a significant place in the folklore, songs, and tribal traditions of the Naga people.

• The event coincides with Nagaland Statehood Day, which is observed on December 1 to commemorate the formation of the state in 1963.

Additional Information

• Assam:

• Home to the Bihu festival, which consists of three distinct celebrations: Rongali, Kongali, and Bhogali Bihu.

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• Famous for the Ambubachi Mela held at the Kamakhya Temple.
• Manipur:
• Celebrates the Sangai Festival, named after the state's rare brow-antlered deer found in Keibul Lamjao National Park.
• Other notable festivals include Yaoshang and the Kang festival.
• Meghalaya:
• Known for the Wangala Festival (100 Drums Festival) celebrated by the Garo tribe to mark the end of the harvest season.
• The Cherry Blossom Festival in Shillong has also become a major international attraction.

Q32. Answer: (d) It mainly builds or elevates parts of the crust

The correct answer is It mainly builds or elevates parts of the crust.

Key Points

• Volcanism is a primary endogenic geomorphic process driven by the internal heat of the Earth, which results from radioactive decay and primordial heat from the core.
• Geomorphic processes are generally classified into two categories: endogenic (internal) and exogenic (external). While exogenic processes tend to reduce relief, endogenic processes like volcanism are constructive or aggradational in nature.
• The process involves the movement of molten rock or magma from the mantle toward the surface. When this magma cools and solidifies on the surface as lava, it forms new landmasses and geographic features.
• Common landforms created by volcanism include volcanic mountains, cinder cones, composite volcanoes, and vast lava plateaus such as the Deccan Traps in India or the Columbia Plateau in the USA.
• In the context of the Earth's crustal evolution, volcanism is responsible for the continuous addition of material to the lithosphere, thereby elevating the terrain and creating structural relief.
• Hence, the statement that volcanism mainly builds or elevates parts of the crust is correct.

Additional Information

• Exogenic Processes:
• These processes, such as weathering, erosion, and mass wasting, are driven by external forces like solar energy and gravity.
• They are primarily degradational, meaning they work to wear down and lower the existing landforms to a base level.
• Factors like rainfall, temperature fluctuations, and running water are the primary agents of these external processes.
• Diastrophism:
• This is another endogenic process that includes orogenic (mountain-building) and epeirogenic (continent-building) forces.
• Like volcanism, diastrophism results in the deformation, uplifting, or subsidence of the Earth's crust.
• Magmatic Features:
• Intrusive landforms (plutonic) are formed when magma cools within the crust (e.g., batholiths, laccoliths, sills, and dykes).
• Extrusive landforms are formed when magma reaches the surface as lava and solidifies.

Q33. Answer: (b) Economic growth and stability

The correct answer is Economic growth and stability.

Key Points

• Fiscal Policy in India is the framework through which the Ministry of Finance manages government spending and taxation to influence the national economy.
• The foremost objective is Economic Growth, achieved by increasing the Gross Domestic Product (GDP) through strategic investments in Infrastructure, Agriculture, and Industrial sectors.
• Economic Stability refers to the government's effort to maintain Price Stability and control Inflation, ensuring that the cost of living remains manageable for the general public.
• It serves as a tool for Resource Mobilization, where the government generates revenue through Direct and Indirect Taxes to fund essential public services and developmental projects.
• Another vital goal is Full Employment, where the government uses budgetary allocations to create job opportunities in both rural and urban areas to reduce poverty.
• The policy also aims at Reducing Inequalities by implementing Progressive Taxation and providing Subsidies to the underprivileged sections of society.

Additional Information

• Inflation and Fiscal Deficit:
• Inflation: While Monetary Policy (managed by the RBI) is the primary tool for inflation control, fiscal policy supports it by managing Public Expenditure. Increasing inflation is a negative economic outcome, not an objective.
• Fiscal Deficit: This is the excess of total expenditure over total receipts (excluding borrowings). The Fiscal Responsibility and Budget Management (FRBM) Act, 2003, actually mandates the government to reduce the fiscal deficit to ensure long-term

Macroeconomic Stability.

• Foreign Trade:

• India's fiscal measures, such as Customs Duties and Export Incentives, are designed to boost Foreign Exchange Reserves and promote exports rather than reducing overall trade.

• Instruments of Fiscal Policy:

• Budgeting: The annual financial statement presented under Article 112 of the Constitution of India.

• Taxation: Includes GST, Income Tax, and Corporate Tax.

• Public Debt: Internal and external borrowings to fund developmental gaps.

Q34. Answer: (b) Grahavarman

The correct answer is Grahavarman.

Key Points

• Rajyashri was the sister of the great north Indian emperor Harshavardhana and the daughter of Prabhakaravardhana, the first notable king of the Pushyabhuti (Vardhana) dynasty of Thanesar.

• She was married to Grahavarman, the last important ruler of the Maukhari dynasty, who ruled over Kannauj in the early 7th century AD.

• The marriage was a critical geopolitical alliance designed to protect the borders of both kingdoms against the rising threats from the rulers of Malwa and Gauda.

• Shortly after the marriage, Grahavarman was attacked and killed by Devgupta (the king of Malwa) who acted in collaboration with Shashanka (the king of Bengal).

• Following Grahavarman’s assassination, Rajyashri was imprisoned in Kannauj, which triggered a series of military campaigns by her brothers, Rajyavardhana and later Harshavardhana, to avenge the family and rescue her.

• After being rescued from the Vindhya forests just as she was about to commit self-immolation, Rajyashri co-ruled Kannauj with Harshavardhana, leading to the unification of the Thanesar and Kannauj administrative seats.

Additional Information

• Rudrasena II:

• He was a ruler of the Vakataka dynasty in the Deccan.

• He is historically significant for his marriage to Prabhavatigupta, the daughter of the Gupta emperor Chandragupta II, which established a strong Gupta-Vakataka alliance.

• Shashanka:

• He was the king of the Gauda Kingdom (modern-day Bengal) and is regarded as the first major independent king of Bengal.

• He was a staunch rival of Harshavardhana and was responsible for the treacherous murder of Harsha’s elder brother, Rajyavardhana.

• Devgupta:

• He was a ruler of the Later Gupta dynasty of Malwa.

• He played a central role in the conflict by killing Grahavarman and capturing Rajyashri before being defeated by Rajyavardhana.

Q35. Answer: (a) 11th Schedule

The correct answer is 11th Schedule.

Key Points

• The 11th Schedule was added to the Constitution of India by the 73rd Constitutional Amendment Act, 1992, which came into force on April 24, 1993.

• This schedule establishes the functional domain for Panchayati Raj Institutions (PRIs), representing the system of Rural Local Self-Government in India.

• It specifies 29 functional items over which Panchayats have the power and authority to prepare plans for economic development and social justice.

• The specific subjects included in the schedule range from Agriculture and Land Improvement to Minor Irrigation, Social Forestry, Small Scale Industries, Rural Housing, and Drinking Water.

• The legislative basis for this schedule is Article 243-G, which empowers State Legislatures to endow Panchayats with necessary powers to function as institutions of self-government.

• The implementation of this schedule was a realization of the Gandhian principle mentioned in Article 40 of the Directive Principles of State Policy.

Additional Information

• 12th Schedule:

• Inserted by the 74th Constitutional Amendment Act, 1992.

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• It defines the powers, authority, and responsibilities of Municipalities (Urban Local Self-Government) and contains 18 functional subjects under Article 243-W.

• 10th Schedule:

• Added by the 52nd Amendment Act, 1985, commonly known as the Anti-Defection Law.

• It contains provisions regarding the disqualification of members of Parliament and State Legislatures on the ground of defection to another political party.

• 9th Schedule:

• Introduced by the 1st Constitutional Amendment Act, 1951 to protect land reform and other laws from judicial review.

• While it initially aimed to prevent legal challenges based on Fundamental Rights, the Supreme Court ruled in 2007 (IR Coelho case) that laws added after 1973 are subject to the Basic Structure Doctrine.

Q36. Answer: (b) Sessions Court

The correct answer is Sessions Court.

Key Points

• The Sessions Court is the highest criminal court in a district and forms the primary tier of the subordinate judiciary in India for handling serious offenses.

• Under Section 28(2) of the Code of Criminal Procedure (CrPC), a Sessions Judge or an Additional Sessions Judge is empowered to pass any sentence authorized by law.

• This judicial authority includes the power to award life imprisonment and the death penalty for heinous crimes defined under the Indian Penal Code (IPC).

• While the Sessions Court can pass a death sentence, Section 366 of the CrPC mandates that such a sentence must be submitted to the High Court for mandatory confirmation before execution.

• In contrast, the Assistant Sessions Judge, though part of the same court hierarchy, can only impose sentences of imprisonment for a term not exceeding 10 years.

• The Sessions Court also acts as an appellate court for cases decided by Judicial Magistrates, reinforcing its status as the most powerful criminal tribunal among subordinate courts.

Additional Information

• Civil Court:

• Presided over by the District Judge, these courts adjudicate on disputes involving property, contracts, and civil rights.

• Unlike criminal courts, they do not have the power to impose punitive sentences like imprisonment for the purpose of criminal justice.

• Family Court:

• Established under the Family Courts Act, 1984, these specialize in matters like marriage dissolution, child custody, and maintenance.

• Their primary focus is on conciliation and mediation rather than criminal sentencing.

• Consumer Court:

• These are quasi-judicial bodies formed under the Consumer Protection Act, 2019 to provide relief against unfair trade practices.

• They award compensation or damages to consumers but are not empowered to award life imprisonment or capital punishment.

Q37. Answer: (c) Legislative relations

The correct answer is Legislative relations.

Key Points

• Part XI of the Indian Constitution establishes the framework for the relationship between the Union and the States, which is a core feature of Indian federalism.

• Chapter I of Part XI, comprising Articles 245 to 255, specifically governs the Legislative relations, defining how law-making powers are distributed between the Parliament and State Legislatures.

• Article 245 specifies the territorial extent of legislation, allowing Parliament to make laws for the entire country and State Legislatures for their respective territories.

• Article 246 deals with the distribution of subject matter through the Seventh Schedule, which contains the Union List, State List, and Concurrent List.

• Article 248 grants residuary powers to the Parliament, meaning it has exclusive authority to legislate on any matter not listed in the Concurrent or State Lists.

• Article 249 empowers the Parliament to legislate on a State List subject if the Rajya Sabha declares it necessary in the national interest by a two-thirds majority.

• Article 254 outlines the Doctrine of Repugnancy, stating that if a State law conflicts with a Central law on a Concurrent List subject, the Central law generally prevails.

Additional Information

• Administrative relations:

• These are detailed in Chapter II of Part XI, specifically from Articles 256 to 263.

• They focus on the executive power coordination, the role of All India Services, and the creation of an Inter-State Council under Article 263.

• Financial relations:

• These are governed by Part XII of the Constitution, encompassing Articles 264 to 293.

• Key aspects include the distribution of tax revenues, Grants-in-aid, and the mandatory appointment of the Finance Commission under Article 280 every five years.

• Judicial relations:

• India does not have a dual judicial system; instead, it features a single integrated judicial system.

• The Supreme Court acts as the apex body, followed by High Courts and Subordinate Courts, ensuring uniformity in the application of both Central and State laws.

Q38. Answer: (c) By promoting indigenous industries and rejecting foreign products.

The correct answer is By promoting indigenous industries and rejecting foreign products..

Key Points

• The Swadeshi movement was officially proclaimed on August 7, 1905, at the Calcutta Town Hall, primarily as a reaction to the Partition of Bengal enacted by Lord Curzon.

• The central strategy to counter British policies was the Boycott of foreign goods, specifically British-made textiles from Manchester and salt from Liverpool, aiming to cripple the colonial economy.

• The movement emphasized Atmashakti (self-reliance), which led to the establishment of various indigenous industries, such as Swadeshi textile mills, soap factories, and match factories, to replace imported British products.

• Leaders like Bipin Chandra Pal, Lala Lajpat Rai, and Bal Gangadhar Tilak (the Lal-Bal-Pal trio) transformed it into a mass movement, encouraging citizens to use only Swadeshi goods as a sign of national pride and resistance.

• It was not just an economic struggle but also a cultural one, promoting National Education through institutions like the National Council of Education to reduce reliance on British-controlled academic systems.

Additional Information

• Partition of Bengal (1905):

• The British claimed the partition was for administrative convenience, but it was actually a Divide and Rule tactic to weaken the Indian National Movement by creating a communal rift.

• The day of the partition, October 16, 1905, was observed as a day of mourning, where people fasted and tied Rakhi to each other to signify unity.

• Economic Nationalism:

• The movement saw the rise of iconic indigenous enterprises, including the Bengal Chemical Pharmaceutical Works founded by Prafulla Chandra Ray.

• The demand for handloom cloth surged, providing a major boost to the traditional weaving industry that had been decimated by British industrial competition.

• Concept Analysis:

• Military Drills: While secret revolutionary groups like Anushilan Samiti emerged, the mainstream Swadeshi movement focused on economic and educational passive resistance.

• Diplomatic Councils: These were the focus of the Moderates, whereas the post-1905 movement moved toward Extremist methods involving mass mobilization.

Q39. Answer: (c) 2000

The correct answer is 2000.

Key Points

• The Foreign Exchange Management Act (FEMA) was passed by the Indian Parliament in 1999 as a replacement for the older and more stringent Foreign Exchange Regulation Act (FERA) of 1973.

• Although the Act is titled FEMA, 1999 and received the Presidential assent on December 29, 1999, it was officially notified and came into force across the country on June 1, 2000.

• The primary objective of FEMA is to consolidate and amend the law relating to foreign exchange with the aim of facilitating external trade and payments and for promoting the orderly development and maintenance of the foreign exchange market in India.

• Unlike its predecessor, FEMA shifted the focus from regulation (restriction) to management, aligning India's financial framework with the liberalization policies initiated in the 1990s.

Additional Information

• Foreign Exchange Regulation Act (FERA), 1973:

• This was the predecessor to FEMA and was characterized by its prohibitive nature.

• Under FERA, any violation was considered a criminal offense, punishable with imprisonment, whereas under FEMA, violations are civil offenses punishable by monetary penalties.

• Enforcement Directorate (ED):

• The Directorate of Enforcement, under the Ministry of Finance, is the primary agency responsible for investigating suspected contraventions of FEMA provisions.

• It has the power to adjudicate cases and impose penalties on individuals or corporate entities found in violation of the Act.

• Role of RBI:

• The Reserve Bank of India (RBI) plays a central role in administering FEMA by controlling current account and capital account transactions.

• The RBI issues detailed Master Directions and circulars to regulate the flow of Foreign Direct Investment (FDI) and External Commercial Borrowings (ECB).

Q40. Answer: (a) Provincial autonomy and federal structure

The correct answer is Provincial autonomy and federal structure.

Key Points

• The Government of India Act, 1935 was a significant milestone that provided for the establishment of an All-India Federation. This federation was intended to consist of British Indian Provinces and Princely States as constituent units.

• The Act abolished the system of Dyarchy in the provinces, which had been introduced by the 1919 Act, and replaced it with Provincial Autonomy. This granted provinces a separate legal identity and the freedom to operate as autonomous units of administration.

• It introduced Responsible Government in provinces, meaning the Governor was required to act on the advice of ministers who were accountable to the Provincial Legislature.

• The Act distributed legislative powers between the Centre and the Provinces through three lists: the Federal List (59 items), the Provincial List (54 items), and the Concurrent List (36 items), while Residuary Powers were vested in the Viceroy.

Additional Information

• Dyarchy in Provinces:

• This system was a feature of the Government of India Act, 1919 (Montagu-Chelmsford Reforms). Under the 1935 Act, Dyarchy was instead proposed at the Central level, though this part of the Act was never implemented.

• Extension of Communal Representation:

• While Separate Electorates were first introduced for Muslims in 1909, the 1935 Act extended this principle to Depressed Classes (Scheduled Castes), Women, and Labor (Workers).

• Institutional Establishments:

• The Act led to the creation of the Reserve Bank of India (RBI) in 1935 to regulate national currency and credit.

• It also provided for the setting up of a Federal Court, which was established in 1937, and Provincial Public Service Commissions.

Q41. Answer: (b) Ctrl + S

The correct answer is Ctrl + S.

Key Points

• In Microsoft Word and Microsoft Excel, the keyboard shortcut Ctrl + S is the standard command used to Save the active document or workbook to the storage drive.

• If the file has already been saved, pressing Ctrl + S instantly updates the existing file with any new modifications made since the last save operation.

• For a new document that has not yet been assigned a name, this shortcut triggers the Save As interface, requiring the user to select a file format (such as .docx or .xlsx) and a directory location.

• The Ctrl (Control) key acts as a modifier, and the letter S serves as a mnemonic for Save, a convention maintained across nearly all Windows-based applications to ensure data integrity and prevent work loss.

• This command interacts with the Office Fluent User Interface to bypass the manual process of clicking File and then Save on the Quick Access Toolbar.

Additional Information

• Ctrl + Tab:

• Functionally used to switch between open tabs in web browsers or to move between different child windows within a single parent application window.

• Ctrl + V:

• The universal shortcut for the Paste command, which retrieves data from the System Clipboard and inserts it at the insertion point or selected cell.

• Ctrl + F:

• Activates the Find feature, opening a Navigation Pane or dialog box to search for specific text strings, formatting, or special characters within the file.

• F12 Function Key:

• While Ctrl + S performs a standard save, the F12 key is specifically designed to open the Save As dialog box directly, even if the file has already been saved.

Q42. Answer: (c) One: only Indian citizenship

The correct answer is One: only Indian citizenship.

Key Points

• The Constitution of India establishes a system of Single Citizenship, meaning that despite India being a Federal State with a dual polity (Centre and States), there is only one citizenship for the entire country.

• This provision is detailed in Part II of the Constitution, encompassing Articles 5 to 11, which define who was eligible for citizenship at the time of the Constitution's commencement on January 26, 1950.

• Unlike other federal systems, an Indian citizen owes allegiance only to the Union of India and does not possess a separate citizenship for the state in which they reside, such as Kerala or Rajasthan.

• The concept of single citizenship in India was inspired by the British Constitution (United Kingdom) to foster national unity, fraternity, and to prevent regionalism from undermining the integrity of the nation.

• All citizens of India, regardless of their place of birth or residence, enjoy uniform Fundamental Rights and political privileges across the whole of the Indian Territory.

Additional Information

• Dual Citizenship Model:

• In countries like the United States of America (USA) and Switzerland, a dual citizenship model is followed where an individual is a citizen of the National Government and also a citizen of a particular State.

• This can sometimes lead to different sets of rights or laws applicable to citizens depending on their state of residence, a situation the Indian framers avoided to ensure equality.

• Citizenship Act, 1955:

• While the Constitution provides the framework, the Parliament used its powers under Article 11 to enact the Citizenship Act, 1955, which governs the acquisition and loss of citizenship after 1950.

• Indian citizenship can be acquired through five methods: Birth, Descent, Registration, Naturalization, and Incorporation of Territory.

• Termination of Citizenship:

• The Indian law is strict regarding single citizenship; if an Indian citizen voluntarily acquires the citizenship of another country, their Indian citizenship is automatically terminated under the principle of Renunciation or Termination.

Q43. Answer: (c) They are non-justiciable guidelines that aim to establish a just society.

The correct answer is They are non-justiciable guidelines that aim to establish a just society..

Key Points

• The Directive Principles of State Policy (DPSP) are enumerated in Part IV of the Constitution of India, covering Articles 36 to 51. These principles are intended to be the fundamental goals that the State must strive to achieve while formulating policies and enacting laws.

• Article 37 of the Constitution explicitly declares that these principles are not enforceable by any court, which makes them non-justiciable in nature. This distinguishes them from Fundamental Rights, which can be legally enforced if violated. Hence, statement 3 is correct.

• The primary objective of the DPSP is to establish social and economic democracy and transform India into a Welfare State. They direct the State to promote the welfare of the people by securing a social order permeated by social, economic, and political justice.

• Since the DPSP are non-justiciable, no citizen can approach the Supreme Court or High Courts through writ petitions (under Article 32 or Article 226) to demand their implementation. Hence, statement 1 is incorrect.

• Unlike Fundamental Rights (Part III), which are legally enforceable, the DPSP are moral obligations and political directives for the government. Hence, statement 2 is incorrect.

• The DPSP are not absolute and can be amended by the Parliament of India. Significant amendments include the 42nd Amendment Act of 1976 (which added Articles 39A, 43A, and 48A) and the 97th Amendment Act of 2011 (which added Article 43B). Hence, statement 4 is incorrect.

Additional Information

• Origins and Classification:

• Source: The concept of DPSP was borrowed from the Irish Constitution of 1937.

• Socialistic Principles: These aim at providing social and economic justice, such as Article 39 (Equal pay for equal work) and Article 41 (Right to work and education).

• Gandhian Principles: These represent the program of reconstruction enunciated by Mahatma Gandhi, including Article 40 (Organization of village panchayats) and Article 47 (Prohibition of intoxicating drinks).

• Liberal-Intellectual Principles: These reflect the ideology of liberalism, such as Article 44 (Uniform Civil Code) and Article 50 (Separation of judiciary from executive).

• Critical Jurisprudence: In the Minerva Mills Case (1980), the Supreme Court held that the Indian Constitution is founded on the bedrock of the balance between Fundamental Rights and Directive Principles.

Q44. Answer: (b) Mayurasarman

The correct answer is Mayurasarman.

Key Points

• The Kadamba dynasty was established around 345 CE by Mayurasarman, marking the rise of the first indigenous kingdom to rule from Karnataka.

• According to the Talagunda inscription, Mayurasarman was a Brahmin scholar who traveled to Kanchipuram, the capital of the Pallavas, to study the Vedas.

• After being insulted by a Pallava horseman or official, he renounced his priestly life, took up the sword, and vowed to end the Pallava hegemony in the region.

• He retreated to the dense forests of Sriparvata (modern-day Srisailam) and organized a powerful rebel force consisting of local tribes.

• He utilized guerrilla warfare tactics to harass Pallava outposts and successfully defeated their subordinates, eventually forcing the Pallava king to recognize his sovereignty.

• He established his capital at Banavasi and performed various sacrifices, including the Ashvamedha, to legitimize his transition from a Brahmin to a Kshatriya ruler, subsequently adopting the name Mayuravarman.

Additional Information

• Mahendravarman:

• He was a famous Pallava king who ruled from 600 CE to 630 CE.

• He was a great patron of rock-cut architecture and authored the satirical Sanskrit play Mattavilasa Prahasana.

• Pulakesin:

• Pulakesin I was the founder of the Chalukya dynasty of Badami in 543 CE.

• Pulakesin II was the most powerful ruler of this dynasty, known for defeating the northern emperor Harshavardhana on the banks of the Narmada river.

• Vinayaditya:

• He was a later Chalukya king who ruled from 681 CE to 696 CE.

• His reign is noted for successful military expeditions against the kingdoms of North India and maintaining the stability of the Badami Chalukya empire.

Q45. Answer: (c) It increases, because the air molecules move faster

The correct answer is It increases, because the air molecules move faster.

Key Points

• The speed of sound in a gas is primarily determined by the temperature of the medium rather than its pressure or density alone.

• As the temperature of the air increases, the kinetic energy of the air molecules increases, causing them to move and vibrate more rapidly.

• Sound is a mechanical wave that travels through the periodic collision of particles; therefore, faster-moving molecules can transmit the vibrational energy of the sound wave more quickly through the air.

• Mathematically, the relationship is expressed as $v = \sqrt{((\gamma RT)/M)}$, where v is the speed, T is the absolute temperature, R is the gas constant, M is the molar mass, and gamma is the adiabatic index.

• Because v is proportional to the square root of T, the speed of sound increases as the temperature rises.

Additional Information

• Numerical Impact of Temperature:

• At 0 degrees Celsius, the speed of sound in dry air is approximately 331 meters per second.

• At 20 degrees Celsius (room temperature), the speed increases to approximately 343 meters per second.

• For every 1 degree Celsius rise in temperature, the speed of sound in air increases by roughly 0.6 meters per second.

• Effect of Medium Properties:

• Humidity: Increased humidity also increases the speed of sound because water vapor is less dense than dry air, decreasing the overall density of the air mixture.

• Density and Elasticity: While speed is inversely proportional to the square root of density, in gases, the increase in temperature has a much more dominant effect on the elastic properties than the resulting decrease in density.

Q46. Answer: (a) N/m²

The correct answer is N/m2.

Key Points

• Pressure is defined as the physical magnitude of the normal force exerted per unit surface area over which that force is distributed.

• The mathematical relationship is expressed by the formula P = F / A, where P represents pressure, F denotes the perpendicular force, and A denotes the area of the surface.

• In the International System of Units (SI), the standard unit of force is the Newton (N) and the standard unit of area is the square meter (m²).

• By substituting these base units into the pressure formula, the derived SI unit is calculated as Newton per square meter, commonly written as N/m².

Additional Information

• Pascal (Pa):

• The unit N/m² is formally designated as the Pascal (Pa) in the SI system, named after the scientist Blaise Pascal.

• One Pascal is a relatively small amount of pressure; for instance, the standard atmospheric pressure at sea level is approximately 101,325 Pa.

• Analysis of Other Units:

• N/m: This is the SI unit for Surface Tension and the Spring Constant (stiffness of a spring).

• N·m: This is the SI unit for Torque (moment of force) and is also equivalent to the Joule (J), the unit for Work and Energy.

• Dimensional Formula: The dimensions of pressure are [M¹ L^(−1) T^(−2)], derived from the dimensions of force divided by area.

• Other Pressure Units:

• Bar: Used in meteorology, where 1 bar = 10^5 Pa.

• Torr: Often used in vacuum physics, where 1 Torr ≈ 133.32 Pa.

Q47. Answer: (d) China

The correct answer is China.

Key Points

• China maintains its position as the global leader in hydropower, possessing the largest installed capacity in the world as per the International Renewable Energy Agency (IRENA) Renewable Capacity Statistics.

• As of the data leading into 2025, China's total installed hydropower capacity has exceeded 421 GW (Gigawatts), which accounts for nearly 30% of the total global hydropower capacity.

• The country’s dominance is underpinned by massive engineering projects such as the Three Gorges Dam on the Yangtze River, which remains the world’s largest power station by installed capacity at 22.5 GW.

• China has also rapidly expanded its Pumped Storage Hydropower (PSH) capacity to support grid stability, reaching over 50 GW, further cementing its top rank in the renewable sector.

• The Baihetan Dam, the world's second-largest hydropower station with a 16 GW capacity, became fully operational recently, significantly boosting China’s renewable output.

Additional Information

• Brazil:

• Holds the second-largest installed capacity globally with approximately 110 GW.

• It relies on the Itaipu Binational Dam (shared with Paraguay), which is one of the highest-yielding hydroelectric plants in the world.

• United States:

• Ranks third with an installed capacity of over 102 GW.

• The Grand Coulee Dam in Washington state is its largest hydroelectric facility, producing about 6.8 GW.

• Canada:

• Ranks fourth globally with roughly 83 GW of installed capacity.

• Hydroelectricity is the primary source of power in provinces like Quebec and Manitoba, making Canada one of the largest

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producers per capita.

• IRENA:

• The International Renewable Energy Agency is an intergovernmental organization headquartered in Abu Dhabi, mandated to promote the adoption and sustainable use of all forms of renewable energy.

Q48. Answer: (d) Tertiary

The correct answer is Tertiary.

Key Points

• The Tertiary sector comprises activities that do not produce a physical good by themselves but provide support or aid for the production process. This is why it is widely referred to as the Service Sector.

• Trade is a fundamental component of this sector as it involves the exchange of goods and services between producers and consumers, facilitating the flow of the economy.

• Services encompass a wide range of intangible benefits, including transportation, communication, banking, and insurance, all of which are essential for the smooth functioning of primary and secondary industries.

• Economic activities in this category help in the distribution of finished products from the factory to the market, making wholesale and retail trade vital tertiary functions.

• Unlike the primary and secondary sectors, the tertiary sector produces services rather than tangible goods, providing professional expertise and infrastructure to society.

Additional Information

• Primary Sector:

• Commonly known as the Agriculture and Allied Sector.

• It involves the direct extraction and use of natural resources such as farming, mining, fishing, and forestry.

• Secondary Sector:

• Commonly known as the Industrial Sector.

• It covers activities where raw materials are transformed into finished products through manufacturing, construction, and processing.

• Quaternary Sector:

• A specialized subset of the tertiary sector focusing on knowledge-based services.

• It includes Information Technology (IT), Research and Development (R&D), financial planning, and consultancy.

Q49. Answer: (d) High birth rates and declining death rates

The correct answer is High birth rates and declining death rates.

Key Points

• The second stage of the Demographic Transition Model (DTM) is known as the early expanding phase, where a country transitions from an agrarian economy toward industrialization.

• During this stage, birth rates remain high because social and cultural traditions, such as the preference for large families and the need for labor in farming, change very slowly.

• The death rate begins to fall sharply due to improvements in food security, basic hygiene, and public health measures like access to clean water and mass vaccinations.

• The resulting gap between the high fertility and rapidly falling mortality creates a high rate of natural increase, leading to a sudden and rapid increase in the total population.

• Historically, many developing nations entered this stage during the 20th century as they imported medical technology and agricultural techniques from more developed regions.

Additional Information

• Stage 1: High Stationary

• This stage is marked by high birth rates and high death rates due to famine, poor sanitation, and lack of medical knowledge, resulting in a stable but low total population.

• Stage 3: Late Expanding

• In this phase, birth rates start to decline as a result of urbanization, increased access to contraception, and higher education levels for women, while death rates continue to level off.

• Stage 4: Low Stationary

• Characterized by low birth rates and low death rates, reflecting a high level of economic development and modern lifestyle, leading to zero or very low population growth.

• Factors Driving Mortality Decline

• Key historical drivers include the Green Revolution which boosted crop yields and the discovery of antibiotics and antiseptics

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which drastically reduced infectious disease fatalities.

Q50. Answer: (a) Lucknow

The correct answer is Lucknow.

Key Points

• The Syed Modi India International Badminton Tournament is a prestigious annual event held in India and is a recognized part of the Badminton World Federation (BWF) calendar.

• For the 2025 season, the tournament is scheduled to be hosted in Lucknow, the capital city of Uttar Pradesh.

• The event is designated to take place from November 25 to November 30, 2025, at its traditional venue, the Babu Banarasi Das (BBD) Indoor Stadium.

• This tournament is classified as a BWF World Tour Super 300 event, which attracts elite international shuttlers and provides crucial ranking points for the global circuit.

Additional Information

• Tournament Legacy:

• The championship is named in memory of Syed Modi, an eight-time Indian National Badminton Champion and a 1982 Commonwealth Games gold medalist.

• Originally established in 1991, it was later upgraded to a Grand Prix Gold event in 2009 and finally became part of the BWF World Tour in 2018.

• BWF World Tour Hierarchy:

• The Super 300 category is part of Grade 2 of the BWF tournament structure, sitting below the Super 1000, Super 750, and Super 500 levels.

• In India, the India Open (held in New Delhi) is typically a higher-tier Super 750 event, while the Syed Modi International remains a key fixture in the Super 300 category.

• Venue Significance:

• The Babu Banarasi Das Indoor Stadium in Lucknow has been the primary host for this event for over a decade, establishing the city as a major badminton hub in Northern India.

Q51. Answer: (a) AI governance evaluation across countries

The correct answer is AI governance evaluation across countries.

Key Points

• The AGILE Index, which stands for Artificial Intelligence Governance International Landscape Evaluation, was launched in 2025 to provide a standardized framework for assessing how nations manage Artificial Intelligence.

• The primary objective of the index is to quantify and compare the regulatory maturity, ethical frameworks, and policy implementations of different countries regarding AI technologies.

• It evaluates nations based on several pillars, including safety protocols, data privacy protections, algorithmic transparency, and the balance between innovation and risk mitigation.

• By providing a global benchmark, the index helps international organizations and governments identify gaps in AI oversight and promotes the harmonization of global AI standards to prevent fragmented regulatory landscapes.

• The introduction of this index reflects the global shift toward responsible AI, ensuring that the rapid advancement of Generative AI and Autonomous Systems aligns with human rights and societal safety.

Additional Information

• Global Economic Competitiveness:

• Typically measured by the World Economic Forum (WEF) through the Global Competitiveness Report, focusing on productivity and long-term growth factors.

• Environmental Policy Performance:

• Assessed by the Environmental Performance Index (EPI), produced by Yale and Columbia University, which ranks countries on environmental health and ecosystem vitality.

• Digital Infrastructure Readiness:

• Evaluated by indices such as the Network Readiness Index (NRI) or the ITU Digital Development Index, measuring ICT access, usage, and skills.

Q52. Answer: (a) Han Kang

The correct answer is Han Kang.

Key Points

• On October 10, 2024, the Swedish Academy awarded the Nobel Prize in Literature to the South Korean author Han Kang.

• The committee cited her for her intense poetic prose that confronts historical traumas and exposes the fragility of human life.

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• She made history as the first South Korean writer and the first Asian woman to be awarded the Nobel Prize in Literature.

• The award recognizes her significant contribution to modern literature through a body of work that explores the connection between the body and soul.

• Her international breakthrough came with the novel 'The Vegetarian', which earned her the International Booker Prize in 2016.

Additional Information

• Han Kang:

• Born in 1970 in Gwangju, she began her literary career as a poet before transitioning to fiction.

• Notable works include 'Human Acts', which deals with the 1980 Gwangju Uprising, and 'The White Book', an introspective meditation on grief.

• She is the second South Korean to win a Nobel Prize, following former President Kim Dae-jung (Peace Prize, 2000).

• Haruki Murakami:

• A world-renowned Japanese novelist known for works like 'Kafka on the Shore' and 'Norwegian Wood'. He is a frequent favorite in Nobel speculations but did not win in 2024.

• Can Xue:

• An influential Chinese avant-garde writer recognized for her experimental and surrealist fiction. She was highly favored by bookmakers for the 2024 award.

• Gerald Murnane:

• A prominent Australian author known for his unique, self-reflective style in novels such as 'The Plains'.

Q53. Answer: (a) (s)

The correct answer is (s).

Key Points

• The reaction provided, Na2SO4(aq) + BaCl2(aq) → BaSO4(s) + 2NaCl(aq), is a classic example of a double displacement reaction.

• In this chemical process, the sodium (Na^+) and barium (Ba^(2+)) ions exchange their partners (sulfate and chloride ions) to form two new compounds.

• When aqueous solutions of sodium sulfate and barium chloride are mixed, a chemical change occurs that results in the formation of barium sulfate and sodium chloride.

• Barium sulfate (BaSO4) is highly insoluble in water. As soon as it is formed, it settles out of the solution as a white precipitate.

• In chemical notation, the physical state of a precipitate (a solid that forms from a liquid solution) is denoted by the symbol (s), which stands for solid.

• The other product, sodium chloride (NaCl), remains in the aqueous state (dissolved in water), which is why it is marked as (aq).

Additional Information

• Precipitation Reactions:

• These occur when two soluble ionic salts are mixed in an aqueous solution to produce an insoluble ionic compound.

• The solubility rules dictate that most sulfates are soluble, but barium sulfate is a notable exception, making it a common precipitate in analytical chemistry.

• Understanding State Symbols:

• (s) - Solid: Used for reactants or products that are in the solid phase, including precipitates.

• (l) - Liquid: Used for pure substances in a liquid state, such as H2O or molten metals.

• (g) - Gas: Used for substances that exist in the gaseous state at the reaction conditions, like CO2 or H2.

• (aq) - Aqueous: Derived from the Latin word aqua, it indicates that the substance is dissolved in water as a solvent.

• Double Displacement Characteristics:

• These reactions often result in the formation of a precipitate, a gas, or a neutral molecular compound like water (in neutralization reactions).

Q54. Answer: (c) Russia

The correct answer is Russia.

Key Points

• In December 2025, Russia officially extended a high-level proposal to India for the localised production of its Sukhoi Su-57 (NATO reporting name: Felon), which is a fifth-generation stealth multirole fighter.

• The offer was presented as part of a strategic push to deepen bilateral defense cooperation and aligns with India's Atmanirbhar Bharat (Self-Reliant India) and Make in India initiatives through a comprehensive Transfer of Technology (ToT).

• The Su-57 is Russia's first aircraft designed with stealth technology, featuring a low radar cross-section (RCS), supercruise capabilities (supersonic flight without afterburners), and highly integrated avionics.

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• This development is significant as it follows India's withdrawal from the Fifth Generation Fighter Aircraft (FGFA) program in 2018; the 2025 offer aims to provide a ready-to-produce platform to meet the Indian Air Force's (IAF) modernization requirements.

• The aircraft is equipped with the N036 Byelka AESA radar system and is capable of carrying a wide array of precision-guided munitions, including the BrahMos-NG air-launched cruise missiles.

Additional Information

• Russia:

• The Su-57 was developed by the Sukhoi Design Bureau to counter top-tier adversaries like the US F-22 Raptor and F-35 Lightning II.

• It features thrust vectoring for super-maneuverability, allowing it to perform complex aerial maneuvers that 4th-generation jets cannot replicate.

• Other Options Breakdown:

• France: Produces the Dassault Rafale, which is a 4.5-generation fighter. While a reliable partner, France does not currently have a fifth-generation stealth jet available for localized production in India.

• America: The United States offers the F-35 and F-15EX, but has traditionally maintained stricter controls on stealth technology transfers compared to the ToT offered by Russia.

• Japan: Collaborates on the Global Combat Air Programme (GCAP) for a sixth-generation jet but does not export stealth fighter production lines to South Asia.

Q55. Answer: (d) The President of India

The correct answer is The President of India.

Key Points

• According to Article 239 of the Constitution of India, every Union Territory shall be administered by the President of India acting through an administrator appointed by him.

• The administrator of a Union Territory is an agent of the President and is not a formal head of state like the Governor of a state; they exercise power only to the extent delegated by the President.

• The President has the authority to specify the designation of the administrator, which varies across different territories as Lieutenant Governor or Administrator.

• Under Article 239(2), the President can also appoint the Governor of an adjoining state as the administrator of a Union Territory, where the Governor exercises their functions independently of their state Council of Ministers.

Additional Information

• The Parliament of India:

• While the President appoints the administrator, it is the Parliament that holds the power under Article 3 to create a new Union Territory, alter boundaries, or change names through legislation.

• Parliament can also create a Legislature or a Council of Ministers for certain Union Territories like Puducherry under Article 239A.

• Administrative Designations:

• Lieutenant Governors: Appointed for Delhi, Puducherry, Andaman and Nicobar Islands, Jammu and Kashmir, and Ladakh.

• Administrators: Appointed for Chandigarh, Dadra and Nagar Haveli and Daman and Diu, and Lakshadweep.

• Special Provisions:

• Article 239AA provides special provisions for the National Capital Territory of Delhi, outlining the relationship between the Lieutenant Governor and the elected Legislative Assembly.

Q56. Answer: (a) System program counter

The correct answer is System program counter.

Key Points

• The Program Counter (PC), also known as the Instruction Pointer, is a dedicated CPU register that holds the memory address of the next instruction scheduled for execution.

• During the Fetch phase of the Instruction Cycle, the Control Unit (CU) refers to the System Program Counter to identify exactly where the upcoming instruction resides in the Main Memory (RAM).

• Once the Central Processing Unit (CPU) successfully retrieves the instruction from that specific address, the Program Counter is automatically incremented or updated to point to the next instruction in the sequence.

• In the event of Branching or Jump instructions, the Program Counter is modified to a non-sequential address, allowing the CPU to manage complex logic and loops within a program.

• This component is essential for maintaining the Execution Flow, ensuring that the processor knows its current position and the next step in the computational task.

Additional Information

• System Secondary Memory:

• Includes devices like Hard Disk Drives (HDD) and Solid State Drives (SSD) used for long-term storage.

• The CPU cannot fetch instructions directly from secondary storage because it is significantly slower than Primary Memory and is not part of the directly addressable execution space.

• System Input/Output Units:

• The Input Buffer Unit temporarily stores data arriving from external devices like keyboards or mice.

• The Output Register holds processed data intended for display or transmission to external peripherals like monitors or printers.

• Neither of these units participates in the Fetch-Decode-Execute cycle for internal program instructions.

• Instruction Register (IR):

• After the instruction is fetched using the address from the Program Counter, it is stored in the Instruction Register.

• The IR holds the actual opcode and operands while they are being decoded and prepared for execution.

Q57. Answer: (d) Sun Temple

The correct answer is Sun Temple.

Key Points

• The Sun Temple, situated in Konark, Odisha, is globally renowned for its unique architectural design as a massive chariot for the Sun God, Surya.

• Constructed in the mid-13th century (c. 1250 CE) by King Narasimhadeva I of the Eastern Ganga Dynasty, it is a masterpiece of the Kalinga style of architecture.

• The temple base features 24 stone wheels, each intricately carved and measuring approximately 9 feet 9 inches in diameter, symbolizing the 24 fortnights of the year or the hours in a day.

• The entire structure is designed to be pulled by seven stone horses, which represent the seven days of the week or the seven colors of the white light spectrum.

• Known as the Black Pagoda by early European sailors due to its dark magnetic roof, it was designated as a UNESCO World Heritage Site in 1984.

Additional Information

• Mukteshvara Temple:

• Located in Bhubaneswar and built in the 10th century, it is famous for its circular Torana (arched gateway) and is often called the Gem of Odisha Architecture.

• Lingaraja Temple:

• Dating back to the 11th century, it is the largest temple in Bhubaneswar and is dedicated to Lord Shiva (Harihara), representing the mature stage of Kalinga architecture.

• Jagannath Temple:

• Located in Puri and built in the 12th century, it is one of the Char Dham pilgrimage sites and is famous for its Rath Yatra (Chariot Festival).

Q58. Answer: (c) boosting manufacturing and job creation

The correct answer is boosting manufacturing and job creation.

Key Points

• Launched on September 25, 2014, by the Prime Minister of India, the Make in India initiative is a major national program designed to facilitate investment, foster innovation, and build best-in-class manufacturing infrastructure.

• The primary objective of the initiative is to transform India into a prominent global manufacturing hub by encouraging both domestic and foreign companies to manufacture their products within the country.

• It specifically aims to increase the manufacturing sectors contribution to the Gross Domestic Product (GDP) to 25% by 2025, up from approximately 16% at the time of launch.

• The program is built on four pillars: New Processes, New Infrastructure, New Sectors, and New Mindset, which collectively aim to improve the Ease of Doing Business in India.

• A critical target of the Make in India campaign is the creation of 100 million additional manufacturing jobs in the economy by 2022 (later extended), focusing on labor-intensive sectors to absorb the growing workforce.

Additional Information

• Targeted Sectors:

• The initiative initially identified 25 sectors of the economy for rejuvenation, including Automobiles, Aviation, Chemicals, IT & BPM, Pharmaceuticals, Renewable Energy, and Textiles.

• The Department for Promotion of Industry and Internal Trade (DPIIT) coordinates the program, ensuring that Foreign Direct Investment (FDI) policies are liberalized across these sectors.

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• Zero Defect Zero Effect:

• This slogan was introduced to ensure that manufactured goods have zero defects (high quality) and zero effect on the environment (sustainability).

• Related Concepts:

• Promoting agricultural exports: While vital for the economy, this falls under the Agriculture Export Policy and the APEDA framework rather than the manufacturing focus of this specific initiative.

• Enhancing tourism: This is addressed through schemes like Swadesh Darshan and PRASHAD, although tourism is a service sector identified for support.

• Improving healthcare facilities: This is the domain of the National Health Mission and Ayushman Bharat, focusing on social infrastructure rather than industrial manufacturing.

Q59. Answer: (c) Debendra Nath Tagore

The correct answer is Debendra Nath Tagore.

Key Points

• Raja Ram Mohan Roy established the Brahmo Sabha in 1828, which was later renamed the Brahmo Samaj, to advocate for monotheism and social reforms like the abolition of Sati.

• Following the death of Raja Ram Mohan Roy in 1833 in Bristol, the movement went through a period of decline and lacked a formal leadership structure for nearly a decade.

• Debendranath Tagore, the son of Dwarkanath Tagore, formally joined the Brahmo Samaj in 1842 and is credited with revitalizing the organization and providing it with a definite systematic shape.

• Before joining the Samaj, Debendranath Tagore had founded the Tattvabodhini Sabha in 1839, which focused on the systematic study of India's past and the propagation of Vedantic ideas.

• He merged the Tattvabodhini Sabha with the Brahmo Samaj and introduced the Brahmo Covenant, a set of solemn vows to ensure a disciplined religious life for its members.

• Under his leadership, the Brahmo Samaj became a powerful force for socio-religious reform in Bengal, supporting education and opposing idol worship.

Additional Information

• Dwarkanath Tagore:

• He was a prominent industrialist, entrepreneur, and a close associate of Raja Ram Mohan Roy.

• While he provided financial and moral support to the Brahmo Samaj after Roy's death, he did not assume the spiritual leadership of the movement.

• Keshub Chandra Sen:

• He joined the Brahmo Samaj in 1857 under the influence of Debendranath Tagore.

• He later split from the main body in 1866 due to ideological differences regarding radical social reforms, forming the Brahmo Samaj of India.

• Swami Vivekananda:

• Born as Narendranath Datta, he was the chief disciple of Ramakrishna Paramahansa.

• He founded the Ramakrishna Mission in 1897 and is famous for his speech at the World Parliament of Religions in Chicago in 1893.

Q60. Answer: (b) Hibernate, because it saves the entire system state to the hard disk and powers down completely.

The correct answer is Hibernate, because it saves the entire system state to the hard disk and powers down completely..

Key Points

• Hibernate mode is specifically designed for laptops and mobile devices to preserve the operating state without consuming any electrical power from the battery.

• When a computer enters this state, it takes all the information currently stored in the Random Access Memory (RAM) and writes it into a hidden system file on the Hard Disk Drive (HDD) or Solid State Drive (SSD) known as hiberfil.sys.

• Since the data is stored on non-volatile storage (the disk) rather than volatile memory (RAM), the system can safely power down completely, achieving zero battery consumption over long periods like a weekend.

• Upon restarting the device, the Windows Boot Manager retrieves the saved state from the disk and loads it back into RAM, allowing the user to resume their exact work session with all open applications and files intact.

Additional Information

• Power Management Modes:

• Sleep (Standby): Keeps the session in RAM and uses a small amount of power. It allows for an almost instant resume, but if the battery dies, any unsaved work is lost.

• Hybrid Sleep: Primarily used for Desktop PCs, it saves the session to both RAM and the hard disk. It uses power to keep the

RAM active but provides a backup on the disk in case of a power failure.

• Shut Down: Completely closes all software programs, clears the RAM, and turns off the hardware. It does not save the user session or open files.

• Fast Startup: A feature in Windows 10 and 11 that combines Hibernate and Shut Down to decrease boot time by saving the OS kernel state to the disk while closing user applications.

Q61. Answer: (d) Low resistivity

The correct answer is Low resistivity.

Key Points

• Electrical conductors are substances that facilitate the easy movement of electric charges (primarily electrons) through them when an external electric field is applied.

• The fundamental property that defines a good conductor is low resistivity (represented by the Greek letter ρ), which implies that the material offers minimal opposition to the flow of electric current.

• Resistivity is the intrinsic property of a material that quantifies how strongly it resists electric current; for conductors like Silver, Copper, and Aluminum, this value is extremely small, typically ranging from 10^(−8) Ω?m to 10^(−6) Ω?m.

• According to Ohm's Law, the resistance of a conductor is directly proportional to its resistivity; therefore, a material with low resistivity will have low resistance, allowing a higher current to flow for a given potential difference.

• The electrical conductivity (σ) is the reciprocal of resistivity (σ = 1/ρ); hence, conductors characterized by low resistivity possess high electrical conductivity.

Additional Information

• High resistivity:

• This is a characteristic feature of insulators such as glass, rubber, and ebonite.

• These materials have very few free electrons, preventing the flow of charge and resulting in resistivity values often exceeding 10^{12} Ω?m.

• No resistivity:

• This state is achieved by superconductors when they are cooled below a specific critical temperature.

• In this state, the material exhibits zero electrical resistance and expels magnetic fields (the Meissner effect).

• Factors affecting Resistivity:

• Resistivity is not constant for all conditions; it depends on the nature of the material and its temperature.

• For metallic conductors, resistivity typically increases with an increase in temperature due to increased collisions between electrons and lattice ions.

Q62. Answer: (c) Odissi

The correct answer is Odissi.

Key Points

• Aruna Mohanty is a pre-eminent practitioner, choreographer, and teacher of the Odissi classical dance form.

• She was conferred with the Padma Shri, India's fourth-highest civilian honor, in the year 2017 for her immense contribution to the field of Art-Dance.

• She has served as the Secretary of the Odisha Sangeet Natak Akademi and has been instrumental in organizing various national and international dance festivals.

• Her artistic style was shaped under the guidance of legendary doyens like Guru Pankaj Charan Das, Guru Kelucharan Mohapatra, and Guru Gangadhar Pradhan.

• In addition to the Padma Shri, she received the Sangeet Natak Akademi Award in 2010 and the Mahari Award for her excellence in choreography and performance.

• She is known for incorporating contemporary social themes and historical narratives into the traditional framework of Odissi, making the art form accessible to modern audiences.

Additional Information

• Odissi:

• Origin: Developed in the temples of Odisha, primarily through the Mahari and Gotipua traditions.

• Features: Characterized by the Tribhanga posture (three-fold bend of the body) and the Chauka (square) stance.

• Bharatanatyam:

• Origin: Traced back to Tamil Nadu and the Sadir dance performed by Devadasis.

• Features: Known for its fixed upper torso, bent legs, and complex Mudras (hand gestures).

• Manipuri:

• Origin: Hails from the state of Manipur in Northeast India.

• Features: Focuses on the Raaslila of Radha-Krishna and is distinguished by its fluid, gentle movements and the Potloi (barrel-shaped skirt).

• Kathakali:

• Origin: A highly stylized dance-drama that originated in Kerala.

• Features: Famous for its Vesham (elaborate makeup), large costumes, and the use of facial expressions and eye movements to convey stories from Hindu epics.

Q63. Answer: (b) 10-tonne Vertical Planetary Mixer

The correct answer is 10-tonne Vertical Planetary Mixer.

Key Points

• In February 2025, the Indian Space Research Organisation (ISRO) commissioned a state-of-the-art 10-tonne Vertical Planetary Mixer at the Solid Propellant Rocket Booster Plant (SPROB) located in SDSC SHAR, Sriharikota.

• This facility is a first-of-its-kind indigenous development in India, designed to handle the massive production requirements of solid propellants for heavy-lift launch vehicles.

• The mixer is specifically engineered to process large batches of composite solid propellants, which are the primary fuel source for boosters like the S200 and the human-rated HS200 used in the Gaganyaan mission.

• The induction of this high-capacity mixer significantly enhances ISRO's self-reliance in manufacturing large-scale rocket motors, reducing the time required for propellant casting and ensuring high homogeneity in the fuel mix.

Additional Information

• Vertical Planetary Mixer Technology:

• This technology utilizes two or more blades that rotate on their own axes while simultaneously orbiting a common center, mimicking a planetary motion.

• This complex movement is essential for mixing high-viscosity materials like HTPB-based propellants (Hydroxyl-terminated polybutadiene) without creating air bubbles or localized hot spots, which could cause accidental ignition.

• Mission Support:

• The facility is critical for the LVM3 (Launch Vehicle Mark 3) and the upcoming Next Generation Launch Vehicle (NGLV) projects.

• By increasing the batch size to 10 tonnes, ISRO can achieve better consistency across the entire propellant grain of massive boosters, which is vital for the stability and safety of spaceflights.

• Strategic Growth:

• The commissioning of this plant aligns with the Atmanirbhar Bharat initiative, showcasing India's capability to build sophisticated industrial machinery for the aerospace sector.

Q64. Answer: (d) Ravi river

The correct answer is Ravi river.

Key Points

• The Ravi river originates in the Bara Bhangal region of the Kangra district, specifically in the Kullu hills of Himachal Pradesh.

• It rises to the west of the Rohtang Pass and flows in a north-westerly direction through the Chamba valley before leaving the mountains at Madhopur.

• Geographically, the river drains the area situated between the Pir Panjal range to the north and the Dhauladhar range to the south.

• The river is historically known as the Iravati or Purushni in Vedic texts and is one of the five major rivers of the Punjab region.

• Its major tributaries in Himachal Pradesh include the Budhil, Nai, Seul, Baira, and Tant Gari, which are fed by perennial glaciers.

Additional Information

• Chenab river:

• Formed by the confluence of the Chandra and Bhaga rivers at Tandi in the Lahaul valley.

• It flows through the Pangi valley in Himachal Pradesh and is the largest river in the state by volume of water.

• Beas river:

• Originates from the Beas Kund near the Rohtang Pass at the southern end of the Pir Panjal range.

• It flows through the Kullu and Kangra valleys and meets the Sutlej river at Harike in Punjab.

• Jhelum river:

• Rises from a deep spring at Verinag, situated at the foot of the Pir Panjal in the Kashmir Valley.

• It is a major tributary of the Indus system but does not originate in Himachal Pradesh.

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Q65. Answer: (a) Chhattisgarh

The correct answer is Chhattisgarh.

Key Points

• The Bastar Olympics is a landmark sports initiative launched by the Government of Chhattisgarh to foster peace, development, and athletic excellence in the insurgency-affected regions of the state.

• The event was specifically designed for the youth of the Bastar Division, covering seven key districts: Kanker, Kondagaon, Bastar, Dantewada, Sukma, Narayanpur, and Bijapur.

• Initiated under the leadership of Chief Minister Vishnu Deo Sai, the primary objective of the Bastar Olympics 2025 is to steer the local tribal youth away from the influence of Left-Wing Extremism (LWE) and integrate them into the social mainstream through sports.

• The tournament structure includes competitions at the village, block, and district levels, culminating in a massive divisional-level championship to identify grassroots talent in various sporting disciplines.

• Participants compete in a wide range of sports, including Archery, Athletics, Kabaddi, Kho-Kho, Volleyball, and Football, highlighting the physical prowess of the tribal community.

Additional Information

• Strategic Significance:

• The Chhattisgarh Government utilizes these games as a part of its surrender and rehabilitation policy, encouraging youth from sensitive areas to pick up sports equipment instead of weapons.

• The event aims to bridge the trust gap between the tribal population and the state administration by promoting positive engagement and community spirit.

• Bastar Division Facts:

• Geographically, Bastar is one of the most resource-rich yet underdeveloped regions in India due to decades of conflict.

• The region is famous for its 75-day long Bastar Dussehra, the longest festival in the world, reflecting the deep-rooted Adivasi traditions of the state.

• Sports Welfare:

• The Department of Sports and Youth Welfare provides special kits, coaching, and nutrition support to the participants to ensure professional standards are met during the games.

Q66. Answer: (b) Red Bull Racing

The correct answer is Red Bull Racing.

Key Points

• The United States Grand Prix, held in October 2025 at the Circuit of the Americas (COTA) in Austin, Texas, was a pivotal race in the 2025 FIA Formula One World Championship.

• Max Verstappen, the Dutch racing driver, secured a dominant victory in this race while competing for Oracle Red Bull Racing, continuing his long-standing partnership with the team that began in 2016.

• This victory contributed to Red Bull Racing maintains its status as a top-tier constructor, utilizing the Honda RBPT (Red Bull Powertrains) engine and advanced aerodynamics designed under the technical direction of the team.

• Verstappen's performance in the 2025 season was characterized by high reliability and pace, allowing him to defend his title against strong competition from McLaren and Ferrari drivers.

Additional Information

• Ferrari

• Headquartered in Maranello, Italy, this team is the most historic and successful in the sport's history.

• In the 2025 season, the team featured a high-profile lineup including Lewis Hamilton and Charles Leclerc, who were the primary challengers to Red Bull in several races.

• McLaren

• A British constructor based in Woking, which experienced a massive resurgence in competitive form during the 2024 and 2025 seasons.

• The team utilized Mercedes-AMG power units and relied on the talented duo of Lando Norris and Oscar Piastri.

• Racing Bulls (RB)

• Formerly known as Scuderia AlphaTauri and Toro Rosso, this Italian-based team serves as the sister outfit to Red Bull Racing.

• Its primary role is to develop young drivers from the Red Bull Junior Team program for potential promotion to the senior team.

Q67. Answer: (a) Calcutta Cup

The correct answer is Calcutta Cup.

Key Points

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• The Calcutta Cup is the oldest international rugby trophy, contested annually during the Six Nations Championship specifically between the national teams of England and Scotland.

• The trophy originated in 1878 after the Calcutta Football Club in India was forced to disband; the members decided to melt down the club's remaining 60,000 silver rupees to create a lasting memorial.

• The silver was crafted into an ornate cup featuring three King Cobra handles and a lid topped with an Indian elephant, which was then gifted to the Rugby Football Union (RFU).

• The inaugural match for the trophy took place on March 10, 1879, at Raeburn Place in Edinburgh, ending in a draw, meaning the trophy was not officially awarded until the following year.

• In the 2025 Six Nations Championship, the two teams will continue this long-standing tradition, which remains one of the most intense rivalries in world rugby.

Additional Information

• Millennium Trophy:

• This trophy is contested within the Six Nations specifically between England and Ireland.

• It was first presented in 1988 to celebrate the millennium anniversary of the city of Dublin.

• Triple Crown Trophy:

• The Triple Crown is an honor awarded when one of the four Home Nations (England, Scotland, Wales, and Ireland) defeats the other three during a single season.

• While the concept has existed since the 19th century, a physical silver trophy was commissioned and first awarded in 2006.

• European Nations Trophy:

• Historically, this referred to the Rugby Europe Championship, which serves as the tier below the Six Nations for emerging European rugby nations.

Q68. Answer: (b) Rekha Gupta

The correct answer is Rekha Gupta.

Key Points

• The Bharatiya Janata Party (BJP) secured a majority in the Delhi Legislative Assembly elections held in February 2025, reclaiming governance of the National Capital Territory (NCT).

• This electoral victory marked the BJP's return to power in Delhi after a 27-year hiatus; the party had last held the administration in 1998 under Chief Ministers such as Madan Lal Khurana, Sahib Singh Verma, and Sushma Swaraj.

• Rekha Gupta, a prominent woman leader of the Delhi BJP and a former three-time councilor from Shalimar Bagh, was elected as the leader of the legislative party and sworn in as the Chief Minister.

• Her elevation was seen as a strategic move to focus on urban infrastructure and local governance, leveraging her extensive experience as a member of the Standing Committee of the Municipal Corporation of Delhi (MCD).

• The election results reflected a significant transition in the political landscape of the capital, ending the decade-long tenure of the Aam Aadmi Party (AAP).

Additional Information

• Atishi Marlena:

• A senior leader of the Aam Aadmi Party, she served as a Cabinet Minister in the previous Delhi government, managing critical portfolios like Education, Finance, and Public Works Department (PWD).

• Manish Sisodia:

• The former Deputy Chief Minister of Delhi and a founding member of AAP, he is widely credited with the reforms in the Delhi government school system and served as the MLA for Patparganj.

• Parvesh Verma:

• A high-profile BJP leader and former Member of Parliament from the West Delhi constituency; he is the son of the former Delhi Chief Minister Sahib Singh Verma and played a key role in the 2025 campaign.

Q69. Answer: (c) Cache Memory

The correct answer is Cache Memory.

Key Points

• Cache Memory is a high-speed, volatile SRAM (Static Random Access Memory) buffer located directly on or very close to the Central Processing Unit (CPU) chip to facilitate rapid data retrieval.

• Its primary objective is to bridge the speed gap between the high-speed Processor and the relatively slower Main Memory (DRAM) by storing copies of the most frequently used data and instructions.

• When the CPU requires data, it initiates a Cache Look-up; if the data is present (a Cache Hit), it is processed nearly instantly, whereas a Cache Miss forces the system to fetch data from RAM, which takes significantly more clock cycles.

• Modern systems utilize a Memory Hierarchy consisting of L1 (fastest, smallest, per core), L2 (intermediate speed/size), and L3

(largest, shared across cores) caches to optimize Instruction Throughput and reduce Latency.

Additional Information

• Address Decoder:

• It is a combinational logic circuit that identifies specific Memory Locations or Registers based on the binary address provided by the CPU.

• While it is crucial for routing data during Read/Write Operations, it does not function as a storage medium or a speed-enhancing buffer.

• Instruction Set:

• Also known as Instruction Set Architecture (ISA), it represents the collection of basic commands (like MOV, ADD, or HLT) that a processor is designed to understand.

• Common architectures include x86 (CISC) and ARM (RISC), defining how software communicates with the hardware.

• CPU Fan:

• An active cooling component that prevents Thermal Throttling by dissipating heat generated by the Transistors.

• It ensures the Processor remains within safe Operating Temperatures but does not interact with the data-loading logic or memory cycles.

Q70. Answer: (b) P waves

The correct answer is P waves.

Key Points

• P waves, also known as Primary waves, are the fastest of all seismic waves and are the first to be recorded by a seismograph after an earthquake occurs.

• These waves are longitudinal or compressional in nature, meaning the particles of the medium vibrate in the same direction as the wave propagation, creating a push-pull effect.

• A defining characteristic of P waves is their ability to travel through all states of matter, including solids, liquids, and gases; this allows them to pass through the Earth's mantle as well as the liquid outer core.

• The velocity of these waves depends on the compressibility and density of the material they pass through, typically traveling at speeds between 1.5 to 8 kilometers per second in the Earth's crust.

Additional Information

• S waves:

• Also called Secondary waves or shear waves, these are slower than P waves and arrive second at seismic stations.

• They move particles up and down or side-to-side, perpendicular to the direction of wave travel, and can only propagate through solid materials.

• Their inability to travel through the liquid outer core provided the first scientific evidence that the Earth has a liquid layer.

• Surface waves:

• These waves travel strictly along the Earth's surface rather than through its deep interior and are responsible for the most severe structural damage during an earthquake.

• Rayleigh waves are a type of surface wave that moves the ground in an elliptical motion, similar to ocean waves.

• Love waves are another type of surface wave that causes horizontal shifting of the Earth's crust.

Q71. Answer: (a) Five

Given: Seven boxes M, N, O, P, X, Y and Z are kept one over the other but not necessarily in the same order.

1. Y is kept 2nd from the bottom.

2. X is kept at one of the positions below Y.

3. Only three boxes are kept between Y and O.

Position	Box
7	
6	O
5	
4	
3	
2	Y

1	X

1. Only N is kept between O and P.

2. M is kept at one of the positions above O.

Final Arrangement:

7	**M**
6	O
5	N
4	P
3	Z
2	Y
1	X

The boxes kept between X and M are Y, Z, P, N, and O.

Thus, five boxes are kept between X and M.

Hence, the correct answer is 'Option 1'.

Q72. Answer: (d) UPT53

The logic follows here.

Hence, the correct answer is "Option 4"

Q73. Answer: (b) Brother

Family Chart:

Symbol	**×**	**=**	**•**	**−**
Meaning	Son	Brother	Wife	Father

Given: S = W × R + T − Z

From the above family tree, it is clear that T and R are the parents of S, W, and Z. Since S is male and a sibling of Z, S is the brother of Z.

Hence, the correct answer is "Option 2".

Q74. Answer: (d) Two

Given number: 5718624

According to the given condition, if 2 is added to each odd digit and 1 is subtracted from each even digit,

So, there are two such digits (7 and 3) that appear more than once.

Hence, the correct answer is 'Option 4'.

Q75. Answer: (d) F

The logic follows here,

R	**E**	**A**	**D**	**I**	**N**	**G**
(−1)	(+1)	(+1)	(−1)	(+1)	(−1)	(−1)
Q	F	B	C	J	M	F

The new group of letters formed is Q, F, B, C, J, M, F.

The letter F appears exactly twice in the group.

Hence, the correct answer is "option 4"

Q76. Answer: (a) Three

Given number: 63145729

According to the given condition, if 2 is added to each even digit and 1 is subtracted from each odd digit in the number

Three digits will appear more than once in the new number, thus formed is 8,6 and 4.

Hence, the correct answer is 'Option 1'.

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Q77. Answer: (b) South-west

Given:

• Town G is to the west of Town H.

• Town I is to the north of Town G.

• Town J is to the east of Town I.

• Town K is to the south of Town J.

• Town H is to the north-east of Town K

The Final Diagram is,

Therefore, Town G is to the South-west of Town J.

Hence, the correct answer is "option 2"

Q78. Answer: (c) Only conclusion (I) follows

The least possible Venn diagram for the given statements is:

Conclusion

(I) Some dongles are phones - Follow (All phone are dongles. Some dongles are phones, and some phone are dongles. Hence, it is true)

(II) All phones are routers - Does not Follow (All routers are phone but all phone are routers is may be possible but not definite. Hence, it is false)

Only conclusion (I) follows.

Hence, the correct answer is "Option 3"

Q79. Answer: (a) Mother's sister

Family Chart:

Let us first decode the given symbols and then draw a family tree.

Symbol	×	≠	÷	Rs.
Meaning	Mother	Wife	Daughter	Father

Given: C ÷ D ≠ E Rs. L × M

Therefore, C is the sister of L, who is the mother of M. C is the mother's sister of M.

Hence, the correct answer is "Option 1".

Q80. Answer: (c) JT 5

The logic follows here,

Hence, the correct answer is 'Option 3'.

Q81. Answer: (a) IFM 56

The logic follows here,

The next term is "IFM 56".

Hence, the correct answer is "option 1".

Q82. Answer: (a) NJK

The logic follows,

NJK,

VRT,

TPR,

PLN,

Therefore, the letter cluster that is different from the others is NJK.

Hence, the correct answer is "Option 1".

Q83. Answer: (a) 2

The logic follows here,

Therefore, the letter M corresponds to the digit 2.

Hence, the correct answer is "option 1"

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Q84. Answer: (b) 106

The logic follows here,
Position of Tus from the top = 51^(st)
Position of Tus from the bottom = 56^(th)
Total number of students in the class = (Position from the top + Position from the bottom) − 1
= (51 + 56) − 1
= 107 − 1
= 106
Hence, the correct answer is 'Option 2'.

Q85. Answer: (c) TONG - ONTG - GNOT

The logic follows here,
For 'SAID - AISD - DIAS':
For 'MODE - ODME - EDOM':
Applying Same logic
'TONG - ONTG - GNOT':
Thus, TONG - ONTG - GNOT follows the correct logic.
Hence, the correct answer is 'Option 3'.

Q86. Answer: (b) 143

The logic follows here,
• 38 + 17 = 55
• 55 + 19 = 74
• 74 + 21 = 95
• 95 + 23 = 118
• 118 + 25 = 143
Pattern: +17, +19, +21, +23, +25 (consecutive odd numbers)
Thus, the missing term in the series is 143.
Hence, the correct answer is 'Option 2';

Q87. Answer: (d) Only conclusion (II) follows

The least possible Venn diagram for the given statements is:
(I) Some fans are buses - Does not Follow
There is no direct relation between fans and buses; maybe it is possible but not definite. Hence, it is false.
(II) Some cars are fans - Follow (Some fans are cars. Some cars are fans)
Therefore, only conclusion (II) follows.
Hence, the correct answer is "Option 4"

Q88. Answer: (b) FSM

The logic follows here,
Combining the letters, we get the term FSM.
Hence, the correct answer is "option 2"

Q89. Answer: (a) ON 2

The logic follows here,
Applying same logic,
Hence, the correct answer is 'Option 1'.

Q90. Answer: (a) XU-SY

The logic follows here,
XU-SY,
OL-JQ,
UR-PW,
RO-MT,

Therefore, the letter-cluster pair that is different from the others is XU-SY.

Hence, the correct answer is "Option 1."

Q91. Answer: (d) 66

The logic follows here,

Logic: The code for a word is determined by summing the positional values of its letters and then adding a constant number 11 to the sum.

For EUOA

• Sum of positional values = 5 + 21 + 15 + 1 = 42

• Code = 42 + 11 = 53

YFMP

• Sum of positional values = 25 + 6 + 13 + 16 = 60

• Code = 60 + 11 = 71

RIZB

• Sum of positional values = 18 + 9 + 26 + 2 = 55

• Code = 55 + 11 = 66

• The correct answer is "option 4"

Q92. Answer: (d) Second to the right

Given: Six people, A, B, P, Q, C, and D, are sitting in a straight line. They all are facing north.

• P is sitting immediately between Q and D.

• D is sitting third to the left of B.

• A sits second to the right of P.

The final arrangement is,

Hence, the correct answer is “Option 4”.

Q93. Answer: (a) Two

Given:Seven boxes B, C, D, E, Q, R and S are kept one over the other but not necessarily in the same order

1. Only one box is kept above R.

2. Only two boxes are kept between R and S.

3. Only three boxes are kept between D and S.

Position	Box
7	D
6	R
5	
4	
3	S
2	
1	

1. Only Q is kept below C.

2. B is not kept immediately above S.

Final Arrangement:

7	D
6	R
5	B
4	E
3	S
2	C

1	Q

The boxes kept between E and Q are S and C. So, there are two boxes between E and Q.

Hence, the correct answer is "Option 1".

Q94. Answer: (d) 427

BODMAS Table:

conversion of symbols

Original Sign	Meaning
•	−
−	×
×	÷
÷	•

Given equation: 322 × 23 − 14 ÷ 463 + 232 = ?

After replacing the signs,using BODMAS rule

= 322 ÷ 23 × 14 + 463 − 232

= 14 × 14 + 463 − 232

= 196 + 463 − 232

= 659 − 232

= 427

Hence, the correct answer is "Option 4."

Q95. Answer: (c) LNI

The logic follows here,

Logic: The second letter is obtained by adding 1 to the first letter, and the third letter is obtained by subtracting 4 from the second letter.

For BCY

For FGC

For NOK

For LNI,

The odd one is LNI

Hence, the correct answer is "option 3"

Q96. Answer: (d) Two

Given: U L Y M R D E L C D A E H R O H F X L D W H

Required Conditions: Consonant, Vowels, Consonant

Left U L Y M R D E L C D A E H R O H F X L D W H Right

There are a total of two such vowels in the given series. Hence, the correct answer is "Option 4."

Q97. Answer: (c) Four

The logic follows here,

Given: Each vowel in the word WORTHLESSLY is changed to the second letter following it in the English alphabetical order AND each consonant is changed to the letter immediately preceding it in the English alphabetical order

W	O	R	T	H	L	E	S	S	L	Y
−1	+2	−1	−1	−1	−1	+2	−1	−1	−1	−1
V	Q	Q	S	G	K	G	R	R	K	X

The letters formed in the group are: V, Q, Q, S, G, K, G, R, R, K, X

The letters that appear exactly twice are Q, G, K, and R.

Total number of letters appearing exactly twice = 4.

Hence, the correct answer is "option 3"

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Q98. Answer: (a) (113, 178, 65)

The logic followed here is:

Logic: Second Number − First Number = Third Number

For (163, 186, 23)

=> 186 − 163 = 23

For (144, 200, 56)

=> 200 − 144 = 56

Applying the same logic to the options:

For (113, 178, 65)

=> 178 − 113 = 65

Hence, the correct answer is "Option 1".

Q99. Answer: (a) None

Given: Seven people H, I, J, K, W, Y and Z are sitting in a row facing north

• Only J sits to the left of W.

• Only four people sit between J and Y.

• Only I sits between K and H and K is not an immediate neighbor of Y

The Final Arrangement is,

No one sits to the right of Z.

Hence, the correct answer is "option 1"

Q100. Answer: (a) 99

The logic follows here,

• $90 + 1^3 = 91$

• $91 + 2^3 = 99$

• $99 + 3^3 = 126$

• $126 + 4^3 = 190$

• $190 + 5^3 = 315$

The term that should come in place of the question mark (?) in the series is 99.

Hence, the correct answer is "option 1"

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