RRB NTPC (Graduate) CBT-I Official Paper (Held On: 18 Mar, 2026 Shift 3) (Previous Year Paper)

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

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Q1. If angle P, angle Q, angle R and angle S of a quadrilateral PQRS, taken in order, are in the ratio 4:3:7:6, then quadrilateral PQRS will be of which type?

(a) Trapezium
(b) Kite
(c) Rhombus
(d) Parallelogram

Q2. Why is the Paika Rebellion of Odisha regarded as distinct among early anti-colonial uprisings in terms of the social background and traditional functions of its participants?

(a) It depended on support from foreign mercenary forces
(b) It was organised by large zamindars seeking revenue concessions
(c) It was driven mainly by urban craft guilds and traders
(d) It was led by hereditary militia with local administrative roles

Q3. In which year was the world's first commercial microprocessor, the Intel 4004, launched?

(a) 1960
(b) 1985
(c) 1971
(d) 1945

Q4. Which of the following rulers built Tughlaqabad Fort in 1321?

(a) Ghiyasuddin Tughlaq
(b) Alauddin Khalji
(c) Muhammad bin Tughlaq
(d) Firoz Shah Tughlaq

Q5. Why did the Supreme Court consider mining activities near national parks and sanctuaries hazardous according to the November 13, 2025 order?

(a) Because they create water sources
(b) Because they increase tourism
(c) Because they are dangerous to wildlife
(d) Because they boost local economy

Q6. Find the maximum value of the quadratic expression $Ax^2 + Bx + C = 0$, where $A < 0$.

(a) $(4AC - B^2)/4$
(b) $(AC - B^2)/4A$
(c) $(4AC - B^2)/4A$
(d) $(B^2 - AC)/4A$

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Q7. Which of the following scientists proposed the nuclear model of the atom based on the results of the gold foil experiment?

(a) J.J. Thomson
(b) Niels Bohr
(c) John Dalton
(d) Ernest Rutherford

Q8. 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 its constituent digits. E.g. 13 – Operations on 13 such as adding / subtracting /multiplying etc. to 13 can be performed. Breaking down 13 into 1 and 3 and then performing mathematical operations on 1 and 3 is not allowed)

(21, 52, 5)

(45, 138, 24)

(a) (41, 117, 18)
(b) (11, 39, 9)
(c) (17, 55, 11)
(d) (36, 74, 1)

Q9. A user mistakenly turns on the overwrite mode and each new letter replaces the old one in a line. Which key is responsible for toggling between the insert mode and the overwrite mode?

(a) Tab
(b) Del
(c) Ins
(d) F5

Q10. GLOW is related to KQRY in a certain way based on the English alphabetical order. In the same way, OVUA is related to SAXC. To which of the following is WFAE related, following the same logic?

(a) ZLEF
(b) AKDG
(c) CKEG
(d) BLCH

Q11. Below are given two sets of numbers. In each set of numbers, a certain mathematical operation on the first number results in the second number. Similarly, a certain mathematical operation on the second number results in the third number, and so on. Which of the given options follows the same set of operations as in the question?

(NOTE: A two-/three-digit number cannot be broken into individual digits for operations, e.g. if 37 is followed by 10, the operation cannot be 3 + 7, as a two-digit number cannot be broken into individual digits.)

3 – 6 – 7 – 14 ; 12 – 24 – 25 – 50

(a) 11 – 22 – 21 – 42
(b) 25 – 50 – 25 – 35
(c) 15 – 30 – 60 – 62
(d) 20 – 40 – 41 – 82

Q12. If $a = 7+4\sqrt{3}$, then evaluate $(a^3 + 1/(a^3))$

(a) $-1560\sqrt{3}$
(b) 2702
(c) -2702
(d) $1560\sqrt{3}$

Q13. Each of A, B, C, D, E and F has a badminton match on a different day of a week starting from Monday and ending on Saturday of the same week. C has match on Friday. Only three people have matches between C and F. D has match immediately after E but immediately before B. On which day of the week does E have the match?

(a) Monday
(b) Wednesday
(c) Thursday

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(d) Tuesday

Q14. If 7 : 63 :: 6.5 : x and 7 : 42 :: 4 : y, then what is the ratio of x to y?

(a) 39 : 16
(b) 43 : 26
(c) 40 : 14
(d) 37 : 17

Q15. Which of the given letter-number clusters will replace the question mark (?) in the following series to make it logically complete?

TRZ 2 RPX 5 PNV 8 NLT 11 ?

(a) MCA 15
(b) AFU 14
(c) KDY 15
(d) LJR 14

Q16. 63 is related to 159 following a certain logic. Following the same logic, 44 is related to 102. To which of the following is 57 related, following the same logic?

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

(a) 127
(b) 141
(c) 139
(d) 152

Q17. Identify the southernmost atomic/nuclear power station of India from the following options.

(a) Kakrapar Atomic Power Station
(b) Narora Atomic Power Station
(c) Madras Atomic Power Station
(d) Kudankulam Nuclear Power Station

Q18. In an election between two candidates, 80% of the registered voters cast their vote and 20% of the votes polled were found invalid. Winning candidate got 55% of the valid votes and won the election by a margin of 368 votes. How many voters were registered?

(a) 5747
(b) 5749
(c) 5751
(d) 5750

Q19. A, B, C, D, E, F and G sit around a circular table, facing the centre.

Only one person sits between D and B when counted from the left of B. F sits third to the right of E. C sits third to the left of G. F sits to the immediate right of C. A is not an immediate neighbour of C.

How many people sit between A and C when counted from the left of A?

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

Q20. What is the maximum value that must be assigned to A so that the 8-digit number 713A8845 is divisible by 3?

(a) 9
(b) 8
(c) 6
(d) 7

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Q21. On November 20, 2025, India signed the Terms of Reference (ToR) to initiate negotiations for a comprehensive Free Trade Agreement with which country?

(a) Canada
(b) Israel
(c) Australia
(d) United Arab Emirates

Q22. Who was popularly known as the 'Payyoli Express' in Indian sports history?

(a) Leander Paes
(b) PT Usha
(c) Sania Mirza
(d) Shoaib Akhtar

Q23. Which of the following options is closest to the speed of sound in air?

(a) 340 m/s
(b) 12000 m/s
(c) 3 x 10^8 m/s
(d) 3400 km/s

Q24. What should come in place of the question mark (?) in the given series?

145 141 133 121 105 ?

(a) 81
(b) 87
(c) 83
(d) 85

Q25. A is the sister of B. C is the brother of D. E is the husband of D. B is the mother of C. How is A related to E?

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

Q26. There are 53 members in group A, 86 members in group B and 57 members in group C. All the members of these groups went to a restaurant. The average amounts spent on each member of groups A, B and C are Rs. 424, Rs. 337 and Rs. 122, respectively. The overall average amount (in Rs.) spent per member is:

(a) 297
(b) 302
(c) 298
(d) 303

Q27. In 2025, with the theme “My Great Story: Cultures and Development”, International Migrants Day was observed on which of the following dates?

(a) December 19
(b) December 20
(c) December 18
(d) December 21

Q28. Two taps can fill a cistern in 4 hours and 28 hours respectively. A third tap can empty it in 28 hours. How long (in hours) will it take to fill one-fourth of the empty cistern, if all of them are opened together?

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

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Q29. Refer to the following letter, number and symbol series and answer the question that follows. Counting should be done from left to right only.

(Left) S # % 2 S 4 P # Z 4 B 8 5 R € * 8 © J & € N (Right)

If all the symbols are dropped from the series, which of the following will be fourth from the left?

(a) Z
(b) P
(c) 4
(d) 2

Q30. C, D, N, O, P and Q live on six different floors of the same building. The lowermost floor in the building is numbered 1, the floor above it is numbered 2 and so on, till the topmost floor, which is numbered 6. D lives on the floor numbered 1. Only two people live between Q and P. Q lives below C. Only two people live between O and C. Only one person lives between D and C. How many people live above N?

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

Q31. Which painting form is known for its monochromatic style using white pigment on mud walls?

(a) Gond
(b) Madhubani
(c) Pahari
(d) Warli

Q32. By which of the following names is the National Institute of Kathak Dance commonly known as?

(a) Kathakali Kendra
(b) Kathak Kendra
(c) Natya Institute of Kathak and Choreography
(d) Lucknow Dance University

Q33. Seven people B, C, D, O, P, Q and R are sitting around a circular table facing the center of the table. Only one person sits between P and B when counted from the left of B. Only one person sits between B and R. Only one person sits between P and D. Only two people sit between O and R. Only one person sits between Q and D. Who sits to the immediate right and immediate left of C, respectively?

(a) P and D
(b) B and R
(c) P and B
(d) Q and D

Q34. Which of the following letter-clusters should replace # and % so that the pattern and relationship followed between the letter-cluster pair on the left side of :: is the same as that on the right side of :: ?

: KUC :: XHP : %

(a) = FOW % = DNV
(b) = EOW % = DNV
(c) = EOW % = DNO
(d) = EOX % = DNV

Q35. Who among the following was the court poet of the Vardhana ruler, Harsha?

(a) Harishena
(b) Kalashoka
(c) Vasumitra
(d) Banabhatta

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Q36. Two trains, Train A and Train B, are running on parallel tracks in the same direction. Train A, which is 150 metres long, is moving at 72 km/hr, while Train B, which is 120 metres long, is moving at 54 km/hr. How long will it take for Train A to completely overtake Train B?

(a) 54 seconds
(b) 58 seconds
(c) 50 seconds
(d) 52 seconds

Q37. Which of the following is the outcome of Globalization in India's economy?

(a) Privatisation
(b) Nationalisation
(c) Liberalisation
(d) Outsourcing

Q38. If 2 is subtracted from each of the digits in the number 3975684 and the resultant digits are then re-arranged in ascending order from left to right, which digit will be fifth from the left end in the new number thus formed?

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

Q39. In this question, a question is followed by two statements numbered (I) and (II). You have to decide whether the data provided in the statements are sufficient to answer the question. Read both the statements and decide the appropriate answer.

Question:

Among 5 trees, L, M, N, T and V each having a different height, which tree is the tallest?

Statements:

(I) M is taller than V but shorter than N.M is shorter than only one tree.

(II) V is taller than T.

(a) Data in Statement II alone is sufficient to answer the question while data in statement I is not
(b) Data in Statement I alone is sufficient to answer the question while data in statement II is not
(c) Both statements I and II together (and not statement 1 alone or statement II alone) are sufficient to answer the question
(d) Both statements I and II together are NOT sufficient to answer the question

Q40. Refer to the following letter, symbol series and answer the question. Counting to be done from left to right only.

(Left) K { J % I + H = G * F / D : - ! B C ? A # (Right)

How many such symbols are there, each of which is immediately preceded by a letter and also immediately followed by another letter?

(a) THREE
(b) SEVEN
(c) TWO
(d) FOUR

Q41. At what rate (in percentage, rounded off to two decimal place) per year will a sum of money double itself in 18 years on simple interest?

(a) 3.56
(b) 5.56
(c) 11.12
(d) 7.56

Q42. Kc is the daughter of Cw. Lu is the father of Qk. Ef is the mother of Kc. Qk is the brother of Ef. How is Lu related to Cw?

(a) Daughter’s husband
(b) Wife’s brother

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(c) Sister's daughter
(d) Wife's father

Q43. If cosecA = 5/3, then find the value of $(9(1 + \cot^2 A))/(80(1 - \sec A)(1 + \sec A))$.
(a) 3/7
(b) 5/7
(c) (-7)/9
(d) (-5)/9

Q44. The HCF of two numbers is 6 and their LCM is 72. If one of the numbers is 18, find the other number.
(a) 48
(b) 12
(c) 36
(d) 24

Q45. When a motorcar makes a sharp turn at high speed, we tend to get thrown to one side. Which of the following explains this phenomenon?
(a) The law of inertia causes our body to resist the change in direction.
(b) Change in air pressure inside the car pushes us outwards.
(c) The force of gravity acts in the opposite direction.
(d) The friction between the road and the tires decreases.

Q46. RILA is related to SKOE in a certain way based on the English alphabetical order. In the same way, KEPO is related to LGSS. To which of the following is MJRT related, following the same logic?
(a) NKTY
(b) NOYZ
(c) NMWX
(d) NLUX

Q47. Which organization concluded its 46^(th) summit in Manama, where leaders adopted the Sakhir Declaration, reaffirming their commitment to deeper political, security, and economic integration?
(a) Organization of Islamic Cooperation (OIC)
(b) United Nations (UN)
(c) Gulf Cooperation Council (GCC)
(d) Arab League

Q48. Which indigenous microprocessor, launched in 2025, marked a milestone in India's technological self-reliance as the country's first 1.0 GHz, 64-bit dual-core processor?
(a) SHAKTI-X64 microprocessor
(b) VEGA-64 indigenous processor
(c) DHRUV64 microprocessor
(d) BHARAT-Core 64 microprocessor

Q49. In a certain code language, 'BUST' is coded as '3519' and 'LIDS' is coded as '6894'. What is the code for 'S' in that language?
(a) 9
(b) 4
(c) 1
(d) 6

Q50. P sells an item to Q at 50% profit. Q sells the same item to R at 32% loss. If R paid Rs. 5406 for the item, then at what price (in Rs.) is the item purchased by P?
(a) 5299
(b) 5301
(c) 5300
(d) 5302

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Q51. Which of the following is a similarity between Hindustani and Carnatic music systems?

(a) Foundation on Raga and Tala
(b) Rejection of Shruti concept
(c) Exclusive focus on instrumental music
(d) Use of identical compositions

Q52. Which of the values of a, b, c given in the options satisfy the following equations?

3a - 4b + 2c = - 9
• 4a + 4b + 10c = 32
• a + 2b - 7c = - 7

(a) (5, 1, 1)
(b) (2, 1, 4)
(c) (1, 4, 2)
(d) (3, 2, 2)

Q53. Which of the following was the capital expenditure (capex) announced for FY 2025-26 in the Union Budget of India?

(a) Rs. 8 lakh crore
(b) Rs. 13.5 lakh crore
(c) Rs. 11.21 lakh crore
(d) Rs. 10.0 lakh crore

Q54. The tropical climatic region is mainly confined to which latitudinal extent of the Earth?

(a) 28.5°N and 28.5°S
(b) 23.5°N and 23.5°S
(c) 13.5°N and 13.5°S
(d) 30.5°N and 30.5°S

Q55. 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 conclusion/s logically follow/s from the given statements.

Statements:

All spoons are forks. All forks are cups. Some spoons are plates.

Conclusions:

(I) Some forks are plates.

(II) Some cups are plates.

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

Q56. A car travels from City A to City B, a distance of 360 km. For the first half of the distance, it travels at a speed of 60 km/h. Due to traffic, it travels the next 120 km at 40 km/h. For the remaining distance, it travels at the same speed as it did for the first half. What is the average speed (in km/h) of the car for the entire trip, correct to two places after decimal?

(a) 51.43 km/h
(b) 49.43 km/h
(c) 52.43 km/h
(d) 50.43 km/h

Q57. The Indian Constitution empowers the Parliament to make laws on matters in the State List under which of the following circumstances?

1. When the Rajya Sabha passes a resolution to that effect
2. During a National Emergency
3. When states make a request

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4. To implement international agreements
5. At the discretion of the Prime Minister

(a) 2, 3, 4, and 5 only
(b) 1, 2, 4, and 5 only
(c) 1, 2, 3, and 5 only
(d) 1, 2, 3, and 4 only

Q58. In a certain code language, 'BITE' is coded as '4568' and 'TIME' is coded as '4826'. What is the code for 'M' in the given code language?

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

Q59. When a law passed by a State Legislature clashes with a Parliamentary law on a Concurrent List subject, what is the legal outcome?

(a) The matter is settled through a ruling by the Supreme Court
(b) The Parliament is obligated to annul the state law
(c) The state legislation automatically overrides the central law
(d) The central law overrides the state law unless the state law has Presidential assent

Q60. Which of the following social reformers founded the Arya Mahila Samaj to serve the cause of women?

(a) Pandita Ramabai
(b) Mehribai Tata
(c) Tarabai Premchand
(d) Sarla Devi Chaudhurani

Q61. Which plateau belt in India is notably rich in both iron ore and coal resources?

(a) North-Eastern Plateau Region
(b) South-Western Plateau Region
(c) West-Eastern Plateau Region
(d) North-Western Plateau Region

Q62. If the mean of the following data is 41, then the value of X is:

xi	fi
30	31
40	X
55	50
95	17

(a) 1293
(b) 1277
(c) 1281
(d) 1298

Q63. Find the value of m, satisfying equation: (13/10)^4 × (10/13)^(16) × (13/10)^(17) = (10/13)^(3m + 18)

(a) -33/3
(b) -29/3
(c) -24/3
(d) -23/3

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Q64. Based on the alphabetical order, three of the following four are alike in a certain way and thus form a group. Which is the one that does not belong to that group?

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

(a) LIF
(b) OLI
(c) EVY
(d) XUR

Q65. What should come in place of '?' in the given series?

21 23 26 31 38 ?

(a) 47
(b) 49
(c) 51
(d) 53

Q66. A shopkeeper fixes the marked price of an item 140% above its cost price. What percentage of discount on marked price should be allowed to gain 68%?

(a) 32%
(b) 30%
(c) 28%
(d) 29%

Q67. Refer to the following letter, symbol series and answer the question. Counting to be done from left to right only.

(Left) H F G J D J V D K P = % S O C B = % B + # (Right)

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

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

Q68. In climatology, what most accurately explains how seasonal conditions are experienced at a particular location?

(a) Long-term average atmospheric patterns of the region
(b) Latitudinal position of the place
(c) Permanent climatic classification of the area
(d) Short-term fluctuations in atmospheric elements

Q69. Which Article empowers the President to specify the Scheduled Castes in various states and union territories?

(a) Article 341
(b) Article 342
(c) Article 330
(d) Article 344

Q70. Which of the following demonstrates the use of computers in scientific research?

(a) Simulation of experiments
(b) Online shopping
(c) Ticket reservation
(d) Word processing

Q71. Piyush has Rs. 1407 with him. He divides this amount between his two sons, Manoj and Anand, and asks them to invest their respective shares at a compound interest rate of 10% per annum, compounded annually. It is observed that Manoj's investment amounts to the same value after 16 years as Anand's investment does after 17 years. How much (in Rs.) did Piyush give to Anand?

(a) 837
(b) 520

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(c) 737
(d) 670

Q72. What is the average of five consecutive even integers if the smallest integer is 28?
(a) 32
(b) 31
(c) 30
(d) 33

Q73. What is one direct way in which economic infrastructure contributes to development?
(a) It restricts the improvements in human capital affecting labor quality
(b) It limits the expansion and growth of physical capital in various sectors
(c) It decreases the overall productivity of all inputs across different sectors
(d) The output or the final products of different segments of infrastructure

Q74. In which present-day state did the Jungle Mahal Uprising, also known as the Bhumij Revolt, take place?
(a) Odisha
(b) West Bengal
(c) Bihar
(d) Jharkhand

Q75. Seven boxes, A, B, C, D, E, F and G, are kept one over the other but not necessarily in the same order. F is kept second from the bottom. Only three boxes are kept between F and D. G is kept at one of the positions below F. Only E is kept between D and B. A is kept at one of the positions above D. How many boxes are kept above C?
(a) 4
(b) 2
(c) 1
(d) 3

Q76. Which of the following Articles of the Indian Constitution contains the fundamental duties?
(a) Article 51A
(b) Article 61A
(c) Article 41A
(d) Article 31A

Q77. _____ is the sophisticated technology used by high-speed scanners (like those in commercial settings or advanced libraries) to capture a very accurate and detailed digital image from a physical document, often used for archival purposes.
(a) Thermal Printing
(b) Optical Character Recognition (OCR)
(c) Magnetic Ink Character Recognition (MICR)
(d) Electrostatic Plotting

Q78. A cone has a base radius of 6 cm and a height of 7 cm. It is to be filled with water, and for every 180 cc of water poured into the cone, an additional 20 cc of water is spilled while pouring. If the spillage is proportional as described, how much water (in cc) will be required to fill the cone to its brim? (Use $\pi = 22/7$ and give your answer correct to two decimal places.)
(a) 283.33
(b) 293.33
(c) 295.67
(d) 296.67

Q79. Find the mean proportional of 425 and 17.
(a) 75
(b) 95
(c) 65

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(d) 85

Q80. What will come in the place of '?' in the following equation, if '+' and '-' are interchanged and '×' and '÷' are interchanged?

47 ÷ 12 + 164 × 2 - 135 = ?

(a) 693
(b) 601
(c) 666
(d) 617

Q81. Which constitutional amendment reduced the Parliament's approval period for National Emergency from two months to one month?

(a) 44th Amendment Act, 1978
(b) 52nd Amendment Act, 1985
(c) 42nd Amendment Act, 1976
(d) 38th Amendment Act, 1975

Q82. The intermediary that DNA molecules use to communicate with the rest of the cell is the:

(a) tRNA
(b) mRNA
(c) miRNA
(d) rRNA

Q83. According to ____ of the Indian Constitution, the Parliament may by law, constitute a High Court for a Union territory.

(a) Article 241
(b) Article 239
(c) Article 238
(d) Article 240

Q84. In December 2025, at which international event did India deliver its National Statement highlighting clean energy progress and Mission LiFE?

(a) G20 Summit
(b) World Environment Day 2024
(c) COP26 Climate Summit
(d) 7th Session of the United Nations Environment Assembly (UNEA)

Q85. Which of the following is NOT a feature of alluvial soils in India?

(a) Rich in potash
(b) Very fertile
(c) Mainly consists of sand, silt and clay
(d) Primarily found in the Deccan Plateau

Q86. Evaluate: (−9) − (−56) ÷ (−14) + (−2) × 9

(a) -34
(b) -33
(c) -30
(d) -31

Q87. The monthly incomes of two friends Mohan and David, are in the ratio 6 : 7 respectively and each of them saves Rs. 69,000 every month. If the ratio of their monthly expenditure is 2 : 3, find the monthly income of Mohan (in Rs.).

(a) 1,04,500
(b) 1,44,900
(c) 1,02,500
(d) 1,03,500

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Q88. If the mean proportional of two numbers is 14 and their third proportional is 112, then the numbers are:

(a) 4.49
(b) 4,44
(c) 14,14
(d) 7,28

Q89. A typist takes 40 minutes to type 2 pages. How long (in minutes) will he take to type 89 pages?

(a) 1780
(b) 1785
(c) 1790
(d) 1770

Q90. If the mode of a data exceeds its mean by 26.7, then the mode exceeds the median by _____. (Use empirical formula to find the answer)

(a) 10.5
(b) 12.4
(c) 8.5
(d) 17.8

Q91. Based on the English alphabetical order, three of the following four letter cluster pairs are alike in a certain way and thus form a group. Which is the one that does not belong to that group? (Note: The odd man out is not based on the number of consonants/vowels or their position in the letter cluster)

(a) HK-JN
(b) IL-KN
(c) MP-OR
(d) AD-CF

Q92. What economic system was adopted by India post-1947 to balance the development of different sectors?

(a) Command economy
(b) Pure socialism
(c) Mixed economy
(d) Pure capitalism

Q93. The total area covered by the Andaman & Nicobar Islands is approximately:

(a) 6,249 sq. kms
(b) 7,567 sq. kms
(c) 5,163 sq. kms
(d) 8,249 sq. kms

Q94. Yeti starts from Point A and drives 48 km towards North. He then takes a right turn, drives 50 km, turns right and drives 54 km. He then takes a right turn and drives 55 km. He takes a final right turn, drives 6 km and stops at Point P. How far (shortest distance) and towards which direction should he drive in order to reach Point A again? (All turns are 90-degree turns only, unless specified.)

(a) 7 km to the west
(b) 6 km to the west
(c) 5 km to the east
(d) 4 km to the east

Q95. By selling an article at 3/10 of its actual selling price, Aman incurs a loss of 25%. If he sells it at 77% of its actual selling price, then the profit percentage is:

(a) 91.4%
(b) 92.6%
(c) 90.6%
(d) 92.5%

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Q96. In December 2025, which organization issued a Request for Proposal (RfP) to establish 'Space Labs' in universities across India?

(a) Defence Research and Development Organisation (DRDO)
(b) Indian Space Research Organisation (ISRO)
(c) Department of Science and Technology (DST)
(d) Indian National Space Promotion and Authorisation Centre (IN-SPACe)

Q97. Which of the following letter-number clusters will replace the question mark "?" in the given series to make it logically complete?

GCW 10, FAT 16, EYQ 22, DWN 28, ?

(a) CUJ 33
(b) BUL 32
(c) CUK 34
(d) CVM 34

Q98. The area of a square is 8649 cm^2. Its perimeter is equal to the perimeter of a regular hexagon. What is the area (in cm^2) of the hexagon?

(a) $5766\sqrt{3}$
(b) $5762\sqrt{3}$
(c) 5758
(d) 5716

Q99. Read the given statements and conclusions carefully. Assuming that the information given in the statements is true, even if it appears to be at variance with commonly known facts, decide which of the given conclusion(s) logically follow(s) from the statements.

Statements:

All caps are helmets. All helmets are hats. No hat is a crown.

Conclusions:

(I) No cap is a crown.(II) Some hats are caps.

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

Q100. If the diameter of a circle is 14 cm, then what is the circumference of the circle?|

(Use $\pi = 22/7$)

(a) 22 cm
(b) 36 cm
(c) 44 cm
(d) 24 cm

ANSWER KEY

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

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81	a	82	b	83	a	84	d	85	d	86	d	87	d	88	d	89	a	90	d
91	a	92	c	93	d	94	c	95	d	96	d	97	c	98	a	99	b	100	c

SOLUTIONS

Q1. Answer: (a) Trapezium

Shortcut Trick

Total ratio = 4 + 3 + 7 + 6 = 20

Each part = 360 ÷ 20 = 18

=> Angles: 72, 54, 126, 108

Check adjacent sum:

=> 54 + 126 = 180 Yes

Therefore Answer = Trapezium

Alternate Method

Given: Ratio = 4 : 3 : 7 : 6

Formula: Sum of angles = 360

=> Let angles be 4x, 3x, 7x, 6x

=> 20x = 360 => x = 18

=> Angles = 72, 54, 126, 108

=> Check trapezium condition: consecutive interior angles on same leg = 180

=> 54 + 126 = 180 => one pair of opposite sides parallel

P(72°) Q(54°) R(126°) S(108°)

Therefore Quadrilateral is Trapezium

Additional Information

Trapezium: One pair of opposite sides parallel; consecutive angles between them sum = 180

Cyclic Quadrilateral: Opposite angles sum = 180

Parallelogram: Opposite angles equal and parallel sides in pairs

Angle Sum Property: Any quadrilateral total = 360

Q2. Answer: (d) It was led by hereditary militia with local administrative roles

The correct answer is Led by hereditary militia with local administrative roles.

Key Points

• The Paika Rebellion of 1817 was an armed uprising against the British East India Company's rule in Odisha, primarily led by the Paikas, who were the traditional landed militia of the state.

• The Paikas were distinct because they held hereditary rent-free lands (known as Paikan Jagirs) in exchange for their military and police services to the Gajapati rulers of Khurda.

• During times of peace, these individuals performed administrative functions, such as maintaining law and order and policing within their localities, while during war, they served as the standing army.

• The rebellion was sparked when the British, after conquering Odisha in 1803, began resuming (taking back) these rent-free lands, imposing heavy land revenues, and abolishing the cowrie currency system in favor of silver.

• The uprising was led by Bakshi Jagabandhu Bidyadhar, the former Military Chief (Commander-in-Chief) of the King of Khurda, who had been dispossessed of his ancestral Killa Rorang estate by the British.

• Statement A is incorrect because the movement was entirely indigenous and did not depend on foreign mercenary forces; it was a grassroots resistance involving local tribals and peasants.

• Statement B is incorrect because while some dispossessed zamindars joined, the Paika Rebellion was a much broader socio-militaristic uprising rooted in the loss of hereditary rights rather than simple revenue concessions.

• Statement C is incorrect because the rebellion was rural and agrarian-military in nature, centered in Khurda, Banapur, and Puri, rather than being driven by urban craft guilds or traders.

• Statement D is correct because the Paikas represented a unique social class that combined peasantry with military and administrative responsibilities. Hence, the correct answer is option D.

Additional Information

• Historical Context: The British East India Company defeated the Marathas in 1803 to take control of Odisha. The Raja of Khurda, Mukunda Deva II, was eventually deposed, leading to the collapse of the traditional Paika system.

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• Economic Grievances: Apart from land issues, the British established a monopoly over salt, which caused the price of this essential commodity to skyrocket, further fueling anger among the common populace and tribals like the Khonds.

• Timeline: The rebellion began in March 1817 when a group of 400 Khonds from Ganjam entered Khurda and joined forces with the Paikas. They attacked the Police Station and Government Treasury at Banapur.

• Suppression: The British declared Martial Law in Khurda. By 1818, the active rebellion was mostly suppressed, though guerrilla warfare continued for a few years. Bakshi Jagabandhu finally surrendered in 1825 and lived as a pensioner in Cuttack until his death in 1829.

• Recognition: Many historians and the Government of Odisha have advocated for the Paika Rebellion to be formally recognized as the First War of Indian Independence, predating the Revolt of 1857.

Important Points

• Social Structure: The Paikas were divided into three ranks: the Paharis (shield-bearers), the Banua (matchlockmen), and the Dhenkiyas (archers).

• Geographical Spread: While it started in Khurda, the insurrection spread rapidly to Puri, Pipli, Cuttack, and Kanika, showing the widespread discontent against colonial administrative policies.

• Administrative Impact: Following the rebellion, the British were forced to make concessions in revenue collection and land settlements in Odisha to prevent further unrest.

• Commemoration: In 2017, the Government of India celebrated the 200th anniversary of the Paika Rebellion with various national-level events and monuments dedicated to the martyrs of the uprising.

Q3. Answer: (c) 1971

The correct answer is 1971.

Key Points

• The Intel 4004 was the world's first commercially available microprocessor, introduced by Intel Corporation on 15 November 1971.

• It was developed by a team led by Federico Faggin, with significant contributions from Ted Hoff and Stanley Mazor.

• The Intel 4004 was a 4-bit microprocessor containing approximately 2,300 transistors and operated at a clock speed of about 740 kHz.

• Originally designed for calculators manufactured by the Japanese company Busicom, it later became a revolutionary innovation in the field of computing.

• The launch of the Intel 4004 marked the beginning of the microprocessor era, paving the way for modern computers, smartphones, and embedded systems.

• Hence, the correct answer is 1971.

Additional Information

• Microprocessor:

• A microprocessor is the Central Processing Unit (CPU) integrated onto a single semiconductor chip.

• It performs arithmetic, logical, and control operations of a computer.

• Intel Corporation:

• Founded in 1968 by Robert Noyce and Gordon Moore.

• Headquartered in California, USA.

• Intel 4004 Specifications:

• Word Length: 4-bit.

• Transistors: Approximately 2,300.

• Clock Speed: Around 740 kHz.

• Evolution of Intel Processors:

• Intel 8008 (1972) – 8-bit microprocessor.

• Intel 8080 (1974) – Used in early personal computers.

• Intel 8086 (1978) – Introduced the x86 architecture.

• Importance of the Intel 4004:

• It transformed computing by replacing multiple integrated circuits with a single programmable chip.

• It laid the foundation for the development of modern computing devices.

Important Points

• World's First Commercial Microprocessor: Intel 4004.

• Launch Year: 1971.

• Bit Size: 4-bit.

• Developer: Intel Corporation.

• Application: Initially designed for Busicom calculators.

Q4. Answer: (a) Ghiyasuddin Tughlaq

The correct answer is Ghiyasuddin Tughlaq.

Key Points

• Ghiyasuddin Tughlaq, also known as Ghazi Malik, was the founder of the Tughlaq dynasty in India and he ordered the construction of the Tughlaqabad Fort in 1321. Hence, statement A is correct.

• The fort was built to serve as the capital of the Delhi Sultanate and is considered the third city of Delhi, designed with massive stone fortifications to protect against Mongol invasions.

• The construction of this gigantic stone structure was completed in a remarkably short span of four years (between 1321 and 1325), featuring high walls and circular bastions.

• Ghiyasuddin Tughlaq ruled from 1320 to 1325, and his reign marked the beginning of a period characterized by significant administrative and military reforms in the Delhi Sultanate.

• The fort's architecture is a prime example of the Tughlaq style, which favored heavy, sloping walls (batter) and functional strength over the ornate decorations of previous dynasties.

Additional Information

• Alauddin Khalji:

• He was the most powerful ruler of the Khalji Dynasty (reign: 1296–1316) and is famous for building the Siri Fort (the second city of Delhi) and the Alai Darwaza. Hence, statement B is incorrect.

• He introduced significant market reforms and maintained a large standing army to repel Mongol attacks long before the Tughlaqs came to power.

• Muhammad bin Tughlaq:

• He was the son of Ghiyasuddin Tughlaq and ruled from 1325 to 1351; while he built the city of Jahanpanah, he did not build Tughlaqabad Fort. Hence, statement C is incorrect.

• He is known for his controversial decisions, such as shifting the capital from Delhi to Daulatabad in 1327 and introducing token currency.

• Firoz Shah Tughlaq:

• Reigning from 1351 to 1388, he was a prolific builder who established the city of Firozabad (Firoz Shah Kotla) and founded towns like Hissar, Fatehabad, and Jaunpur. Hence, statement D is incorrect.

• He is credited with developing extensive irrigation canals and hospital systems (Dar-ul-Shifa) across the empire.

• Location and Status:

• The Tughlaqabad Fort is located in South Delhi, India. Today, it stands mostly in ruins but remains a significant archaeological site under the Archaeological Survey of India (ASI).

Important Points

• Legend of the Curse: A famous historical legend mentions a conflict between Ghiyasuddin Tughlaq and the Sufi saint Nizamuddin Auliya. The saint reportedly cursed the fort, saying, "Ya rahe usar, ya base Gujar" (May it remain barren or be inhabited by herdsmen), which is often cited as the reason for its early abandonment.

• Tomb of Ghiyasuddin Tughlaq: Located across the fort and connected by a stone causeway, the tomb is a masterpiece of Indo-Islamic architecture. It features a white marble dome and sloping red sandstone walls, which became a signature of the Tughlaq era.

• Military Architecture: The fort was equipped with underground passages, granaries, and deep wells to sustain the population during long sieges, reflecting the constant threat of foreign invasions during the 14th century.

Q5. Answer: (c) Because they are dangerous to wildlife

The correct answer is Because they are dangerous to wildlife.

Key Points

• The Supreme Court of India, in its order dated November 13, 2025, reiterated that mining activities in the vicinity of National Parks and Wildlife Sanctuaries are inherently hazardous to the ecological balance.

• Mining operations involve blasting, excavation, and the use of heavy machinery, which result in significant noise pollution and ground vibrations that distress and displace wild animals. Hence, option C is correct.

• Such activities lead to the destruction of natural habitats and the fragmentation of wildlife corridors, which are vital for the migration and survival of species.

• Mining does not create sustainable water sources; instead, it often leads to the depletion of groundwater and the contamination of streams with toxic minerals and silt. Hence, option A is incorrect.

• While some argue that mining can boost the local economy, the Supreme Court held that economic gains cannot override the

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"Precautionary Principle" regarding the environment. Hence, option D is incorrect.

• The court noted that mining activities generally deter tourism in the long run by destroying the pristine nature and biodiversity of the region. Hence, option B is incorrect.

Additional Information

• Eco-Sensitive Zones (ESZ):

• These are areas within 10 kilometers around Protected Areas, National Parks, and Wildlife Sanctuaries notified by the Ministry of Environment, Forest and Climate Change (MoEFCC).

• The Supreme Court has previously mandated a minimum 1 km ESZ for all protected areas to act as a "shock absorber" for the ecosystem.

• In these zones, activities are classified into Prohibited (like commercial mining), Regulated, and Permitted categories.

• Wildlife Protection Act, 1972:

• This Act provides the legal framework for the protection of various species of wild animals and plants and the management of their habitats across India.

• It prohibits the entry into or destruction of wildlife sanctuaries without proper authorization from the Chief Wildlife Warden.

• Environment Protection Act, 1986:

• This Act authorizes the Central Government to take measures to protect and improve the environment and set standards for pollution emissions.

• It is the umbrella legislation under which ESZ notifications are issued to prevent industrial hazards near sensitive zones.

Important Points

• Constitutional Mandate:

• Article 48A of the Directive Principles of State Policy mandates that the State shall endeavor to protect and improve the environment.

• Article 51A(g) establishes the fundamental duty of every citizen to protect and improve the natural environment, including forests, lakes, rivers, and wildlife.

• Public Trust Doctrine:

• The Supreme Court frequently applies this doctrine, which states that resources like air, water, and forests are held by the Government in trust for the free and unimpeded use of the public and for the protection of nature.

• Impact of Dust:

• Mining produces particulate matter (PM 2.5 and PM 10), which settles on leaves, hindering photosynthesis in forests and causing respiratory issues for wildlife.

Q6. Answer: (c) $(4AC - B^2)/4A$

Shortcut Trick

For $A < 0$, parabola opens downward => maximum at vertex

Direct formula:

Maximum value = $(4AC - B^2) \div 4A$

Therefore Answer = $(4AC - B^2) \div 4A$

Alternate Method

Given: $y = Ax^2 + Bx + C$, $A < 0$

Formula: Vertex x-coordinate = $-B \div 2A$

=> Put $x = -B \div 2A$

=> $y = A(-B \div 2A)^2 + B(-B \div 2A) + C$

=> $y = A(B^2 \div 4A^2) - B^2 \div 2A + C$

=> $y = B^2 \div 4A - B^2 \div 2A + C$

=> $y = (B^2 - 2B^2) \div 4A + C$

=> $y = (-B^2) \div 4A + C$

=> $y = (4AC - B^2) \div 4A$

Therefore Maximum value = $(4AC - B^2) \div 4A$

Additional Information

Nature of Parabola: $A > 0$ => minimum, $A < 0$ => maximum

Vertex Formula: $x = -B \div 2A$ gives extreme value point

Discriminant: $D = B^2 - 4AC$ decides roots nature

Axis of Symmetry: $x = -B \div 2A$

Q7. Answer: (d) Ernest Rutherford

The correct answer is Ernest Rutherford.

Key Points

• In 1911, the British physicist Ernest Rutherford conducted the famous alpha-particle scattering experiment, also known as the Gold Foil Experiment, which fundamentally changed the understanding of atomic structure.

• The experiment involved bombarding a very thin gold foil (approximately 1000 atoms thick) with fast-moving alpha particles, which are doubly-charged helium ions possessing a mass of 4u and high energy.

• Rutherford observed that most alpha particles passed straight through the foil, some were deflected by small angles, and a very small fraction (about 1 in 12,000) rebounded almost 180 degrees.

• From these observations, he concluded that the atom contains a very small, dense, and positively charged center called the nucleus, where nearly all the mass of the atom is concentrated.

• He proposed the Nuclear Model of the Atom, stating that electrons revolve around the nucleus in well-defined circular paths, much like planets around the sun.

Additional Information

• J.J. Thomson:

• In 1897, he discovered the electron using cathode ray tube experiments.

• In 1904, he proposed the Plum Pudding Model, which suggested that an atom is a sphere of positive charge with negatively charged electrons embedded in it like raisins in a pudding.

• John Dalton:

• In 1808, he presented Dalton's Atomic Theory, which stated that all matter is made of indivisible particles called atoms.

• He theorized that atoms of the same element are identical in mass and chemical properties, forming the basis of modern chemistry.

• Niels Bohr:

• In 1913, he modified Rutherford's model to overcome the problem of atomic stability.

• He proposed the Bohr Model, stating that electrons revolve in discrete orbits (fixed energy levels) called shells (K, L, M, N), and they do not radiate energy while in these orbits.

• Gold Foil Selection:

• Gold was chosen for the experiment because of its high malleability, allowing it to be hammered into an extremely thin sheet, which was necessary to observe the scattering of individual alpha particles.

Important Points

• Rutherford is widely regarded as the "Father of Nuclear Physics" for his discovery of the atomic nucleus.

• A major drawback of the Rutherford model was that it could not explain the stability of the atom; according to classical electrodynamics, an accelerating electron should continuously lose energy and eventually spiral into the nucleus.

• The discovery of the nucleus led to the later discovery of the proton, a term coined by Rutherford in 1920 to describe the hydrogen nucleus as a fundamental particle.

Q8. Answer: (d) (36, 74, 1)

The logic followed here is:

Logic: The second number is obtained by multiplying the first number by 2 and then subtracting the third number.

For, (21, 52, 5)

=> 21 × 2 = 42

=> 42 + 10 = 52

For, (45, 138, 24)

=> 45 × 2 = 90

=> 90 + 48 = 138

Now, checking the options using the same pattern:

Option 1) (41, 117, 18)

=> 41 × 2 = 82

=> 82 + 36 = 118 ≠ 117

Option 2) (11, 39, 9)

=> 11 × 2 = 22

=> 22 + 18 = 40 ≠ 39

Option 3) (17, 55, 11)

=> 17 × 2 = 34

=> 34 + 22 = 56 ≠ 55

Option 4) (36, 74, 1)

=> 36 × 2 = 72

=> 72 + 2 = 74

Hence, the correct answer is Option 4.

Q9. Answer: (c) Ins

The correct answer is Ins.

Key Points

• The Ins key, short for Insert, is a toggle key found on most computer keyboards that is primarily used to switch between Insert mode and Overwrite mode (also known as Overtype mode) during text entry.

• In Insert mode, which is the default setting in most modern word processors like Microsoft Word and Google Docs, any new character typed is placed at the current cursor position, and the existing text to the right is shifted forward.

• In Overwrite mode, the newly typed character replaces or "overwrites" the character currently situated to the right of the cursor, effectively deleting the old text as you type. Hence, the Ins key is the correct option for toggling these modes.

• The Ins key is typically located in the control keys or navigation block of a standard QWERTY keyboard, usually situated above the Delete key and to the right of the Backslash key.

• On many keyboards, the Insert function is also shared with the 0 (zero) key on the numeric keypad, which is activated when Num Lock is turned off.

Additional Information

• Tab Key (Option A):

• The Tab key (short for Tabulator) is primarily used to advance the cursor to the next tab stop in a document or to move focus between fields in a User Interface (UI).

• In word processing, it creates a specific indentation, usually 0.5 inches by default.

• It does not toggle between text entry modes. Hence, statement A is incorrect.

• Del Key (Option B):

• The Del or Delete key is used to remove the character immediately following the cursor or to delete a selected object or file.

• Unlike Backspace, which deletes to the left, Delete performs forward deletion.

• While it removes text, it does not change the behavior of how new text is entered. Hence, statement B is incorrect.

• F5 Key (Option D):

• The F5 key is a function key that serves different purposes depending on the operating system or software being used.

• In web browsers like Chrome or Edge, it is used to refresh or reload the current page.

• In Microsoft PowerPoint, it starts a slideshow from the first slide, and in Excel, it opens the "Go To" dialog box. Hence, statement D is incorrect.

Important Points

• Visual Indicator: In many terminal-based systems or older applications, the cursor changes shape when Overwrite mode is active, often switching from a vertical line to a solid block or an underscore.

• Modern Software Behavior: Many modern applications have disabled the Insert key toggle by default to prevent users from accidentally overwriting their work. For instance, in Microsoft Word, you may need to enable this feature via the Options menu before the key will function as a toggle.

• Combination Shortcuts: The Insert key is also used in various shortcuts, such as Shift + Insert, which acts as the Paste command in many Windows environments, serving as an alternative to Ctrl + V.

• Legacy Use: The concept of Overwrite mode dates back to mainframes and early MS-DOS editors, where overtyping was often the primary method of editing existing text strings due to limited processing power and simple interface designs.

Q10. Answer: (b) AKDG

The logic followed here is:

For, GLOW → KQRY

Similarly, OVUA → SAXC

Now, apply the same rule to WFAE:

Here, WFAE → AKDG

Hence, the correct answer is Option 2.

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Q11. Answer: (d) 20 – 40 – 41 – 82

The logic followed here is:

Logic: The pattern is based on a fixed sequence of operations: Multiply by 2, Add 1, Multiply by 2.

For, 3 – 6 – 7 – 14

=> 3 × 2 = 6

=> 6 + 1 = 7

=> 7 × 2 = 14

For, 12 – 24 – 25 – 50

=> 12 × 2 = 24

=> 24 + 1 = 25

=> 25 × 2 = 50

Now, checking the options using the same pattern:

Option 1) 11 – 22 – 21 – 42

=> 11 × 2 = 22

=> 22 + 1 = 23 ≠ 21

Option 2) 25 – 50 – 25 – 35

=> 25 × 2 = 50

=> 50 + 1 = 51 ≠ 25

Option 3) 15 – 30 – 60 – 62

=> 15 × 2 = 30

=> 30 + 1 = 31 ≠ 60

Option 4) 20 – 40 – 41 – 82

=> 20 × 2 = 40

=> 40 + 1 = 41

=> 41 × 2 = 82

Hence, the correct answer is Option 4.

Q12. Answer: (b) 2702

Shortcut Trick

Given $a = 7 + 4\sqrt{3}$

=> $1/a = 7 - 4\sqrt{3}$ (since $(7 + 4\sqrt{3})(7 - 4\sqrt{3}) = 1$)

=> $a + 1/a = 14$

Use identity: $a^3 + 1/a^3 = (a + 1/a)^3 - 3(a + 1/a)$

=> $= 14^3 - 3\times14 = 2744 - 42 = 2702$

Therefore Answer = 2702

Alternate Method

Given: $a = 7 + 4\sqrt{3}$

Formula: $(x + y)^3 = x^3 + y^3 + 3xy(x + y)$

=> $a^3 = (7 + 4\sqrt{3})^3$

=> $1/a = 7 - 4\sqrt{3}$ => $1/a^3 = (7 - 4\sqrt{3})^3$

=> Add both:

=> $a^3 + 1/a^3 = (7 + 4\sqrt{3})^3 + (7 - 4\sqrt{3})^3$

=> $= 2[7^3 + 3\times7\times(4\sqrt{3})^2]$

=> $= 2[343 + 3\times7\times48]$

=> $= 2[343 + 1008] = 2\times1351 = 2702$

Therefore Answer = 2702

Additional Information

Conjugate Property: $(a + b)(a - b) = a^2 - b^2$

Important Identity: $a^3 + b^3 = (a + b)^3 - 3ab(a + b)$

Shortcut Form: If $ab = 1$ => $a^3 + 1/a^3 = (a + 1/a)^3 - 3(a + 1/a)$

Square Identity: $(a + b)^2 = a^2 + b^2 + 2ab$

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Q13. Answer: (d) Tuesday

Given Statements:

All spoons are forks.

All forks are cups.

Some spoons are plates.

The least possible Venn diagram for the given statements is:

Conclusions:

I. Some forks are plates - True (Since some spoons are plates and all spoons are forks, those plates that overlap with spoons must also overlap with forks. So some forks are plates.)

II. Some cups are plates - True (All forks are cups, and some forks are plates, so those plates are also inside cups. Hence, some cups are plates.)

So, both conclusions I and II follow.

Hence, the correct answer is "Option 1".

Q14. Answer: (a) 39 : 16

Shortcut Trick

7 : 63 => multiplier = 9 => x = 6.5 × 9 = 58.5

7 : 42 => multiplier = 6 => y = 4 × 6 = 24

=> x : y = 58.5 : 24

=> Multiply by 2 => 117 : 48

=> Simplify => 39 : 16

Therefore Answer = 39 : 16

Alternate Method

Given: 7 : 63 :: 6.5 : x and 7 : 42 :: 4 : y

Formula: a : b :: c : d => d = (b × c) ÷ a

=> x = (63 × 6.5) ÷ 7 = 9 × 6.5 = 58.5

=> y = (42 × 4) ÷ 7 = 6 × 4 = 24

=> x : y = 58.5 : 24

=> Multiply by 2 => 117 : 48

=> Divide by 3 => 39 : 16

Therefore Answer = 39 : 16

Additional Information

Proportion Rule: a : b :: c : d => ad = bc

Cross Multiplication: d = (b × c) ÷ a

Ratio Simplification: Divide by common factor

Decimal Handling: Multiply both terms to remove decimal

Q15. Answer: (d) LJR 14

The logic followed here is:

So, 'LJR 14' will replace the question mark in the given series.

Hence, the correct answer is "Option 4".

Q16. Answer: (b) 141

The logic followed here is:

63 → 159

=> 63 × 3 − 30 = 159

44 → 102

=> 44 × 3 − 30 = 102

So, the pattern is:

Result = (Number × 3) − 30

Now, applying the same pattern for 57:

=> 57 × 3 − 30 = 171 − 30 = 141

Hence, the correct answer is Option 2.

Q17. Answer: (d) Kudankulam Nuclear Power Station

The correct answer is Kudankulam Nuclear Power Station.

Key Points

• Kudankulam Nuclear Power Station (KKNPP) is located in the Tirunelveli district of Tamil Nadu, making it the southernmost nuclear power plant in India. Hence, the correct answer is option D.

• It is a civil nuclear power plant built in collaboration with Russia (specifically Atomstroyexport, a subsidiary of Rosatom).

• The plant utilizes VVER-1000 reactors (Pressurized Water Reactors) and has a planned capacity of 6,000 MW once all six units are completed.

• Kakrapar Atomic Power Station is situated in the Tapi district (near Surat) of Gujarat, which is in Western India. Hence, statement A is incorrect.

• Narora Atomic Power Station is located in the Bulandshahr district of Uttar Pradesh, serving the Northern Grid of India. Hence, statement B is incorrect.

• Madras Atomic Power Station (MAPS), also known as Kalpakkam, is located in the Chengalpattu district of Tamil Nadu. While it is in the south, it is located north of Kudankulam along the coast. Hence, statement C is incorrect.

Additional Information

• Tarapur Atomic Power Station (TAPS): It was the first commercial nuclear power station built in India, commissioned in 1969. It is located in Palghar, Maharashtra, and was built with technical assistance from the United States of America.

• Rajasthan Atomic Power Station (RAPS): Located at Rawatbhata in the Chittorgarh district of Rajasthan. It was developed in collaboration with Canada and uses CANDU reactor technology.

• Kaiga Generating Station: Located in the Uttara Kannada district of Karnataka. It features Pressurized Heavy Water Reactors (PHWR) and is a key energy provider for the Southern Grid.

• Department of Atomic Energy (DAE): Established in 1954, it operates under the direct charge of the Prime Minister of India. It oversees the development of nuclear power technology and applications of radiation in agriculture, medicine, and industry.

• Homi J. Bhabha: Known as the "Father of the Indian Nuclear Programme," he envisioned India's three-stage nuclear power programme to achieve energy independence by utilizing the country's vast Thorium reserves.

Important Points

• NPCIL: The Nuclear Power Corporation of India Limited is a Public Sector Undertaking (PSU) headquartered in Mumbai. It is responsible for the design, construction, commissioning, and operation of nuclear power reactors.

• Operational Status: As of the current date, India has 20+ nuclear reactors in operation across 7 major sites, with a total installed capacity of over 7,480 MW.

• Uranium and Thorium: India imports Uranium from countries like Kazakhstan, Canada, and Uzbekistan to fuel its reactors, while simultaneously researching Thorium-based systems (Stage 3) found in monazite sands of Kerala and Tamil Nadu.

• Safety Features: The Kudankulam plant is equipped with "Generation 3+" safety features, including a Passive Heat Removal System (PHRS) and a Core Catcher, which are designed to prevent radiation leaks even during total power loss.

Q18. Answer: (d) 5750

Shortcut Trick

Let total voters = N

Valid votes = 80% × 80% = 64% of N

Winning margin = (55% − 45%) of valid = 10% of valid

=> Margin = 10% of 64% of N = 6.4% of N

=> 6.4% of N = 368 => N = 368 ÷ 0.064 = 5750

Therefore Answer = 5750

Alternate Method

Given:

80% voted, 20% invalid, winner gets 55%, margin = 368

Formula:

Margin = Difference% × Valid votes

Calculation:

=> Let total voters = N

=> Votes polled = 0.8N

=> Valid votes = 80% of 0.8N = 0.64N

=> Winner votes = 55% of 0.64N = 0.352N

=> Loser votes = 45% of 0.64N = 0.288N

=> Margin = 0.352N − 0.288N = 0.064N

=> 0.064N = 368

=> N = 368 ÷ 0.064 = 5750

Therefore Total voters = 5750

Additional Information

Valid Votes: = Total votes polled − Invalid votes

Winning Margin: = Difference of % × Total valid votes

Percentage Conversion: x% = x ÷ 100

Shortcut Tip: Combine percentages stepwise to reduce calculation

Q19. Answer: (c) 1

The logic followed here is:

Given: A, B, C, D, E, F and G sit around a circular table facing the centre.

Only one person sits between D and B when counted from the left of B.

F sits third to the right of E.

C sits third to the left of G.

F sits to the immediate right of C.

A is not an immediate neighbour of C.

So, there is 1 person between A and C.

Hence, the correct answer is "Option 3".

Q20. Answer: (a) 9

Shortcut Trick

Sum of known digits = 7 + 1 + 3 + 8 + 8 + 4 + 5 = 36

For divisibility by 3 => (36 + A) must be multiple of 3

36 is already divisible by 3 => A must be divisible by 3

Possible digits: 0, 3, 6, 9

Maximum = 9

Therefore Answer = 9

Alternate Method

Given: Number = 713A8845

Rule: A number is divisible by 3 if sum of digits is divisible by 3

=> Sum = 7 + 1 + 3 + A + 8 + 8 + 4 + 5

=> Sum = 36 + A

=> For divisibility: (36 + A) ÷ 3 should be integer

=> 36 is divisible by 3 => A must be multiple of 3

=> A in {0, 3, 6, 9}

=> Maximum value = 9

Therefore Required digit A = 9

Additional Information

Divisibility by 3: Sum of digits must be multiple of 3

Divisibility by 9: Sum of digits must be multiple of 9

Digit Range: A digit can take values from 0 to 9

Shortcut Tip: First check base sum, then adjust missing digit

Q21. Answer: (b) Israel

The correct answer is Israel.

Key Points

• On November 20, 2024, India and Israel officially signed the Terms of Reference (ToR) to begin negotiations for a Comprehensive Free Trade Agreement (FTA). This significant milestone was achieved during a meeting in New Delhi, marking a new chapter in the economic relationship between the two nations.

• The Terms of Reference were signed by India’s Union Minister of Commerce and Industry, Piyush Goyal, and the Israeli Minister of Economy and Industry, Nir Barkat. The ToR serves as the framework that defines the scope, coverage, and timeline for the FTA

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negotiations.

• The primary objective of the proposed FTA is to substantially increase bilateral trade in goods and services, foster investment flows, and strengthen economic cooperation in high-tech sectors such as semiconductors, cybersecurity, and artificial intelligence.

• India and Israel have seen a consistent rise in trade volumes; for the financial year 2022-23, bilateral trade (excluding defense) stood at approximately $10.7 billion. The FTA is expected to address tariff and non-tariff barriers, potentially doubling trade figures in the near future.

• The negotiations will also focus on integrating supply chains and promoting innovation-led partnerships. This move aligns with India's broader strategy to sign FTAs with developed economies to boost its manufacturing and service exports.

Additional Information

• Diplomatic History: Although India recognized Israel in 1950, full diplomatic relations were established only in January 1992. The relationship was elevated to a Strategic Partnership during the historic visit of Prime Minister Narendra Modi to Israel in July 2017.

• Key Export-Import Commodities: Major Indian exports to Israel include pearls, precious stones, chemical products, and textiles. Conversely, India imports fertilizers, machinery, electrical equipment, and defense technologies from Israel. Diamonds constitute a major portion of the trade, accounting for nearly 50% of the bilateral commerce.

• Defense and Technology Cooperation: Israel is one of India's top four defense suppliers. Beyond defense, the two countries collaborate extensively under the India-Israel Industrial R&D and Technological Innovation Fund (I4F) to promote joint research in sectors like Water Management, Agriculture, and Healthcare.

• The I2U2 Grouping: Both nations are founding members of the I2U2 group (India, Israel, United Arab Emirates, and the United States). This platform, often called the 'West Asian Quad,' focuses on joint investments in six areas: water, energy, transportation, space, health, and food security.

• India's Recent FTAs: India has recently fast-tracked its trade diplomacy, signing the Comprehensive Economic Partnership Agreement (CEPA) with the United Arab Emirates in February 2022 and the Economic Cooperation and Trade Agreement (ECTA) with Australia in April 2022.

Important Points

• Center of Excellence (CoE): Israel has established 30 Centers of Excellence across 12 Indian states to share advanced agricultural technology and water harvesting techniques, benefiting thousands of Indian farmers.

• Water Cooperation: In 2020, India and Israel signed a cultural agreement and a cooperation agreement on water utility reform, focusing on desalination and wastewater treatment, which are critical for India's Jal Jeevan Mission.

• Startup Ecosystem: The India-Israel Innovation Bridge was launched to facilitate collaboration between startups from both countries, focusing on finding solutions for global challenges in agritech and medtech.

Q22. Answer: (b) PT Usha

The correct answer is PT Usha.

Key Points

• Pilavullakandi Thekkeparambil Usha, popularly known as PT Usha, is a retired Indian track and field athlete who is often called the "Queen of Indian Track and Field". She was born on June 27, 1964, in the village of Payyoli, Kozhikode district, Kerala. Due to her lightning speed on the track and her place of birth, she earned the iconic nickname "Payyoli Express".

• She rose to national fame at the 1979 National School Games and made her Olympic debut at the age of 16 in the 1980 Moscow Olympics. She became a household name across India during the 1980s for her dominance in sprint events.

• PT Usha is most famously remembered for her performance at the 1984 Los Angeles Olympics. She became the first Indian woman to reach the final of an Olympic event, where she missed the bronze medal in the 400m hurdles by just 1/100th of a second.

• Throughout her career, she won four gold medals and one silver medal at the 1986 Seoul Asian Games. Overall, she has won 101 international medals and was awarded the Arjuna Award in 1983 and the Padma Shri (India's fourth-highest civilian award) in 1985.

Additional Information

• Leander Paes: He is a legendary Indian tennis player who is widely considered one of the greatest doubles and mixed doubles players in history. He holds the record for the most doubles wins in Davis Cup history. Paes won a bronze medal for India in the singles category at the 1996 Atlanta Olympics, becoming the first Indian to win an individual Olympic medal since 1952.

• Sania Mirza: She is a retired professional tennis player from India who achieved a former world No. 1 ranking in doubles. She has won six Grand Slam titles (three in women's doubles and three in mixed doubles). She was the first Indian woman to win a WTA title and is a recipient of the Major Dhyan Chand Khel Ratna award (2015).

• Shoaib Akhtar: He is a former Pakistani cricketer and fast bowler, famously nicknamed the "Rawalpindi Express" because of his birthplace (Rawalpindi) and his extreme bowling speed. He holds the world record for the fastest delivery ever bowled in international cricket, clocking 161.3 km/h (100.2 mph) during the 2003 Cricket World Cup.

• Milkha Singh: Another legendary Indian athlete known as "The Flying Sikh". He was a field sprinter who won gold medals at the 1958 and 1962 Asian Games. He famously finished fourth in the 400m final at the 1960 Rome Olympics, missing the podium by a

fraction of a second.

Important Points

• Administrative Roles: In December 2022, PT Usha was elected unopposed as the President of the Indian Olympic Association (IOA). She is the first woman to head the organization in its 95-year history and the first Olympian to hold the post.

• Parliamentary Nomination: In July 2022, she was nominated to the Rajya Sabha (the Upper House of the Indian Parliament) by the President of India for her contribution to Indian sports.

• Usha School of Athletics: To give back to the sport, she founded the Usha School of Athletics in Koyilandy, Kerala. The academy focuses on identifying and training young talent to win medals for India at the Olympics.

• Records: During the 1985 Asian Track and Field Championships in Jakarta, she won five gold medals (100m, 200m, 400m, 400m hurdles, and 4x400m relay) and one bronze medal, a feat rarely matched in athletics history.

Q23. Answer: (a) 340 m/s

The correct answer is 340 m/s.

Key Points

• The speed of sound in air is approximately 343 meters per second (m/s) when the temperature is 20 degrees Celsius (68 degrees Fahrenheit).

• Sound is a longitudinal mechanical wave that propagates through a medium by the vibration of particles. In dry air at 0 degrees Celsius, the speed is 331 m/s.

• Option A (340 m/s) is the closest value to the standard speed of sound in air at normal atmospheric conditions. Hence, this statement is correct.

• Option B (12000 m/s) is far beyond the speed of sound in air; such high speeds are only observed in extremely stiff materials like diamond, where sound travels at approximately 12,000 m/s. Hence, this statement is incorrect.

• Option C (3 x 10^8 m/s) represents the speed of light in a vacuum (approximately 299,792,458 m/s), which is about a million times faster than sound. Hence, this statement is incorrect.

• Option D (3400 km/s) converts to 3,400,000 m/s, which is an unrealistic value for sound propagation in any common earthly medium. Hence, this statement is incorrect.

Additional Information

• Factors Affecting Speed: The speed of sound in air depends primarily on the temperature. For every 1 degree Celsius increase in temperature, the speed of sound increases by about 0.6 m/s.

• Medium Density: Sound travels fastest in solids, slower in liquids, and slowest in gases. For example, the speed of sound in steel is about 5,960 m/s and in water is about 1,480 m/s.

• Humidity: Increased humidity (water vapor in the air) slightly increases the speed of sound because water molecules are less dense than nitrogen and oxygen molecules, making the air lighter and easier for sound to move through.

• Pressure: At a constant temperature, changes in atmospheric pressure do not affect the speed of sound because the density changes proportionally, cancelling out the effect.

• Mach Number: The ratio of the speed of an object to the speed of sound in the surrounding medium is called the Mach Number. Mach 1 represents traveling at the speed of sound.

Important Points

• Newton-Laplace Formula: Sir Isaac Newton originally calculated the speed of sound assuming isothermal conditions, but Pierre-Simon Laplace corrected it in 1816 by accounting for adiabatic compression and expansion.

• Frequency and Wavelength: The speed (v) is related to frequency (f) and wavelength (λ) by the formula $v = f \times \lambda$. However, the speed itself is a property of the medium, not the sound source.

• Audible Range: Humans can hear sound frequencies between 20 Hz and 20,000 Hz. Frequencies below this are infrasonic and above are ultrasonic.

• Thunder and Lightning: During a storm, we see lightning before we hear thunder because light travels at 3,00,000 km/s, while sound travels at only 0.34 km/s.

Q24. Answer: (d) 85

The logic followed here is:

thus, "85" will replace the question mark in the given series.

Hence, the correct option is "Option 4".

Q25. Answer: (d) Wife's mother's sister

Family Chart:

Given:

A is the sister of B,

B is the mother of C,

C is the brother of D,

E is the husband of D.

Since, A is wife's mother's sister.

Hence, the correct answer is Option 4.

Q26. Answer: (c) 298

Shortcut Trick

Use weighted average:

Overall avg = (53×424 + 86×337 + 57×122) ÷ (53+86+57)

=> = (22472 + 28982 + 6954) ÷ 196

=> = 58408 ÷ 196

=> = 298

Therefore Answer = 298

Alternate Method

Given: A(53,424), B(86,337), C(57,122)

Formula: Overall average = Total expenditure ÷ Total members

=> Total A = 53 × 424 = 22472

=> Total B = 86 × 337 = 28982

=> Total C = 57 × 122 = 6954

=> Total expenditure = 22472 + 28982 + 6954 = 58408

=> Total members = 53 + 86 + 57 = 196

=> Average = 58408 ÷ 196 = 298

Therefore Overall average = 298

Additional Information

Weighted Average: = (Σ (value × frequency)) ÷ total frequency

Shortcut Tip: Always multiply before adding

Common Mistake: Don't take simple average of averages

Application: Used in marks, mixture, population problems

Q27. Answer: (c) December 18

The correct answer is December 18.

Key Points

• International Migrants Day is an international day observed on December 18 every year to recognize the efforts, contributions, and rights of migrants worldwide.

• For the year 2025, the theme is "My Great Story: Cultures and Development", which emphasizes the narrative of migrants as agents of cultural exchange and drivers of economic and social development.

• The United Nations General Assembly (UNGA) officially proclaimed December 18 as International Migrants Day on 4 December 2000 under resolution 55/93.

• The date was chosen because on 18 December 1990, the UNGA adopted the International Convention on the Protection of the Rights of All Migrant Workers and Members of Their Families.

• The day highlights the need for safe, orderly, and regular migration, addressing the challenges faced by over 280 million migrants globally. Hence, the option specifying December 18 is correct.

Additional Information

• International Organization for Migration (IOM):

• Established in 1951, the IOM is the leading intergovernmental organization in the field of migration and is part of the United Nations system.

• Headquartered in Geneva, Switzerland, it works closely with governmental, intergovernmental, and non-governmental partners to manage migration for the benefit of all.

• Global Compact for Migration (GCM):

• The Global Compact for Safe, Orderly and Regular Migration was adopted in December 2018.

• It is the first inter-governmentally negotiated agreement, prepared under the auspices of the United Nations, covering all dimensions of international migration in a holistic and comprehensive manner.

• Sustainable Development Goals (SDGs):

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• Migration is integrated into the 2030 Agenda for Sustainable Development, particularly under SDG Target 10.7.

• This target aims to facilitate orderly, safe, regular, and responsible migration and mobility of people, including through the implementation of planned and well-managed migration policies.

• World Migration Report:

• The IOM publishes the World Migration Report every two years (e.g., 2022, 2024).

• According to the World Migration Report 2024, there are approximately 281 million international migrants, which represents about 3.6% of the global population.

Important Points

• Indian Context and Migration:

• India has the world's largest diaspora, with over 18 million people living outside their country of birth as of 2020 reports.

• The Ministry of External Affairs (MEA) handles the welfare of Non-Resident Indians (NRIs) and Overseas Citizens of India (OCI).

• Pravasi Bharatiya Divas (PBD) is celebrated in India on 9 January to mark the contribution of the overseas Indian community. It commemorates the return of Mahatma Gandhi from South Africa to Mumbai on 9 January 1915.

• Constitutional Provisions in India:

• Article 19(1)(e) of the Constitution of India grants citizens the fundamental right to reside and settle in any part of the territory of India.

• Articles 5 to 11 of the Indian Constitution deal with the citizenship of individuals at the commencement of the Constitution.

• Remittances:

• According to World Bank data, India is consistently one of the largest recipients of remittances globally, receiving over $100 billion in recent years (e.g., 2023).

Q28. Answer: (b) 1

Shortcut Trick

LCM of 4, 28 = 28 (Total work)

=> Tap A = 28 ÷ 4 = 7 units/hr

=> Tap B = 28 ÷ 28 = 1 unit/hr

=> Tap C (empty) = −1 unit/hr

=> Net work = 7 + 1 − 1 = 7 units/hr

=> Work required = 1/4 of 28 = 7 units

=> Time = 7 ÷ 7 = 1 hour

Therefore Answer = 1 hour

Alternate Method

Given: Filling = 4 hr, 28 hr; Emptying = 28 hr

Table Method:

Tap	Time (hrs)	Work per hour
A	4	1/4
B	28	1/28
C (empty)	28	−1/28

=> Net rate = 1/4 + 1/28 − 1/28 = 1/4

=> Work required = 1/4

=> Time = (1/4) ÷ (1/4) = 1 hour

Therefore Time required = 1 hour

Additional Information

LCM Method: Assume total work = LCM of times

Efficiency: Work per hour = Total work ÷ Time

Net Work: Add filling, subtract emptying

Time Formula: Time = Work ÷ Net rate

Q29. Answer: (c) 4

The logic followed here is:

Given series: (Left) S # % 2 S 4 P # Z 4 B 8 5 R € * 8 © J & € N (Right)

Now, Remove all symbols: #, %, €, *, ©, &, €

Remaining series (letters and numbers only): S 2 S 4 P Z 4 B 8 5 R 8 J N

Now, Count from the left: S 2 S 4 P Z 4 B 8 5 R 8 J N

Fourth from the left = 4

Hence, the correct answer is Option 3.

Q30. Answer: (c) Two

Given: C, D, N, O, P and Q live on six different floors of the same building. The lowermost floor is numbered 1 and the topmost floor is numbered 6.

D lives on floor number 1.

Only two people live between Q and P.

Q lives below C.

Only two people live between O and C.

Only one person lives between D and C.

Floor	Person
6	O
5	P
4	N
3	C
2	Q
1	D

Now, people above N (floor 4) are O and P → 2 people

Hence, the correct answer is Option 3.

Q31. Answer: (d) Warli

The correct answer is Warli.

Key Points

• Warli Painting is a world-renowned tribal art form that originated in the Sahyadri Range of Maharashtra, particularly within the Palghar and Thane districts. It is distinguished by its monochromatic style, where a white pigment made from rice paste, water, and gum is applied onto reddish-brown mud walls. Hence, option D is correct.

• Gond Painting is a traditional art form practiced by the Gond tribe, predominantly in Madhya Pradesh. This style is famous for its use of vibrant colors and intricate patterns consisting of dots and lines to depict flora, fauna, and local folklore. It does not follow a monochromatic scheme on mud walls. Hence, option A is incorrect.

• Madhubani Painting, also known as Mithila Art, hails from the Mithila region of Bihar and parts of Nepal. It is characterized by bold, geometric patterns and vibrant natural dyes derived from turmeric, indigo, and sandalwood, often featuring double outlines for figures. Hence, option B is incorrect.

• Pahari Painting refers to an umbrella term for miniature painting styles that developed in the Himalayan hill states of India (such as Himachal Pradesh and Jammu) during the 17th to 19th centuries. These are highly detailed courtly paintings known for their expressive colors and spiritual themes. Hence, option C is incorrect.

Additional Information

• Materials and Techniques: The Warli artists use a bamboo stick chewed at the end to serve as a brush. The background of the mud walls is prepared using cow dung and red mud, which provides the distinctive terracotta color that contrasts with the white rice-paste figures.

• Geographical Identity: Warli painting from Maharashtra has been granted the Geographical Indication (GI) tag, which protects the intellectual property of the tribal artisans and ensures the authenticity of the art form produced in the Palghar region.

• Themes of Art: Unlike many other Indian folk arts that focus on religious deities, Warli art primarily depicts social life, nature, and tribal rituals. Common scenes include harvesting, hunting, fishing, and communal dancing (specifically the Tarpa dance).

• Cultural Significance: Historically, Warli paintings were created by women (known as Suhasinis) on the walls of their huts during wedding ceremonies or harvest festivals to seek blessings and prosperity for the household.

Important Points

• Geometric Symbolism: Warli art is built upon three basic geometric shapes: the circle (representing the sun and moon), the triangle (representing mountains and conical trees), and the square (representing a sacred enclosure or a piece of land).

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• Human Figures: In Warli paintings, human and animal bodies are represented by two triangles joined at the tip. The upper triangle represents the torso, while the lower triangle represents the pelvis. This symmetry symbolizes the balance of the universe.

• Historical Context: Although it gained global recognition in the 1970s due to artists like Jivya Soma Mashe, the roots of Warli art are believed to date back as far as the 10th century AD, showing similarities to Neolithic rock paintings found at Bhimbetka.

• Modern Evolution: Today, the art form has transitioned from mud walls to paper, canvas, and fabrics. It is widely used in fashion, home decor, and advertising, making it one of India's most recognizable cultural exports.

Q32. Answer: (b) Kathak Kendra

The correct answer is Kathak Kendra.

Key Points

• The National Institute of Kathak Dance, popularly known as Kathak Kendra, is the premier institution for training in Kathak, one of the eight classical dance forms of India.

• It is a constituent unit of the Sangeet Natak Akademi, which is India's National Academy of Music, Dance and Drama under the Ministry of Culture.

• The institute is located in New Delhi and was formally established in its current form in the year 1964.

• It was initially established as a wing of the Sriram Bharatiya Kala Kendra in 1955, primarily to provide a platform for the legendary Pandit Shambhu Maharaj to teach the nuances of the Lucknow Gharana.

• The Kathak Kendra focuses on preserving and promoting the diverse traditions of Kathak, specifically the Lucknow, Jaipur, and Banaras styles, while fostering innovation within the classical framework.

Additional Information

• Kathak Dance Overview:

• The word Kathak is derived from the Sanskrit word Katha, which means "story," and Kathakar, which means "storyteller."

• It originated in North India and was traditionally performed by wandering bards in temples and later in the Mughal courts.

• Key features include intricate footwork (Tatkar), lightning-fast pirouettes (Chakkars), and expressive facial movements (Abhinaya).

• Major Gharanas (Schools):

• Lucknow Gharana: Known for grace, elegance, and Bhava (expression). It was greatly patronized by Wajid Ali Shah, the last Nawab of Awadh.

• Jaipur Gharana: Emphasizes powerful footwork and complex rhythmic patterns.

• Banaras Gharana: Known for its sobriety and use of the Natwari style of dancing.

• Prominent Personalities:

• Pandit Birju Maharaj was perhaps the most famous face associated with Kathak Kendra, serving as its Head of Faculty and Director for several years.

• Other notable figures include Lachhu Maharaj, Shambhu Maharaj, and Sitara Devi, who have significantly contributed to the global recognition of this dance form.

Important Points

• Institutional Role: The Kathak Kendra offers specialized courses, including a five-year Diploma and post-graduate studies, making it a central hub for professional dancers and researchers.

• Cultural Impact: By functioning under the Sangeet Natak Akademi, which was established in 1953, the institute ensures that the Guru-Shishya Parampara (teacher-disciple tradition) continues in a modern academic setting.

• Sriram Bharatiya Kala Kendra: While Kathak Kendra is now an independent unit of the government, the Sriram Bharatiya Kala Kendra (founded in 1952) remains a private cultural organization in New Delhi that also promotes Kathak and other performing arts.

• National Importance: As a national institute, it represents the cultural heritage of India on international platforms and facilitates exchange programs with other countries to promote Indian classical arts.

Q33. Answer: (a) P and D

The logic followed here is:

Given: Seven people B, C, D, O, P, Q and R are sitting around a circular table facing the centre.

Only one person sits between P and B when counted from the left of B.

Only one person sits between B and R.

Only one person sits between P and D.

Only two people sit between O and R.

Only one person sits between Q and D.

Now finding immediate neighbours of C:

Immediate right of C = P

Immediate left of C = D

Hence, the correct answer is "Option 1".

Q34. Answer: (b) = EOW % = DNV

Given: # : KUC :: XHP : %

Option 1) # = FOW, % = DNV

For # (FOW) to KUC

For % (DNV) from XHP

Since, the pattern is not consistent for both transformations, Option 1 is incorrect.

Option 2) # = EOW, % = DNV

For # (EOW) to KUC

For % (DNV) from XHP

Since, both transformations follow a uniform +6 shift pattern, Option 2 is correct.

Option 3) # = EOW, % = DNO

For # (EOW) to KUC

For % (DNO) from XHP

Since, the pattern is not consistent, Option 3 is incorrect.

Option 4) # = EOX, % = DNV

For # (EOX) to KUC

For % (DNV) from XHP

Since, # does not follow a uniform shift, Option 4 is incorrect.

Hence, the correct answer is "Option 2".

Q35. Answer: (d) Banabhatta

The correct answer is Banabhatta.

Key Points

• Banabhatta was the celebrated Asthana Kavi (court poet) of King Harshavardhana, who ruled Northern India in the 7th century. Hence, option D is correct.

• He is most famous for writing the Harshacharita, which is the first historical biography in Sanskrit, detailing the life and rise to power of Harsha.

• Apart from the biography, Banabhatta authored Kadambari, which is considered one of the world's earliest novels.

• Harshavardhana, also known as Harsha, belonged to the Pushyabhuti or Vardhana dynasty and reigned from 606 AD to 647 AD.

• Under Harsha's patronage, Kannauj became a major political and cultural center in Northern India, shifting the capital from Thanesar.

Additional Information

• Harishena:

• Harishena was a 4th-century Sanskrit poet and a high-ranking official in the court of the Gupta Emperor Samudragupta.

• He is best known for composing the Prayag Prashasti (also known as the Allahabad Pillar Inscription), which describes the military achievements and character of Samudragupta. Hence, statement A is incorrect.

• Kalashoka:

• Kalashoka was a ruler of the Shishunaga dynasty of Magadha in ancient India.

• His reign is historically significant for the Second Buddhist Council, which was held at Vaishali in 383 BC. Hence, statement B is incorrect.

• Vasumitra:

• Vasumitra was a distinguished Buddhist monk and scholar who lived during the reign of the Kushan Emperor Kanishka.

• He presided over the Fourth Buddhist Council held in Kashmir (at Kundalvana) during the 1st or 2nd century AD. Hence, statement C is incorrect.

Important Points

• Harsha's Literary Contributions: King Harsha was not only a patron of arts but also an accomplished author himself. He wrote three famous Sanskrit plays: Ratnavali, Priyadarsika, and Nagananda.

• Xuanzang (Hiuen Tsang): The famous Chinese traveler visited India during Harsha's reign in 630 AD and stayed for about 15 years. His writings provide a detailed account of the socio-economic and religious conditions of that era.

• Military Conflict: While Harsha conquered much of Northern India, his southward expansion was halted by the Chalukya King

Pulakeshin II on the banks of the Narmada River in 618-619 AD.

• Religious Tolerance: Harsha was known for his Mahayana Buddhist leanings but maintained tolerance toward other faiths. He organized a grand assembly at Kannauj and the Prayag Assembly (held every five years) for charitable distributions.

Q36. Answer: (a) 54 seconds

Shortcut Trick

Relative speed (same direction) = 72 − 54 = 18 km/hr

=> Convert: 18 × 5/18 = 5 m/s

Total distance = 150 + 120 = 270 m

=> Time = 270 ÷ 5 = 54 sec

Therefore Answer = 54 seconds

Alternate Method

Given:

Train	Length (m)	Speed (km/hr)
A	150	72
B	120	54

Formula: Time = Total length ÷ Relative speed

=> Relative speed = (72 − 54) = 18 km/hr

=> Convert to m/s: 18 × 5/18 = 5 m/s

=> Total length = 150 + 120 = 270 m

=> Time = 270 ÷ 5 = 54 sec

Therefore Time required = 54 seconds

Additional Information

Relative Speed: Same direction => difference of speeds

Opposite Direction: Speeds are added

Conversion: km/hr to m/s => multiply by 5/18

Train Crossing: Distance = sum of lengths

Q37. Answer: (d) Outsourcing

The correct answer is Outsourcing.

Key Points

• Outsourcing is considered one of the most important outcomes of the Globalization process. In this practice, a company hires regular service from external sources, often located in other countries, which was previously performed internally. Hence, statement D is correct.

• Privatisation refers to the process of involving the private sector in the ownership or operation of a state-owned enterprise. While it was a part of the 1991 reforms, it is categorized as a policy measure rather than a direct outcome of globalization. Hence, statement A is incorrect.

• Nationalisation is the process of transforming private assets into public assets by bringing them under the public ownership of a national government. This was a prominent feature of the Indian economy in the 1960s and 1970s, which is the opposite of the current globalization trend. Hence, statement B is incorrect.

• Liberalisation refers to the relaxation of government restrictions in the areas of social, political, and economic policies. In the economic context, it means opening up the economy by removing barriers to entry and growth for the private sector. It acts as a prerequisite for globalization rather than its outcome. Hence, statement C is incorrect.

• India has emerged as a major hub for Outsourcing, particularly in Business Process Outsourcing (BPO) and Information Technology (IT) services, due to the availability of skilled manpower and lower wage rates.

Additional Information

• New Economic Policy (NEP) 1991: The NEP was launched in July 1991 under the leadership of Prime Minister P.V. Narasimha Rao and Finance Minister Dr. Manmohan Singh to address the Balance of Payments (BoP) crisis.

• LPG Model: The reforms are famously known as the LPG model, standing for Liberalisation, Privatisation, and Globalisation. The primary objective was to plunge the Indian economy into the arena of Globalization and to give it a new thrust on market orientation.

• Globalisation: It is the process of integrating the national economy with the world economy through the removal of barriers on international trade and capital movements. It involves the free flow of goods, services, capital, and labor across borders.

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• Role of WTO: The World Trade Organization (WTO), established in 1995 as the successor to GATT, played a crucial role in facilitating globalization by encouraging member countries (including India) to reduce tariffs and non-tariff barriers.

• Impact on Service Sector: Globalization significantly boosted India's Service Sector. The export of services like software, banking, and technical consultancy grew exponentially, contributing heavily to India's Gross Domestic Product (GDP).

Important Points

• Knowledge Process Outsourcing (KPO): Beyond simple data entry, India has moved into high-end KPO, which includes services like R&D, e-learning, business and market research, and legal services.

• FDI and FII: Globalization led to an increase in Foreign Direct Investment (FDI) and Foreign Institutional Investment (FII). The government has gradually increased FDI limits in various sectors like Insurance, Defense, and Retail.

• BPO Industry Growth: The Business Process Outsourcing industry in India provides employment to millions of youth and has turned India into the "back office of the world." Common services include customer care, record keeping, and accountancy.

• Challenges: While globalization has brought growth, it has also led to challenges such as increased competition for Micro, Small, and Medium Enterprises (MSMEs) and concerns regarding economic inequality.

Q38. Answer: (a) 5

The logic followed here is:

Given number: 3975684

Logic: Subtract 2 from each digit, then arrange the new digits in ascending order.

Original number: 3 9 7 5 6 8 4

After subtracting 2: 1 7 5 3 4 6 2

Ascending order: 1 2 3 4 5 6 7

Fifth digit from the left = 5

Hence, the correct answer is Option 1.

Q39. Answer: (b) Data in Statement I alone is sufficient to answer the question while data in statement II is not

Given Statements:

I. M is taller than V but shorter than N. M is shorter than only one tree.

II. V is taller than T.

Analysis:

I. From Statement I → M is shorter than only one tree, so M is the second tallest.

Since, M is shorter than N, N must be taller than M.

Therefore, N is the tallest tree → Statement I alone is sufficient.

II. From Statement II → V is only compared with T, so no information about L, M, or N;

tallest cannot be determined → Not sufficient.

Using both I and II together → Statement I already identifies N as the tallest, so additional data is not required.

Hence, the correct answer is Option 2.

Q40. Answer: (b) SEVEN

The logic followed here is:

Given series: (Left) K { J % I + H = G * F / D : - ! B C ? A # (Right)

Now, We need symbols which are immediately preceded by a letter and immediately followed by another letter.

So, needed pattern is: Letter - Symbol - Letter

(Left) K { J % I + H = G * F / D : - ! B C ? A # (Right)

Total valid symbols = 7

Hence, the correct answer is Option 2.

Q41. Answer: (b) 5.56

Shortcut Trick

In SI, doubling => Interest = Principal

=> Rate = 100 ÷ Time

=> Rate = 100 ÷ 18 = 5.555...

=> ≈ 5.56%

Therefore Answer = 5.56%

Alternate Method

Given: Time = 18 years, Amount = 2P

Formula: SI = (P × R × T) ÷ 100

Parameter	Value
Principal (P)	P
Amount (A)	2P
Interest (SI)	P
Time (T)	18

=> P = (P × R × 18) ÷ 100

=> 1 = (R × 18) ÷ 100

=> R = 100 ÷ 18 = 5.555...

=> R ≈ 5.56%

Therefore Rate = 5.56% per annum

Additional Information

Simple Interest: SI = (P × R × T) ÷ 100

Doubling Rule (SI): Rate = 100 ÷ Time

Amount Formula: A = P + SI

Approximation: 100/18 ≈ 5.56

Q42. Answer: (d) Wife’s father

Family Chart:

Given:

Kc is the daughter of Cw,

Ef is the mother of Kc,

Qk is the brother of Ef,

Lu is the father of Qk.

Hence, Lu is related to Cw as Wife’s father.

Hence, the correct answer is Option 4.

Q43. Answer: (d) (-5)/9

Shortcut Trick

cosecA = 5/3 => sinA = 3/5 => cosA = 4/5

=> secA = 5/4

Use identities: $1 + \cot^2A = \text{cosec}^2A$

=> Numerator = 9 × (25/9) = 25

=> Denominator = 80(1 − secA)(1 + secA) = 80(1 − $\sec^2A$)

=> = 80(1 − 25/16) = 80(−9/16) = −45

=> Value = 25 ÷ (−45) = −5/9

Therefore Answer = −5/9

Alternate Method

Given: cosecA = 5/3

Formula: sinA = 1/cosecA

=> sinA = 3/5

=> cosA = √(1 − $\sin^2A$) = √(1 − 9/25) = √(16/25) = 4/5

=> secA = 1/cosA = 5/4

=> $1 + \cot^2A = \text{cosec}^2A = (5/3)^2 = 25/9$

=> Numerator = 9 × 25/9 = 25

=> Denominator = 80(1 − secA)(1 + secA)

=> = 80(1 − $\sec^2A$)

=> = 80(1 − 25/16)

=> = 80 × (−9/16) = −45

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=> Required value = 25 ÷ (−45) = −5/9

Therefore Final Answer = −5/9

Additional Information

Pythagorean Identity: $\sin^2A + \cos^2A = 1$

Important Identity: $1 + \cot^2A = \text{cosec}^2A$

Sec Identity: $1 - \sec^2A = -\tan^2A$

Conjugate Use: $(1 - \sec A)(1 + \sec A) = 1 - \sec^2A$

Q44. Answer: (d) 24

Shortcut Trick

Use: Product of numbers = HCF × LCM

=> Other number = (6 × 72) ÷ 18

=> = 432 ÷ 18 = 24

Therefore Answer = 24

Alternate Method

Given:

HCF = 6, LCM = 72, One number = 18

Formula:

Product of two numbers = HCF × LCM

Calculation:

=> Product = 6 × 72 = 432

=> Other number = 432 ÷ 18 = 24

Therefore Required number = 24

Additional Information

Key Relation: HCF × LCM = Product of numbers

HCF: Highest common factor (greatest divisor)

LCM: Least common multiple

Application: Used to find unknown numbers quickly

Q45. Answer: (a) The law of inertia causes our body to resist the change in direction.

The correct answer is The law of inertia causes our body to resist the change in direction.

Key Points

• The phenomenon of being thrown to one side when a motorcar makes a sharp turn at high speed is a direct application of Newton's First Law of Motion, also known as the Law of Inertia.

• Inertia is the inherent property of an object to resist any change in its state of rest or uniform motion in a straight line. In this case, it is specifically Inertia of Direction, which is the tendency of a body to maintain its direction of motion. Hence, statement A is correct.

• When the car takes a sharp turn, the friction between the tires and the road provides the necessary centripetal force to change the car's direction. However, the passenger's body, due to inertia, tries to continue moving in its original straight-line path.

• As the car moves towards the center of the curve, the passenger feels an outward pull (often perceived as centrifugal force), which is actually just the body resisting the change in velocity (direction).

• Air pressure changes inside the car are negligible during a turn and do not possess the magnitude required to push a human body. Hence, statement B is incorrect.

• The force of gravity acts vertically downwards towards the center of the Earth and does not change its primary direction based on the horizontal turn of a vehicle. Hence, statement C is incorrect.

• While friction is required for the turn, the sensation of being thrown is caused by the body's mass and velocity, not by a decrease in friction itself. In fact, if friction were to decrease significantly, the car would skid rather than make a sharp turn. Hence, statement D is incorrect.

Additional Information

• Newton's First Law (1687): Formulated by Sir Isaac Newton in his work 'Philosophiæ Naturalis Principia Mathematica', it states that an object will remain at rest or in uniform motion unless acted upon by an external unbalanced force.

• Types of Inertia:

• Inertia of Rest: The inability of a body to change its state of rest by itself. Example: When a bus starts suddenly, passengers fall backwards.

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• Inertia of Motion: The inability of a body to change its state of uniform motion. Example: An athlete runs some distance before taking a long jump to gain momentum.

• Inertia of Direction: The inability of a body to change its direction of motion. Example: The sparks produced during grinding of a stone fly off tangentially.

• Mass as a Measure: The quantitative measure of inertia is mass. An object with a higher numerical value of mass (measured in kilograms) possesses greater inertia and requires more force to change its state.

• Safety Applications: Seatbelts in cars are designed based on the principles of inertia. During a sudden brake or a sharp turn, the seatbelt provides the necessary external force to stop the body from moving forward or sideways, preventing accidents.

Important Points

• Centripetal vs. Centrifugal Force: Centripetal force is a real force that acts towards the center of the circular path. Centrifugal force is a pseudo-force (apparent force) that appears to act outward when observed from a non-inertial frame of reference (the accelerating car).

• Galileo's Contribution: Before Newton, Galileo Galilei was the first to suggest the concept of inertia through his experiments with inclined planes in the early 17th century.

• Banking of Roads: To prevent vehicles from skidding due to high inertia and lack of friction during turns at high speed, roads are often "banked" (tilted upwards towards the outer edge). This allows a component of the Normal Force to contribute to the centripetal force.

Q46. Answer: (d) NLUX

The logic followed here is:

For, RILA → SKOE

Similarly, KEPO → LGSS

Now, apply the same rule to MJRT:

Here, MJRT → NLUX

Hence, the correct answer is Option 4.

Q47. Answer: (c) Gulf Cooperation Council (GCC)

The correct answer is Gulf Cooperation Council (GCC).

Key Points

• The Gulf Cooperation Council (GCC) concluded its 46th Summit in Manama, Bahrain, where the participating leaders adopted the Sakhir Declaration.

• The GCC summit brought together the leaders of the six member states to discuss matters concerning political coordination, regional security, economic cooperation, and integration.

• The Sakhir Declaration reaffirmed the GCC countries' commitment to strengthening collective action, political unity, security cooperation, and economic integration.

• The GCC consists of six Arab Gulf countries: Saudi Arabia, Kuwait, the United Arab Emirates, Qatar, Bahrain, and Oman.

• Hence, the correct answer is Gulf Cooperation Council (GCC).

Additional Information

• Gulf Cooperation Council (GCC):

• The GCC was established on 25 May 1981 through the Charter of the Gulf Cooperation Council.

• Its headquarters is located in Riyadh, Saudi Arabia.

• The organisation promotes coordination, integration, and interconnection among its member states in areas including politics, economy, security, defence, and social affairs.

• GCC Member States:

• Bahrain

• Kuwait

• Oman

• Qatar

• Saudi Arabia

• United Arab Emirates (UAE)

• Sakhir Declaration:

• The declaration takes its name from Sakhir, an area in Bahrain associated with the summit.

• It emphasised the importance of GCC unity and collective cooperation in addressing regional challenges.

• The declaration also reaffirmed the objective of advancing deeper political, security, and economic integration among GCC members.

• GCC Summit:

• The GCC holds regular meetings of its highest-level leadership through the Supreme Council, comprising the heads of the member states.

• These summits provide a platform for discussing regional security, economic relations, international developments, and intra-GCC cooperation.

Important Points

• Organisation: Gulf Cooperation Council (GCC)

• 46th Summit: Held in Manama, Bahrain

• Declaration adopted: Sakhir Declaration

• Established: 25 May 1981

• Headquarters: Riyadh, Saudi Arabia

• Number of members: 6

• Core focus: Political, security, economic, and regional cooperation

Q48. Answer: (c) DHRUV64 microprocessor

The correct answer is DHRUV64 microprocessor.

Key Points

• DHRUV64 was launched on 15 December 2025 as India's first indigenously designed 1.0 GHz, 64-bit dual-core microprocessor.

• Developer: It was developed by the Centre for Development of Advanced Computing (C-DAC) under the Microprocessor Development Programme (MDP) initiated by the Ministry of Electronics and IT (MeitY).

• Architecture: The processor is based on the open-source RISC-V instruction set architecture, which helps eliminate dependence on foreign intellectual property (IP) and licensing fees.

• Significance: It marks a major step in the Digital India RISC-V (DIR-V) initiative, following the earlier THEJAS32 and THEJAS64 prototypes, and is intended for use in strategic sectors like 5G infrastructure, automotive electronics, and industrial automation.

Additional Information

• SHAKTI Microprocessor:

• Developed by IIT Madras, SHAKTI was India’s first indigenous microprocessor family launched earlier than VEGA.

• While SHAKTI proved the viability of Indian silicon, the VEGA-64 represents an evolution into higher clock speeds of 1.0 GHz and 64-bit dual-core capabilities for more intensive computing tasks.

• Digital India RISC-V (DIR-V) Program:

• Launched by the Government of India, the DIR-V program is tasked with making India a global hub for RISC-V talent and design.

• It envisions the development of various classes of processors, including E-class for IoT, A-class for high-performance applications, and H-class for high-performance computing.

• Role of C-DAC:

• C-DAC (Centre for Development of Advanced Computing) is the premier R&D organization of the Ministry of Electronics and Information Technology (MeitY) for carrying out R&D in IT, Electronics, and associated areas.

• It has been instrumental in the Microprocessor Development Programme (MDP), which led to the creation of the VEGA family of processors including 32-bit and 64-bit variants.

• Global Context and RISC-V:

• By adopting RISC-V, India joins a global movement towards open-source hardware, reducing dependency on proprietary architectures like ARM or x86.

• This move ensures security and sovereignty over the hardware level, preventing backdoors and ensuring long-term maintenance of critical infrastructure.

Important Points

• Specifications of VEGA-64: The processor operates at a frequency of 1.0 GHz, utilizes a 64-bit data width, and incorporates a Super-scalar execution pipeline to enhance performance-per-watt.

• Manufacturing and Fabrication: The VEGA series processors are typically fabricated at advanced semiconductor foundries, often utilizing nodes like 28nm or 180nm (for older variants at SCL Mohali), with 2025 milestones focusing on more compact and efficient process nodes.

• Applications: The VEGA-64 is targeted at General Purpose Computing, Secure Storage, Smart Mobility, and Automotive systems, providing a local alternative for critical data handling.

• Atmanirbhar Bharat: The development of indigenous microprocessors is a cornerstone of the Atmanirbhar Bharat (Self-Reliant India) initiative, aiming to reduce the import bill of electronic components which is currently one of the highest for the Indian economy.

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Q49. Answer: (a) 9

The logic followed here is:

Given:

BUST → 3519

LIDS → 6894

Hence, the code for S is 9.

Hence, the correct answer is Option 1.

Q50. Answer: (c) 5300

×

Shortcut Trick

Backward method:

Q → R at 32% loss => 68% = 5406

=> 100% = 5406 ÷ 68 × 100 = 7950

P → Q at 50% profit => 150% = 7950

=> 100% = 7950 ÷ 1.5 = 5300

Therefore Answer = 5300

Alternate Method

Given:

P→Q profit = 50%, Q→R loss = 32%, Final price = 5406

Formula:

SP = CP × (1 ± profit/loss%)

Calculation:

=> Let CP of Q = x

=> R paid = 68% of x

=> 0.68x = 5406

=> x = 5406 ÷ 0.68 = 7950

=> Let CP of P = y

=> Q bought at 150% of y

=> 1.5y = 7950

=> y = 7950 ÷ 1.5 = 5300

Therefore Required price = 5300

Additional Information

Profit Formula: SP = CP × (1 + profit%)

Loss Formula: SP = CP × (1 − loss%)

Backward Method: Use reverse percentage from final value

Shortcut Tip: Convert % into multiplier (e.g., 68% = 0.68)

Q51. Answer: (a) Foundation on Raga and Tala

The correct answer is Foundation on Raga and Tala.

Key Points

• The primary similarity between Hindustani and Carnatic music systems is their common foundation on Raga (the melodic framework) and Tala (the rhythmic cycle). Both systems utilize these elements as the basic building blocks of musical expression.

• Both traditions trace their historical origins to ancient Indian texts, specifically the Samaveda and Bharata's Natya Shastra (written between 200 BCE and 200 CE). They shared a unified system until approximately the 13th or 14th century AD, when they began to diverge.

• They both utilize the Sapta Swara (seven notes) system—Sa, Re, Ga, Ma, Pa, Dha, and Ni—and place immense importance on Shruti (microtones or the smallest audible pitch).

• Both systems are essentially monophonic, focusing on a single melodic line accompanied by a drone, typically provided by the Tanpura. This distinguishes them from Western classical music, which is polyphonic or harmonic.

• The concept of Laya (tempo or rhythm) is central to both, where the performance progresses through different speeds to create a structured musical experience. Hence, the statement regarding the foundation on Raga and Tala is correct.

Additional Information

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• Hindustani Music System:

• Prevalent in North India, it was significantly influenced by Persian, Arabic, and Afghan musical traditions during the Delhi Sultanate and Mughal eras.

• It places a heavy emphasis on improvisation (Manodharma) and the emotional nuances of the Gharana (musical lineage or school) system.

• Major vocal styles include Dhrupad, Khyal, Thumri, and Tappa. Prominent instruments used are the Sitar, Sarod, Tabla, and Shehnai.

• It classifies ragas into 10 Thaats (parent scales), a system formalised by Vishnu Narayan Bhatkhande in the early 20th century.

• Carnatic Music System:

• Rooted in South India (covering Tamil Nadu, Karnataka, Andhra Pradesh, and Kerala), it remained relatively untouched by external Persian influences and preserved indigenous characteristics.

• It is highly structured and focuses on Kritis or Keertanas (fixed compositions). The Trinity of Carnatic Music—Tyagaraja, Muthuswami Dikshitar, and Syama Sastri (active during the 18th and 19th centuries)—composed the bulk of the standard repertoire.

• It follows the 72 Melakarta system (scheme of parent scales) codified by Venkatamakhin in his 17th-century work, Chaturdandi Prakashika.

• Common instruments include the Veena, Violin, Mridangam, Ghatam, and Flute.

Important Points

• Terminology Differences: While the concepts are similar, the names often differ. For example, the unmetered melodic improvisation is called Alap in the North and Alapana in the South. Similarly, a rhythmic cycle is Tala in both, but the specific patterns like Teental (North) and Adi Tala (South) vary.

• Evolutionary Split: The divergence of the two systems is often attributed to the work of Sarangadeva in the 13th century (Sangeeta Ratnakara), which is considered the last text to be authoritative for both traditions before the distinct Persian influence began in the North.

• Modern Context: Today, both systems coexist and frequently interact through Jugalbandis (duets between Hindustani and Carnatic performers), showcasing their underlying structural similarities despite stylistic differences.

Q52. Answer: (c) (1, 4, 2)

Given:

=> 3a - 4b + 2c = -9 ...(1)

=> -4a + 4b + 10c = 32 ...(2)

=> -a + 2b - 7c = -7 ...(3)

Formula Used:

Elimination method to solve system of linear equations

Calculation:

=> Adding (1) and 2×(3): 3a - 4b + 2c + (-2a + 4b - 14c) = -9 + (-14) → a - 12c = -23 ...(4)

=> From (2) and 2×(3): -4a + 4b + 10c - (-2a + 4b - 14c) = 32 - (-14) → -2a + 24c = 46 → -a + 12c = 23 ...(5)

=> Adding (4) and (5): (a - 12c) + (-a + 12c) = -23 + 23 → 0 = 0 (dependent system, one free variable)

=> From (4): a = 12c - 23

=> From (3): 2b = a + 7c - 7 = (12c - 23) + 7c - 7 = 19c - 30 → b = (19c - 30) ÷ 2

=> For integer solution, put c = 2: a = 12 × 2 - 23 = 24 - 23 = 1

=> b = (19 × 2 - 30) ÷ 2 = (38 - 30) ÷ 2 = 8 ÷ 2 = 4

=> Verify (1): 3 × 1 - 4 × 4 + 2 × 2 = 3 - 16 + 4 = -9 Yes

=> Verify (2): -4 × 1 + 4 × 4 + 10 × 2 = -4 + 16 + 20 = 32 Yes

=> Verify (3): -1 + 2 × 4 - 7 × 2 = -1 + 8 - 14 = -7 Yes

Therefore The correct answer is a = 1, b = 4, c = 2.

Q53. Answer: (c) Rs. 11.21 lakh crore

The correct answer is Rs. 11.21 lakh crore.

Key Points

• In the Union Budget 2025–26 presented on 1 February 2025, Union Finance Minister Nirmala Sitharaman announced a capital expenditure (capex) outlay of Rs. 11,21,089.77 crore, commonly referred to as Rs. 11.21 lakh crore.

• Significance: This allocation represents approximately 3.1% of India's GDP.

• Comparison: It marked an increase from the previous year's original budget estimate (BE) of Rs. 11.11 lakh crore for FY 2024–25.

• Infrastructure Support: As part of this capex push, the government also proposed an outlay of Rs. 1.5 lakh crore for 50-year interest-free loans to states for their own capital expenditure.

• Impact: The increase in public investment was intended to continue the momentum of infrastructure development and crowd in private investment across the economy.

Additional Information

• Definition of Capital Expenditure:

• Capex refers to the funds used by the government to acquire, upgrade, and maintain physical assets such as property, plants, buildings, technology, or equipment.

• Unlike Revenue Expenditure, which is used for operational costs like salaries and pensions, Capex creates assets and helps in the long-term growth of the country's economy.

• Fiscal Deficit Targets:

• The government aims to reduce the Fiscal Deficit to 4.9% of GDP in FY 2024-25, moving toward a target of below 4.5% by FY 2025-26.

• Maintaining a high capex while reducing the deficit is a strategic move to ensure fiscal consolidation without hampering development.

• Historical Context:

• In the last three years, the capital expenditure has seen a tripling effect, rising from Rs. 4.39 lakh crore in 2020-21 to the current levels, reflecting a strong post-pandemic recovery strategy.

• The Interim Budget presented in February 2024 first proposed the Rs. 11.11 lakh crore figure, which was maintained in the Full Budget presented in July 2024.

Important Points

• Sector-Specific Allocations:

• Railways: A significant portion of the capex is directed towards the Indian Railways for the implementation of three major economic railway corridor programs identified under PM Gati Shakti.

• Road Transport: Continued funding for the National Highways Authority of India (NHAI) to expand the road network across the country.

• States' Support: The central government has also extended the scheme of fifty-year interest-free loans to State Governments for capital expenditure with an outlay of Rs. 1.3 lakh crore to spur regional development.

• Economic Impact:

• According to Reserve Bank of India (RBI) and Finance Ministry studies, every 1 rupee spent on Capital Expenditure has a multiplier effect of approximately 2.45 on the GDP, whereas revenue expenditure has a multiplier of less than 1.

• This high investment is designed to generate employment and increase private sector investment through crowding-in effects.

Q54. Answer: (b) 23.5°N and 23.5°S

The correct answer is 23.5°N and 23.5°S.

Key Points

• The Tropical Climatic Region, also known as the Torrid Zone, is the area of the Earth located between the Tropic of Cancer at 23.5°N and the Tropic of Capricorn at 23.5°S.

• This region is centered around the Equator (0° latitude) and covers approximately 40% of the Earth's total surface area.

• It is characterized by being the only part of the globe where the Sun reaches a zenith point, meaning it appears directly overhead at least once during the solar year.

• The climate in this latitudinal extent is generally hot and humid throughout the year, with very little variation in temperature between different months, leading to a lack of distinct thermal seasons as seen in higher latitudes.

• The boundaries of 23.5°N and 23.5°S are determined by the axial tilt of the Earth, which is approximately 23.5 degrees relative to its orbital plane.

Additional Information

• Climate Sub-types: According to the Köppen climate classification, the tropics are divided into Tropical Rainforest (Af), Tropical Monsoon (Am), and Tropical Wet and Dry/Savanna (Aw).

• Tropical Rainforests receive high precipitation exceeding 2,000 mm annually.

• Tropical Savannas have a distinct dry season and are found further from the Equator toward the 23.5° limits.

• Pressure Belts: This region is the home of the Intertropical Convergence Zone (ITCZ), a low-pressure belt where trade winds from the Northern and Southern Hemispheres converge, causing heavy convective rainfall.

• Biodiversity: Although the tropical region covers a limited part of the Earth, it hosts over 50% of the world's plant and animal species, particularly within the Amazon Basin in South America and the Congo Basin in Africa.

• Global Location: Major countries situated within this latitudinal extent include Brazil, India (southern half), Indonesia, Nigeria, and

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Thailand.

• Solar Energy: The tropics receive the highest amount of insolation (incoming solar radiation) on Earth, making them crucial for global atmospheric circulation and the water cycle.

Important Points

• Solstices and Equinoxes: On June 21 (Summer Solstice), the sun is directly over the Tropic of Cancer (23.5°N). On December 22 (Winter Solstice), it is directly over the Tropic of Capricorn (23.5°S).

• Atmospheric Circulation: The heating in the tropics drives the Hadley Cell, where warm air rises at the Equator and sinks at approximately 30°N and 30°S, creating the subtropical high-pressure zones.

• Agriculture: The year-round warmth allows for the cultivation of specific crops such as coffee, cocoa, rubber, sugar cane, and bananas, which are primary exports for many tropical countries.

• Daylight Hours: Near the Equator, day and night are almost equal in length (12 hours each) throughout the year, whereas, near the 23.5° marks, there is a slight seasonal variation in daylight duration.

Q55. Answer: (a) Both conclusions I and II follow.

Given Statements:

All spoons are forks.

All forks are cups.

Some spoons are plates.

The least possible Venn diagram for the given statements is:

Conclusions:

I. Some forks are plates - True (Since some spoons are plates and all spoons are forks, those plates that overlap with spoons must also overlap with forks. So some forks are plates.)

II. Some cups are plates - True (All forks are cups, and some forks are plates, so those plates are also inside cups. Hence, some cups are plates.)

So, both conclusions I and II follow.

Hence, the correct answer is "Option 1".

Q56. Answer: (a) 51.43 km/h

Shortcut Trick

Total distance = 360 km

Break smartly:

=> 180 km @ 60 km/h → time = 3 hr

=> 120 km @ 40 km/h → time = 3 hr

=> Remaining = 60 km @ 60 km/h → time = 1 hr

Total time = 3 + 3 + 1 = 7 hr

Average speed = 360 ÷ 7 = 51.43 km/h

Therefore Answer = 51.43 km/h

Alternate Method

Given:

Total distance = 360 km

First 180 km @ 60 km/h

Next 120 km @ 40 km/h

Remaining 60 km @ 60 km/h

Formula:

Average speed = Total distance ÷ Total time

Calculation:

=> Time1 = 180 ÷ 60 = 3 hr

=> Time2 = 120 ÷ 40 = 3 hr

=> Time3 = 60 ÷ 60 = 1 hr

=> Total time = 3 + 3 + 1 = 7 hr

=> Average speed = 360 ÷ 7 = 51.43 km/h

Therefore Final Answer = 51.43 km/h

Additional Information

Average Speed: Total distance ÷ Total time

Key Insight: Break journey into segments

Common Mistake: Do NOT average speeds directly

Shortcut Tip: Equal speeds simplify calculations

Q57. Answer: (d) 1, 2, 3, and 4 only

The correct answer is 1, 2, 3, and 4 only.

Key Points

• Article 249 of the Constitution of India empowers the Parliament to legislate on a matter in the State List if the Rajya Sabha passes a resolution supported by two-thirds of the members present and voting. This resolution must state that such legislation is necessary or expedient in the national interest. Hence, statement 1 is correct.

• Under Article 250, the Parliament acquires the power to make laws for the whole or any part of India with respect to any of the matters enumerated in the State List while a Proclamation of National Emergency is in operation. These laws cease to have effect six months after the emergency has ended. Hence, statement 2 is correct.

• Article 252 provides that if the legislatures of two or more states pass resolutions requesting the Parliament to enact laws on a specific matter in the State List, the Parliament can pass an act for regulating that matter. Such an act applies only to those states that made the request, though other states may adopt it later through their own legislatures. Hence, statement 3 is correct.

• Article 253 enables the Parliament to make any law for the whole or any part of the territory of India for implementing any treaty, agreement, or convention with any other country or international body. This remains true even if the subject matter falls under the State List. Hence, statement 4 is correct.

• The Indian Constitution follows a federal structure where powers are divided. There is no provision that allows the Parliament to legislate on state subjects at the sole discretion of the Prime Minister. Legislative competence is governed by constitutional articles and not by executive discretion. Hence, statement 5 is incorrect.

Additional Information

• Seventh Schedule: The Constitution provides a three-fold distribution of legislative subjects between the Union and the States, viz., List-I (Union List), List-II (State List), and List-III (Concurrent List).

• Residuary Powers: Under Article 248, the Parliament has exclusive power to make any law with respect to any matter not enumerated in the Concurrent List or State List. These are known as residuary powers.

• Article 254 (Repugnancy): If any provision of a law made by the Legislature of a State is repugnant to any provision of a law made by Parliament on a Concurrent List subject, the law made by Parliament shall prevail, and the state law shall be void to the extent of the repugnancy.

• President's Rule: Under Article 356 and Article 357, when President's Rule is imposed in a state, the Parliament is empowered to exercise the legislative powers of that State Legislature.

Important Points

• Specific Examples: Several important laws have been enacted by the Parliament under Article 252 after state requests, such as the Wildlife (Protection) Act, 1972 and the Water (Prevention and Control of Pollution) Act, 1974.

• Role of the Rajya Sabha: The power under Article 249 highlights the federal character of the Rajya Sabha as the representative of the states, ensuring that Parliament only intervenes in the State List when the states' representatives agree it is in the national interest.

• Time Limits: A resolution passed under Article 249 remains in force for a period not exceeding one year, though it can be renewed for further periods of one year at a time by the Rajya Sabha.

Q58. Answer: (b) 2

The logic followed here is:

Given:

BITE → 4568

TIME → 4826

Hence, the code for M is 2.

Hence, the correct answer is Option 2.

Q59. Answer: (d) The central law overrides the state law unless the state law has Presidential assent

The correct answer is The central law overrides the state law unless the state law has Presidential assent.

Key Points

• Article 254 of the Constitution of India specifically deals with the inconsistency between laws made by Parliament and laws made by the Legislatures of States. It provides the mechanism to resolve conflicts when both bodies legislate on subjects listed in the Concurrent List (List III).

• According to Article 254(1), if any provision of a law made by the State Legislature is repugnant to any provision of a law made

by Parliament, the Parliamentary law shall prevail, and the state law shall, to the extent of the repugnancy, be void. Hence, the general rule is that central law overrides state law.

• An important exception is provided under Article 254(2). If a state law on a Concurrent List subject contains provisions repugnant to an earlier Parliamentary law, it can still prevail in that particular state if it has been reserved for the consideration of the President and has received Presidential assent. Hence, the option stating the central law overrides unless there is Presidential assent is correct.

• The Concurrent List includes subjects where both the Union and the States have the power to legislate. However, the Constitution ensures uniformity across the country by giving Parliament overriding powers in case of conflict, ensuring national integration.

• The Supreme Court of India has interpreted this "repugnancy" in various judgments, stating that it arises when two enactments are so inconsistent that they cannot stand together, or when Parliament intended to occupy the entire field of legislation.

Additional Information

• The Seventh Schedule:

• The Seventh Schedule of the Indian Constitution distributes legislative powers between the Union and the States through three lists: the Union List (List I), the State List (List II), and the Concurrent List (List III).

• The Union List currently contains 100 subjects (originally 97) such as Defense, Foreign Affairs, and Banking, where only Parliament can legislate.

• The State List contains 61 subjects (originally 66) like Public Order, Police, and Agriculture, where State Legislatures usually have exclusive power.

• The Concurrent List contains 52 subjects (originally 47) including Education, Forests, Marriage, Adoption, and Succession.

• 42nd Amendment Act, 1976:

• This significant amendment moved five subjects from the State List to the Concurrent List: Education, Forests, Weights and Measures, Protection of Wild Animals and Birds, and Administration of Justice.

• Residuary Powers:

• Under Article 248, the power to legislate on any matter not mentioned in any of the three lists (known as Residuary Powers) is vested solely in the Parliament. This includes modern subjects like Cyber Law.

Important Points

• Doctrine of Pith and Substance: This legal doctrine is used by courts to determine which legislature has the authority to enact a law when there is an overlap between subjects. It looks at the "true nature and character" of the legislation.

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

• Article 250: Parliament gains the power to legislate on any State List subject while a Proclamation of Emergency is in operation.

• Article 251: Clarifies that even when Parliament legislates under Articles 249 and 250, the State Legislature is not barred from making laws, but the Parliamentary law prevails in case of repugnancy.

Q60. Answer: (a) Pandita Ramabai

The correct answer is Pandita Ramabai.

Key Points

• Pandita Ramabai Sarasvati founded the Arya Mahila Samaj on 30th November 1882 in Pune (then Poona) to serve the cause of women's rights and education. Hence, the correct option is Pandita Ramabai.

• The primary objective of the Arya Mahila Samaj was to provide education to women and to liberate them from the oppression of child marriage and the harsh social conditions faced by widows.

• The society worked towards creating awareness about the importance of female literacy and social empowerment, urging the Hunter Commission in 1882 to provide medical education for women in India.

• Pandita Ramabai aimed to create a network of women who could support each other, and the Arya Mahila Samaj established various branches across the Bombay Presidency to expand its reach.

• Through this organization, she advocated for the appointment of women doctors and school inspectors, which eventually led to the Dufferin Fund for providing medical aid to women.

Additional Information

• Mehribai Tata:

• She was a prominent social reformer and the wife of Sir Dorabji Tata.

• She played a significant role in the National Council of Women in India (NCWI), which was founded in 1925 to coordinate women's activities at a national level.

• Mehribai Tata was a staunch advocate for the Sarda Act (Child Marriage Restraint Act) and campaigned against the purdah system and untouchability.

• Sarla Devi Chaudhurani:

• She founded the Bharat Stree Mahamandal in 1910 in Allahabad.

• This was considered the first major all-India women's organization created by a woman for women.

• Its main goal was to promote female education across India, regardless of caste or creed, and to improve the status of women in society.

• Tarabai Premchand:

• She was a dedicated social worker associated with the Jain community and worked for the upliftment of women through education and vocational training.

• She was involved with several charitable trusts and played a role in the All India Women's Conference (AIWC).

Important Points

• Titles and Recognition: In 1878, the University of Calcutta conferred the titles of Pandita and Sarasvati upon Ramabai for her profound knowledge of Sanskrit and Vedic texts.

• Sharada Sadan: Apart from Arya Mahila Samaj, she founded the Sharada Sadan (Home for Learning) in 1889 in Mumbai to provide shelter and education to young widows.

• Mukti Mission: She also established the Mukti Mission at Kedgaon, which became a sanctuary for thousands of destitute women and orphans during the famine of 1896.

• Literary Work: Her famous book, 'The High-Caste Hindu Woman' (published in 1887), highlighted the darkest aspects of the lives of Hindu women, including child brides and widows, and helped gain international support for her cause.

Q61. Answer: (a) North-Eastern Plateau Region

The correct answer is North-Eastern Plateau Region.

Key Points

• The North-Eastern Plateau Region is the most mineral-rich belt in India, encompassing the Chota Nagpur Plateau, Odisha Plateau, and parts of West Bengal and Chhattisgarh.

• This region is uniquely characterized by its high concentration of both Iron ore and Coal, which are the fundamental pillars of the industrial sector. It holds nearly 90% of the country's Coal reserves.

• The belt is often referred to as the "Ruhr of India", comparing it to the mineral-rich Ruhr valley in Germany, due to its massive deposits of metallurgical coal and ferrous minerals.

• Major Coalfields such as Jharia, Raniganj, Bokaro, Giridih, and Karanpura are located within this specific geographical region.

• It also hosts world-class Iron ore deposits, particularly in the Singhbhum district of Jharkhand and the Keonjhar and Mayurbhanj districts of Odisha.

Additional Information

• South-Western Plateau Region: This belt extends over the Karnataka Plateau and adjacent Tamil Nadu. While it is rich in Iron ore (specifically in the Bababudan hills and Kudremukh), Manganese, and Bauxite, it significantly lacks Coal deposits, with the exception of Neyveli Lignite.

• North-Western Plateau Region: Spanning across the Aravalli range in Rajasthan and parts of Gujarat, this region is famous for non-ferrous minerals like Copper, Zinc, and Lead. It also contains significant Petroleum and Natural Gas reserves in the Cambay basin.

• Geological Age: Most of the Coal found in the North-Eastern belt belongs to the Gondwana period, dating back approximately 250 million years, whereas the Iron ore is typically found in the Dharwar and Cuddapah rock systems.

• Industrial Hubs: The proximity of raw materials led to the establishment of major Steel Plants in Jamshedpur (TISCO), Durgapur, Bhilai, and Rourkela, making this belt the backbone of India's manufacturing and infrastructure.

• Mineral Diversity: Besides coal and iron, the North-Eastern region is a primary source for Manganese, Bauxite, Mica, and Copper, contributing heavily to the national mining output and GDP.

Important Points

• Jharia Coalfield: Located in Jharkhand, it is the largest source of Coking Coal in India and is essential for the Iron and Steel industry.

• Raniganj Coalfield: Located in West Bengal, it is the oldest coal mine in India, where mining first commenced in the year 1774.

• Iron Ore Quality: The iron ore found in the Bailadila mines of Chhattisgarh is of very high Hematite grade, which is exported to countries like Japan and South Korea via the Visakhapatnam port.

• Administrative Oversight: The extraction and management of these resources are governed by the Mines and Minerals (Development and Regulation) Act, 1957, and monitored by the Ministry of Mines and Ministry of Coal of the Government of India.

Q62. Answer: (b) 1277

Shortcut Trick

Use direct formula: Mean = Σfx ÷ Σf

=> 41 = (5295 + 40X) ÷ (98 + X)

=> 41(98 + X) = 5295 + 40X
=> 4018 + 41X = 5295 + 40X
=> X = 1277
Therefore Answer = 1277
Alternate Method
Given: :contentReference[oaicite:0]{index=0}
Mean = 41
x_i = 30, 40, 55, 95
f_i = 31, X, 50, 17
Formula: Mean = (Σf_ix_i) ÷ (Σf_i)
Calculation:
=> Σf_ix_i = 30×31 + 40×X + 55×50 + 95×17
=> = 930 + 40X + 2750 + 1615 = 5295 + 40X
=> Σf_i = 31 + X + 50 + 17 = 98 + X
=> 41 = (5295 + 40X) ÷ (98 + X)
=> 41(98 + X) = 5295 + 40X
=> 4018 + 41X = 5295 + 40X
=> X = 1277
Therefore Final Answer = 1277
Additional Information
Mean: Σfx ÷ Σf
Linear Equation: Cross-multiply to solve unknown
Tip: Keep Σfx and Σf separate
Check: Substitute back to verify

Q63. Answer: (d) -23/3

Shortcut Trick
Convert all to (10/13):
(13/10)^4 = (10/13)^(−4), (13/10)^(17) = (10/13)^(−17)
Total power = −4 + 16 − 17 = −5
=> (10/13)^(−5) = (10/13)^(3m + 18)
=> 3m + 18 = −5 => m = −23/3
Therefore Answer = −23/3
Alternate Method
Given:
(13/10)^4 × (10/13)^(16) × (13/10)^(17) = (10/13)^(3m + 18)
Formula:
a^m × aⁿ = a^(m+n), and (a/b)^(−n) = (b/a)ⁿ
Calculation:
=> Convert (13/10) = (10/13)^(−1)
=> (13/10)^4 = (10/13)^(−4)
=> (13/10)^(17) = (10/13)^(−17)
=> LHS = (10/13)^(−4) × (10/13)^(16) × (10/13)^(−17)
=> = (10/13)^((−4 + 16 − 17))
=> = (10/13)^(−5)
=> RHS = (10/13)^(3m + 18)
=> Equate powers:
=> 3m + 18 = −5
=> 3m = −23
=> m = −23/3
Therefore Final Answer = −23/3
Additional Information

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Laws of Exponents: a^m × aⁿ = a^(m+n)
Negative Power: a^(−n) = 1/aⁿ
Base Conversion: (a/b)^(−n) = (b/a)ⁿ
Key Idea: Make bases same, then equate powers

Q64. Answer: (c) EVY

The logic followed here is based on the alphabetical position pattern:
Option 1: LIF
Option 2: OLI
Option 3: EVY
Option 4: XUR
Thus, EVY is different from the rest given options.
Hence, the odd one out is Option 3.

Q65. Answer: (b) 49

The logic followed here is:
thus, "49" will replace the question mark in the given series.
Hence, the correct option is "Option 2".

Q66. Answer: (b) 30%

Shortcut Trick
Let CP = 100
=> MP = 240 (140% ↑)
=> Required SP for 68% gain = 168
=> Discount = (240 − 168) = 72
=> % Discount = (72 ÷ 240) × 100 = 30%
Therefore Answer = 30%
Alternate Method
Given:
Marked price = 140% above CP
Profit = 68%
Formula:
MP = CP × (1 + 140/100)
SP = CP × (1 + 68/100)
Calculation:
=> Let CP = 100
=> MP = 100 × 2.4 = 240
=> SP = 100 × 1.68 = 168
=> Discount = MP − SP = 240 − 168 = 72
=> Discount% = (72 ÷ 240) × 100 = 30%
Therefore Final Answer = 30%
Additional Information
Marked Price: MP = CP × (1 + markup%)
Selling Price: SP = CP × (1 + profit%)
Discount: MP − SP
Tip: Assume CP = 100 for faster calculation

Q67. Answer: (b) One

The logic followed here is:
Given series: (Left) H F G J D J V D K P = % S O C B = % B + # (Right)
Now,
We need letters which are immediately preceded by a symbol and immediately followed by a symbol.
So, needed pattern is: Symbol - Letter - Symbol

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(Left) H F G J D J V D K P = % S O C B = % B + # (Right)

Only one such case satisfies the condition.

Hence, the correct answer is Option 2.

Q68. Answer: (a) Long-term average atmospheric patterns of the region

The correct answer is Long-term average atmospheric patterns of the region.

Key Points

• Climate is defined as the long-term average of weather conditions, such as temperature, humidity, atmospheric pressure, wind, and precipitation, in a given region over long periods. These patterns determine how seasons are typically experienced at a specific location. Hence, option A is the correct explanation.

• While the latitudinal position of a place (Option B) is a primary determinant of the amount of solar radiation received, it is just one factor among many (like altitude and proximity to the sea) that shapes the overall atmospheric patterns. Hence, statement B is a contributing factor but not the comprehensive explanation of the experience.

• Short-term fluctuations in atmospheric elements (Option D) refer to Weather, not Climate. Weather describes the state of the atmosphere at a specific place and time, which can change within minutes or hours. Hence, statement D is incorrect as it defines weather rather than seasonal climatic conditions.

• The World Meteorological Organization (WMO) suggests that the classical period for determining the climatic average is 30 years. This duration is long enough to filter out short-term weather anomalies and provide a stable statistical description of the region's seasonal cycles.

• Seasonal conditions are periodic changes that repeat annually. The consistent experience of these changes—such as monsoons in India or Mediterranean summers—is the result of established atmospheric circulation and regional geography.

Additional Information

• Factors Influencing Climate:

• Latitude: Due to the curvature of the Earth, the amount of solar energy varies according to latitude. Air temperature generally decreases from the equator towards the poles.

• Altitude: As one goes from the surface of the earth to higher altitudes, the atmosphere becomes less dense and temperature decreases. This is why hills are cooler during summers.

• Continentality (Distance from the sea): The sea exerts a moderating influence on climate. As distance from the sea increases, this influence decreases and people experience extreme weather conditions (very hot summers and very cold winters).

• Earth's Tilt and Seasonality:

• The seasons are primarily caused by the Earth's axial tilt of 23.5 degrees and its orbital motion around the Sun.

• During the Summer Solstice (around June 21), the Northern Hemisphere is tilted toward the Sun, resulting in longer days and warmer seasonal conditions in regions like India and North America.

• During the Winter Solstice (around December 22), the Southern Hemisphere receives more direct sunlight, creating summer conditions there while the north experiences winter.

• Climatic Classification Systems:

• The most widely used system is the Köppen Climate Classification, developed by Wladimir Köppen in 1884. It uses monthly and annual averages of temperature and precipitation to categorize world climates into groups like Tropical (A), Dry (B), Temperate (C), Continental (D), and Polar (E).

Important Points

• Atmospheric Pressure and Wind Systems: The pressure and wind system of any area depend on the latitude and altitude of the place. It influences the temperature and rainfall pattern, which are key elements of the seasonal experience.

• Ocean Currents: Ocean currents along with onshore winds affect the climate of the coastal areas. For example, any coastal area with warm or cold currents flowing past it will be warmed or cooled if the winds are onshore.

• Relief Features: High mountains act as barriers for cold or hot winds; they may also cause precipitation if they are high enough and lie in the path of rain-bearing winds. The leeward side of mountains remains dry (Rain shadow area).

Q69. Answer: (a) Article 341

The correct answer is Article 341.

Key Points

• Article 341 of the Constitution of India specifically empowers the President to specify the Scheduled Castes in various States and Union Territories. Hence, Option A is correct.

• Under Clause (1) of this article, the President may, after consultation with the Governor of a State, issue a public notification to specify the castes, races, or tribes which shall be deemed as Scheduled Castes for that specific State or Union territory.

• This power ensures that the identification of Scheduled Castes is tailored to the socio-economic and historical context of each region, as a community recognized in one state may not face the same disabilities in another.

• Article 341(2) mandates that once a notification is issued by the President, any subsequent inclusion or exclusion of a caste from the list can only be done by a law passed by the Parliament of India.

• The list of Scheduled Castes is essential for the implementation of various constitutional safeguards, including reservations in education, employment, and political representation.

Additional Information

• Article 342: This article is similar to Article 341 but pertains to Scheduled Tribes. It empowers the President to specify the tribes or tribal communities to be deemed as Scheduled Tribes. Hence, Option B is incorrect.

• Article 330: This article provides for the reservation of seats for Scheduled Castes and Scheduled Tribes in the House of the People (Lok Sabha) based on their population ratio. Hence, Option C is incorrect.

• Article 344: This article relates to the Official Language of the Union. It provides for the constitution of a Commission and a Committee of Parliament to advise on the progressive use of Hindi for official purposes. Hence, Option D is incorrect.

• Article 366 (24): This article provides the constitutional definition of Scheduled Castes, stating they are the castes defined under the provisions of Article 341.

• The Constitution (Scheduled Castes) Order, 1950: This was the first comprehensive order issued by the President listing the various castes and tribes categorized as Scheduled Castes across India.

Important Points

• National Commission for Scheduled Castes (NCSC): Established under Article 338, this is a constitutional body tasked with safeguarding the interests of Scheduled Castes in India. It was separated from the combined commission for SCs and STs by the 89th Constitutional Amendment Act, 2003.

• Untouchability: The primary historical basis for identifying a group as a Scheduled Caste is the social disability resulting from the traditional practice of untouchability, which is abolished under Article 17 of the Constitution.

• Role of the Governor: While the President issues the notification, the consultation with the Governor of the concerned State is a mandatory requirement to ensure local administrative and social nuances are considered.

• Amendment Power: It is important to note that the judiciary cannot add or subtract names from the Scheduled Caste list; that authority rests exclusively with the Parliament under Article 341(2).

Q70. Answer: (a) Simulation of experiments

The correct answer is Simulation of experiments.

Key Points

• Simulation of experiments is a core application of computers in scientific research. It allows scientists to create mathematical models of real-world physical systems to study their behavior under various parameters. This is particularly useful when actual physical experiments are too expensive, dangerous, or time-consuming. Hence, the statement regarding simulation is correct.

• Computers provide High-Performance Computing (HPC) capabilities required for complex calculations. In fields like theoretical physics and climatology, computers solve differential equations and algorithms that would take humans centuries to complete.

• Data Analysis and Visualization: Modern research generates massive datasets (Big Data). Computers use statistical software to identify patterns, correlations, and trends. Tools like Python, R, and MATLAB are essential for graphical representation of scientific data.

• Automation of Laboratory Equipment: Computers are used to control instruments such as electron microscopes, spectrometers, and particle accelerators (like those at CERN). This ensures precision and reproducibility in empirical research.

Additional Information

• Online Shopping: This refers to Electronic Commerce (E-commerce). It involves the buying and selling of goods and services over the internet. While it relies on database management and secure payment gateways, it is a commercial application rather than a scientific research tool.

• Ticket Reservation: Known as Computerized Reservation Systems (CRS), this application is used in the travel and tourism industry. Examples include IRCTC in India for railway bookings. Its primary function is inventory management and logistics.

• Word Processing: This involves using software like Microsoft Word or LaTeX to create, edit, and format text documents. While researchers use it to write theses and reports, the function of the software is general productivity and documentation, not the core process of scientific discovery.

• Bioinformatics: This is a specific field where biology and computer science merge. It uses computational tools for DNA sequencing and protein folding, which was crucial during the COVID-19 pandemic for vaccine development in 2020.

Important Points

• Supercomputers: Countries like the USA, China, and India invest heavily in supercomputing for research. India's PARAM Siddhi-AI is an example of a supercomputer used for advanced simulation and Artificial Intelligence.

• Artificial Intelligence (AI) and Machine Learning (ML): These technologies are the latest frontiers in scientific research. ML algorithms can predict chemical reactions or astronomical events by learning from historical data.

• Global Collaboration: Computers and the internet allow real-time sharing of research findings across international borders, facilitating peer review and open-access science.

• Storage: Scientific research requires archiving petabytes of digital information. Cloud computing services (like AWS or Google Cloud) provide scalable storage for research institutions worldwide.

Q71. Answer: (d) 670

Shortcut Trick

Ratio of shares Manoj : Anand = (1 + Rate/100)^((Anand's time − Manoj's time)) : 1

Manoj : Anand = (1 + 10/100)^(17 − 16) : 1 = $(1.1)^1$: 1 = 11 : 10

Total units = 11 + 10 = 21 units → Rs. 1407

1 unit = 1407 ÷ 21 = Rs. 67

Anand's share = 10 units = 10 × 67 = Rs. 670

Therefore The correct answer is Rs. 670.

Alternate Method

Given:

Total Sum = Rs. 1407

Rate (r) = 10% per annum

Time for Manoj (n1) = 16 years, Time for Anand (n2) = 17 years

Formula Used:

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

Piyush Rs. 1407 Manoj (16 yrs, 10%) Amount A_M Anand (17 yrs, 10%) Amount A_A A_M = A_A

Calculations:

Let Manoj's share be M and Anand's share be A.

=> M(1 + 10/100)^(16) = A(1 + 10/100)^(17)

=> M ÷ A = (1 + 1/10)^(17) ÷ (1 + 1/10)^(16)

=> M ÷ A = (11/10)^(17 − 16)

=> M ÷ A = 11/10

=> M : A = 11 : 10

=> Sum of ratio parts = 11 + 10 = 21 units

=> 21 units = Rs. 1407

=> 1 unit = 1407 ÷ 21 = Rs. 67

=> Anand's share (A) = 10 units × 67

=> A = Rs. 670

Therefore The correct answer is Rs. 670.

Additional Information

Compound Interest Amount Formula

The amount A after n years with interest compounded annually is given by $A = P(1 + R/100)^n$, where P is the principal and R is the annual interest rate.

Effective Rate of Interest

For a rate R% compounded half-yearly, the effective annual rate is $[(1 + (R/2)/100)^2 − 1] × 100$.

Difference between SI and CI

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

Q72. Answer: (a) 32

Shortcut Trick

Five consecutive even numbers → middle number = average

Numbers: 28, 30, 32, 34, 36

=> Average = middle = 32

Therefore Answer = 32

Alternate Method

Given:

Smallest even integer = 28

Formula: Average = Sum ÷ Number of terms

Calculation:

=> Five consecutive even integers:

28, 30, 32, 34, 36

=> Sum = 28 + 30 + 32 + 34 + 36 = 160

=> Average = 160 ÷ 5 = 32

Therefore Final Answer = 32

Additional Information

Consecutive Numbers: Difference remains constant

Odd Count Rule: Average = middle term

Even Numbers: Increase by 2

Tip: No need to sum all numbers

Q73. Answer: (d) The output or the final products of different segments of infrastructure

The correct answer is The output or the final products of different segments of infrastructure.

Key Points

• Economic infrastructure includes those elements of the support system (such as power, transport, and communication) that provide services that facilitate economic activities.

• A direct way in which economic infrastructure contributes to development is through the output or the final products of different segments of infrastructure, such as electricity, transportation, and telecommunications, which are essential for production. Hence, statement D is correct.

• Infrastructure does not restrict improvements in human capital; rather, it facilitates the delivery of social services like education and healthcare, thereby improving labor quality. Hence, statement A is incorrect.

• Economic infrastructure acts as a catalyst for the expansion and growth of physical capital in various sectors like agriculture and manufacturing by providing the necessary support systems. Hence, statement B is incorrect.

• Infrastructure significantly increases (rather than decreases) the overall productivity of all inputs (land, labor, capital) across different sectors by reducing transaction costs and improving market access. Hence, statement C is incorrect.

Additional Information

• Types of Infrastructure: Infrastructure is broadly divided into Economic Infrastructure (energy, transport, communication) and Social Infrastructure (education, health, housing). While economic infrastructure directly aids production, social infrastructure enhances human efficiency.

• Impact on GDP: There is a strong positive correlation between infrastructure investment and economic growth. Historically, a 1% increase in the stock of infrastructure is associated with a 1% increase in Gross Domestic Product (GDP) across various countries.

• Government Initiatives in India: To boost infrastructure, the Government of India launched the National Infrastructure Pipeline (NIP) for the period 2019-2025 with an estimated investment of Rs. 111 Lakh Crore.

• PM Gati Shakti: Launched in October 2021, the PM Gati Shakti - National Master Plan aims for multi-modal connectivity to integrate various infrastructure schemes like Bharatmala and Sagarmala to reduce logistics costs in India.

• Global Standards: The World Bank releases the Logistics Performance Index (LPI), which measures the infrastructure quality of countries. In 2023, India ranked 38th out of 139 countries, showing significant improvement in port-run efficiency and digital transformation.

Important Points

• Energy and Power: The most visible segment of economic infrastructure is energy. In India, the installed power capacity has reached over 400 GW as of 2023, with a major push towards Renewable Energy to meet Sustainable Development Goals.

• Transportation Networks: This includes Roadways, Railways, Airways, and Waterways. India has the second-largest road network in the world, which is vital for the movement of goods and labor mobility.

• Digital Infrastructure: With the rise of the Fourth Industrial Revolution, broadband connectivity and 5G technology have become critical infrastructure components, enabling e-commerce, fintech, and digital governance.

• Irrigation: Especially in an agrarian economy like India, irrigation infrastructure is crucial for ensuring food security and improving the productivity of land.

Q74. Answer: (b) West Bengal

The correct answer is West Bengal.

Key Points

• The Jungle Mahal Uprising, historically documented as the Bhumij Revolt, primarily took place in the Jungle Mahals region, which covers large parts of present-day West Bengal, specifically the districts of Purulia, Bankura, and Midnapore.

• The revolt occurred during the years 1832-1833 and was a significant tribal uprising against the exploitative administrative and land revenue policies of the British East India Company.

• The movement was led by Ganga Narain Singh, the son of Lakshman Narain Singh and a claimant to the Barabhum estate.

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Because of his central role, the British often referred to this rebellion as the "Ganga Narain Hangama".

• The primary cause of the uprising was the harsh land revenue system, the displacement of traditional Bhumij chiefs (Ghatwals), and the introduction of British judicial and police systems that favored outsiders and moneylenders over the indigenous population.

• The Bhumij people, along with other tribal groups like the Hos and Mundas, joined forces to protest against the Company's interference in their ancestral customs and the illegal occupation of their lands.

Additional Information

• Geographical Context of Jungle Mahals: The Jungle Mahals was a district formed by the British in 1805. It was situated in the western part of Bengal and included territories that now fall under West Bengal and parts of Jharkhand (Singhbhum).

• Administrative Impact: Following the intensity of the Bhumij Revolt, the British realized that the existing administrative structure was ineffective for tribal areas. Consequently, Regulation XIII of 1833 was passed, which led to the abolition of the Jungle Mahals district.

• South-West Frontier Agency: After the reorganization in 1833, the tribal territories were placed under a new administrative unit called the South-West Frontier Agency (SWFA), which was managed by a Political Agent reporting directly to the Governor-General.

• Connection to Chuar Rebellion: The Bhumij Revolt is often seen as a continuation or a later stage of the Chuar Rebellion (which lasted from 1766 to 1816), as both movements involved the same ethnic groups and were driven by resistance to the Permanent Settlement of 1793.

Important Points

• Leadership and Martyrdom: Ganga Narain Singh successfully unified various tribal factions. He was eventually killed in February 1833 while attacking the fort of the Thakur of Kharsawan, who was a British ally. The Thakur sent his severed head to the British Commissioner, Captain Wilkinson.

• Tactics and Scale: The rebels employed guerrilla warfare tactics in the dense forests of the Jungle Mahals, making it extremely difficult for the British forces to suppress the movement for nearly two years.

• Socio-Economic Factors: The Bhumij community traditionally held lands in exchange for military and police services (the Ghatwali system). The British attempt to convert these services into cash revenue and replace Bhumij guards with police from the plains was a direct trigger for the 1832 violence.

• Linguistic and Cultural Identity: The Bhumij are an Austroasiatic ethnic group. The revolt was not just an economic struggle but also a fight to preserve their Munda-based cultural identity against Sanskritization and colonial legalism.

Q75. Answer: (a) 4

The logic followed here is:

Given: Seven boxes A, B, C, D, E, F and G are kept one over the other (1 = bottom, 7 = top).

F is kept second from the bottom.

Only three boxes are kept between F and D.

G is kept below F.

Only E is kept between D and B.

A is kept above D.

Position	Box
7	A
6	D
5	E
4	B
3	C
2	F
1	G

Now, boxes above C = A, D, E, B → 4 boxes

Hence, the correct answer is Option 1.

Q76. Answer: (a) Article 51A

The correct answer is Article 51A.

Key Points

• Article 51A of the Indian Constitution specifically enumerates the Fundamental Duties of the citizens of India. Hence, option A is correct.

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

• The committee suggested that steps should be taken to ensure that the individual did not overlook his duties while in exercise of his rights. Initially, there were 10 Fundamental Duties listed under this Article.

• An additional duty was added later through the 86th Constitutional Amendment Act in the year 2002, bringing the total number of duties to 11.

• The Fundamental Duties are contained in Part IV-A of the Constitution, which consists of only one article, Article 51A.

Additional Information

• Article 61: This article deals with the procedure for the impeachment of the President of India. It outlines that the President can be removed from office for the 'violation of the Constitution'. There is no "Article 61A" commonly cited in the context of duties. Hence, option B is incorrect.

• Article 41: This is a part of the Directive Principles of State Policy (DPSP) in Part IV. it states that the State shall, within the limits of its economic capacity and development, make effective provision for securing the right to work, to education, and to public assistance in cases of unemployment, old age, sickness, and disablement. Hence, option C is incorrect.

• Article 31A: This article was added by the 1st Amendment Act, 1951. It provides for the saving of laws providing for the acquisition of estates, etc. It protects certain laws from being challenged on the ground of contravention of the Fundamental Rights conferred by Article 14 and Article 19. Hence, option D is incorrect.

• The concept of Fundamental Duties in the Indian Constitution was inspired by the Constitution of the former USSR (Union of Soviet Socialist Republics).

• These duties serve as a reminder to the citizens that while enjoying their rights, they should also be conscious of their duties towards their country, society, and fellow citizens.

Important Points

• Non-Justiciable Nature: Like the Directive Principles of State Policy, the Fundamental Duties are non-justiciable. This means that the Constitution does not provide for their direct enforceable by the courts. However, Parliament is free to enforce them by suitable legislation.

• Scope: The Fundamental Duties are confined to citizens only and do not extend to foreigners.

• The 11th Duty: Added in 2002, it mandates that a parent or guardian must provide opportunities for education to his child or ward between the age of 6 and 14 years.

• Verma Committee (1999): This committee identified the existence of legal provisions for the implementation of some of the Fundamental Duties. For example, the Prevention of Insults to National Honour Act (1971) prevents disrespect to the National Flag and the Constitution.

• Examples of Duties: Some major duties include abiding by the Constitution, cherishing the noble ideals of the freedom struggle, protecting the sovereignty and integrity of India, promoting harmony and the spirit of common brotherhood, and safeguarding public property.

Q77. Answer: (b) Optical Character Recognition (OCR)

The correct answer is Optical Character Recognition (OCR).

Key Points

• Optical Character Recognition (OCR) is a sophisticated technology that enables the conversion of different types of documents, such as scanned paper documents, PDF files, or images captured by a digital camera, into editable and searchable data.

• In high-speed scanners used in commercial settings and advanced libraries, OCR technology is integral for archival purposes. It allows for the massive digitization of historical records, books, and legal documents, making them accessible through digital databases.

• The technology functions by analyzing the structure of the document image. It divides the page into elements such as blocks of texts or images and then breaks down the characters into components. These are compared with a set of stored patterns or algorithms to identify the specific letters or numbers.

• Modern OCR utilizes Artificial Intelligence (AI) and Machine Learning to improve accuracy. It can now handle various fonts, styles, and even handwritten text (often referred to as Intelligent Character Recognition or ICR), which is essential for preserving historical manuscripts in national archives.

• OCR significantly enhances data entry efficiency and document management by eliminating the need for manual typing. It is widely used in banking, legal, and healthcare sectors for rapid processing of forms and records.

Additional Information

• Magnetic Ink Character Recognition (MICR):

• This technology is primarily used by the banking industry to facilitate the processing and clearance of cheques.

• It involves using a special magnetic ink (containing iron oxide) that can be read by a specialized MICR reader even if the

characters are obscured by stamps or signatures.

• Commonly used fonts in this system include E-13B (widely used in India, USA, and UK) and CMC-7.

• Thermal Printing:

• It is a digital printing process that produces a printed image by selectively heating thermochromic paper (heat-sensitive paper).

• It is commonly used in Point of Sale (POS) terminals, ATMs, and for printing shipping labels due to its high speed, low noise, and lack of need for ink or toner.

• Electrostatic Plotting:

• This is an output technology used for creating high-quality, large-format vector graphics and drawings.

• It works by creating an electrostatic charge on a specially coated paper, which then attracts liquid or dry toner to form the image. It was traditionally used in Computer-Aided Design (CAD) and mapping.

• Archival Scanning Hardware:

• High-end scanners often use Charge-Coupled Device (CCD) sensors rather than Contact Image Sensors (CIS) because CCD provides a better depth of field and color fidelity, which is crucial for high-resolution digital imaging in libraries.

• The resolution of these scanners is measured in Dots Per Inch (DPI), with 600 DPI or higher being the standard for archival quality.

Important Points

• The transition from physical to digital archives via OCR is a key component of Digital India initiatives and global Open Access movements.

• Accuracy levels in OCR are affected by the quality of the original document, the scanning resolution, and the complexity of the language/script.

• OCR software today often outputs files in Searchable PDF format, which contains both the original image and a hidden text layer for indexing.

Q78. Answer: (b) 293.33

Shortcut Trick

Volume of cone = $(1/3)\pi r^2 h$

= $(1/3) \times (22/7) \times 36 \times 7 = 264$ cc

For every 180 cc poured, 20 cc is wasted => efficiency = 180/200 = 0.9

Required water = 264 ÷ 0.9 = 293.33 cc

Therefore Answer = 293.33

Alternate Method

Given:

Radius = 6 cm, Height = 7 cm

Spillage: 20 cc per 180 cc filled

Formula used:

Volume of cone = $(1/3)\pi r^2 h$

Effective fraction = Useful / Total poured

Calculation:

=> Volume = $(1/3) \times (22/7) \times 6^2 \times 7$

=> = $(1/3) \times (22/7) \times 36 \times 7$

=> = 264 cc

=> Out of 200 cc poured, only 180 cc is useful

=> Efficiency = 180/200 = 0.9

=> Let total water poured = x

=> Useful water = 0.9x

=> 0.9x = 264

=> x = 264 ÷ 0.9 = 293.33 cc

Therefore The correct answer is 293.33 cc.

Additional Information

Cone Volume

$(1/3)\pi r^2 h$

Efficiency Concept

Useful fraction = 180/200

Key Insight

Adjust input based on loss ratio

Q79. Answer: (d) 85

Shortcut Trick

Mean proportional = √(425 × 17)

=> 425 × 17 = 7225

=> √7225 = 85

Therefore Answer = 85

Alternate Method

Given: Numbers = 425 and 17

Formula: Mean proportional = √(a × b)

Calculation:

=> Mean proportional = √(425 × 17)

=> = √7225

=> = 85

Therefore Final Answer = 85

Additional Information

Mean Proportional: x = √(a × b)

Also Called: Geometric Mean

Property: a : x = x : b

Use: Ratios, geometry, sequences

Q80. Answer: (d) 617

BODMAS Table:

Given equation: 47 ÷ 12 + 164 × 2 − 135 = ?

Now, if '+' and '−' are interchanged and '×' and '÷' are interchanged, then:

=> 47 × 12 − 164 ÷ 2 + 135

=> 47 × 12 = 564

=> 164 ÷ 2 = 82

=> 564 − 82 + 135

=> 482 + 135

=> 617

Hence, the correct answer is "Option 4".

Q81. Answer: (a) 44th Amendment Act, 1978

The correct answer is 44th Amendment Act, 1978.

Key Points

• The 44th Amendment Act, 1978 was enacted by the Janata Government to nullify several changes made by the 42nd Amendment and to prevent future misuse of Emergency provisions. Hence, Option A is correct.

• Prior to this amendment, a proclamation of National Emergency under Article 352 had to be approved by both Houses of Parliament within two months from the date of its issue.

• The 44th Amendment Act reduced this approval period to one month to ensure stricter parliamentary control over the executive's power to declare an emergency.

• It also mandated that the proclamation must be approved by a special majority (a majority of the total membership of each House and a majority of not less than two-thirds of the members present and voting), rather than a simple majority.

• Another significant change was the substitution of the words "internal disturbance" with "armed rebellion" as a ground for declaring a National Emergency.

Additional Information

• 42nd Amendment Act, 1976:

• Known as the "Mini-Constitution", it was enacted during the Emergency by the Indira Gandhi government.

• It attempted to reduce the power of the Judiciary and added the words "Socialist", "Secular", and "Integrity" to the Preamble. Hence, Option C is incorrect.

• 52nd Amendment Act, 1985:

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• This amendment introduced the Anti-Defection Law in India to prevent political defections.

• It added the 10th Schedule to the Constitution of India, which provides for the disqualification of members on grounds of defection. Hence, Option B is incorrect.

• 38th Amendment Act, 1975:

• This act made the declaration of National Emergency non-justiciable, meaning it could not be challenged in a Court of Law.

• This provision was later modified and clarified by the Judiciary and the 44th Amendment to ensure that Judicial Review remains a basic feature of the Constitution. Hence, Option D is incorrect.

Important Points

• Written Advice: The 44th Amendment introduced a requirement that the President can proclaim a National Emergency only after receiving a written recommendation from the Cabinet (the Prime Minister and other ministers of cabinet rank).

• Periodic Approval: Once approved by Parliament, the emergency continues for six months. It can be extended indefinitely but requires parliamentary approval every six months.

• Article 20 and 21: The 44th Amendment ensured that the enforcement of the rights guaranteed by Articles 20 (protection in respect of conviction for offences) and 21 (protection of life and personal liberty) cannot be suspended even during an Emergency.

• Revocation: A National Emergency must be revoked if the Lok Sabha passes a resolution disapproving its continuation by a simple majority.

Q82. Answer: (b) mRNA

The correct answer is mRNA.

Key Points

• mRNA, or messenger Ribonucleic Acid, serves as the primary intermediary molecule that carries genetic instructions from the DNA in the nucleus to the ribosomes in the cytoplasm.

• Since DNA is a large, double-stranded molecule sequestered within the cell nucleus for protection, it cannot directly participate in protein synthesis; therefore, mRNA is synthesized to act as a portable blueprint. Hence, the statement regarding mRNA being the intermediary is correct.

• The process by which mRNA is created from a DNA template is known as transcription, which is facilitated by the enzyme RNA polymerase.

• mRNA carries the genetic code in sequences of three nucleotides called codons. Each codon corresponds to a specific amino acid or a stop signal during the process of translation.

• In eukaryotic cells, mRNA undergoes significant post-transcriptional modifications, including the addition of a 5' cap, a poly-A tail, and the splicing of non-coding introns before it is ready for use.

Additional Information

• tRNA (transfer RNA):

• tRNA acts as an adapter molecule that bridges the gap between the mRNA code and amino acids.

• Each tRNA molecule has an anticodon that is complementary to a specific mRNA codon and carries the corresponding amino acid to the ribosome.

• It plays a critical role during the elongation phase of protein synthesis.

• rRNA (ribosomal RNA):

• rRNA is the catalytic and structural component of the ribosomes, which are the protein-making factories of the cell.

• It ensures the proper alignment of mRNA and tRNA and catalyzes the formation of peptide bonds between amino acids.

• Approximately 80% of the total RNA in a cell consists of rRNA.

• miRNA (microRNA):

• miRNA consists of small, non-coding RNA molecules, typically 21 to 25 nucleotides in length.

• Their primary function is the regulation of gene expression by binding to complementary sequences on mRNA molecules, usually resulting in gene silencing or the degradation of the target mRNA.

• The Central Dogma:

• Proposed by Francis Crick in 1958, it describes the unidirectional flow of genetic information: DNA (replication) → RNA (transcription) → Protein (translation).

Important Points

• Chemical Composition: Unlike DNA, which contains deoxyribose sugar, RNA contains ribose sugar. Additionally, RNA uses the nitrogenous base Uracil (U) instead of Thymine (T).

• Stability: mRNA is generally short-lived and less stable than DNA, allowing the cell to quickly change its protein production levels in response to environmental needs.

• Location: While DNA is primarily found in the nucleus (and small amounts in mitochondria and chloroplasts), the various forms of

RNA are found throughout the nucleus, cytoplasm, and on the Rough Endoplasmic Reticulum.

• Discovery: The concept of mRNA was first proposed by Sydney Brenner and Francois Jacob in 1961.

Q83. Answer: (a) Article 241

The correct answer is Article 241.

Key Points

• Article 241 of the Indian Constitution explicitly empowers the Parliament to constitute a High Court for a Union territory. It also allows the Parliament to declare any court in such a territory to be a High Court for all or any purposes of the Constitution.

• This article ensures that citizens residing in Union territories have access to a superior judiciary, maintaining the rule of law across all administrative divisions of India.

• The provisions of Chapter V of Part VI of the Constitution, which govern the High Courts in the States, apply to the High Courts established under this article, subject to such modifications or exceptions as Parliament may provide by law.

• Currently, most Union territories fall under the jurisdiction of the High Court of a neighboring state, but Article 241 remains the constitutional basis for creating independent judicial bodies for these territories.

Additional Information

• Article 239: This article deals with the Administration of Union territories. It states that every Union territory shall be administered by the President, acting through an Administrator (often designated as a Lieutenant Governor or Chief Commissioner) appointed by him.

• Article 240: Grants the President the power to make regulations for the peace, progress, and good government of certain Union territories, including the Andaman and Nicobar Islands, Lakshadweep, Dadra and Nagar Haveli and Daman and Diu, and Puducherry. This power is equivalent to an Act of Parliament.

• Article 238: This article originally dealt with the application of provisions of Part VI to States in Part B of the First Schedule. However, it was repealed by the Constitution (Seventh Amendment) Act, 1956, when the distinction between Part A, B, and C states was abolished.

• Delhi High Court: Established on 31st October 1966 under the Delhi High Court Act, 1966, it was for a long time the only Union territory to have its own dedicated High Court. This status changed with the reorganization of Jammu and Kashmir.

Important Points

• Jurisdictional Extensions: Because not all Union territories have their own High Courts, the Parliament uses its power to extend the jurisdiction of state High Courts. For example, the Calcutta High Court has jurisdiction over the Andaman and Nicobar Islands, and the Kerala High Court serves Lakshadweep.

• Bombay High Court: It exercises legal jurisdiction over the Union territory of Dadra and Nagar Haveli and Daman and Diu, as well as the states of Maharashtra and Goa.

• Madras High Court: This court exercises jurisdiction over the Union territory of Puducherry. Similarly, the Punjab and Haryana High Court serves the Union territory of Chandigarh.

• Jammu and Kashmir Reorganisation: Following the Jammu and Kashmir Reorganisation Act, 2019, the existing High Court of the state was transitioned into a common High Court for the Union territory of Jammu and Kashmir and the Union territory of Ladakh.

• Legislative Power: The Parliament holds the exclusive power to alter the jurisdiction of High Courts or create new ones for Union territories, as per the framework provided in Part VIII of the Constitution.

Q84. Answer: (d) 7th Session of the United Nations Environment Assembly (UNEA)

The correct answer is 7th Session of the United Nations Environment Assembly (UNEA).

Key Points

• The 7th Session of the United Nations Environment Assembly (UNEA-7) was held from 8 to 12 December 2025 in Nairobi, Kenya. This assembly serves as the world’s highest decision-making body on environmental issues.

• During this session, India delivered its National Statement, which underscored the country's proactive steps toward achieving sustainable development and its leadership in the global climate arena.

• A major highlight of India's statement was the progress in clean energy, where it noted that it has already met several of its Nationally Determined Contributions (NDCs) ahead of the 2030 deadline.

• The statement heavily promoted Mission LiFE (Lifestyle for Environment), a global mass movement introduced by India to encourage environmentally conscious living. Hence, the statement regarding India's participation in UNEA-7 is correct.

• India emphasized the transition from a "take-make-dispose" economy to a Circular Economy, focusing on resource efficiency and the reduction of single-use plastics.

Additional Information

• United Nations Environment Assembly (UNEA):

• The UNEA was created in June 2012 during the United Nations Conference on Sustainable Development (Rio+20). It is the governing body of the United Nations Environment Programme (UNEP).

• It meets biennially in Nairobi to set the global environmental agenda and provide overarching policy guidance.

• Mission LiFE (Lifestyle for Environment):

• Launched by the Prime Minister of India at COP26 in Glasgow, this mission aims to nudge individuals to adopt simple acts in their daily lives that can contribute to climate change mitigation.

• It focuses on Pro-Planet People (P3) and aims to utilize the power of social networks to influence social norms around environmental protection.

• India's Clean Energy Targets:

• India has set a target to achieve 500 GW of non-fossil fuel energy capacity by the year 2030.

• As of 2025, India ranks high globally in Renewable Energy capacity, particularly in Solar and Wind power.

• The National Green Hydrogen Mission, launched with an initial outlay of Rs. 19,744 crore, is a key component of India's strategy to become energy independent and decarbonize heavy industries.

Important Points

• Panchamrit Goals: India’s climate action is defined by five elements (Panchamrit) presented at COP26, including reaching Net Zero emissions by the year 2070.

• International Solar Alliance (ISA): Headquartered in Gurugram, India, this treaty-based intergovernmental organization was co-founded by India and France to mobilize efforts against climate change through the deployment of solar energy solutions.

• Global Biofuels Alliance (GBA): Launched during India's G20 Presidency in 2023, it aims to facilitate the adoption of biofuels and promote sustainable energy transitions worldwide.

• Climate Finance: At UNEA-7, India reiterated that developed nations must fulfill their commitment to provide $100 billion annually in climate finance to support developing countries in their transition to green technology.

Q85. Answer: (d) Primarily found in the Deccan Plateau

The correct answer is Primarily found in the Deccan Plateau.

Key Points

• Alluvial soil is the most widespread soil type in India, covering approximately 40% of the country's total land area. It is formed by the deposition of sediments by major Himalayan rivers such as the Indus, the Ganga, and the Brahmaputra.

• Rich in potash: Alluvial soils are chemically characterized by being rich in potash and lime, although they are generally deficient in phosphorous, nitrogen, and organic matter. Hence, statement A is a correct feature of alluvial soil.

• Very fertile: Due to their high mineral content and consistent deposition of fresh silt, these soils are very fertile and support intensive agriculture. They are responsible for the high agricultural productivity of the Northern Plains. Hence, statement B is a correct feature of alluvial soil.

• Composition: These soils are depositional in nature and vary in texture from sandy loam to clay. They mainly consist of sand, silt, and clay in varying proportions. Hence, statement C is a correct feature of alluvial soil.

• Location: Alluvial soils are primarily found in the Northern Plains and river valleys of India. They are not the primary soil of the Deccan Plateau; the Deccan region is dominated by Black Soil (also known as Regur soil) which is formed from volcanic rocks. Hence, statement D is NOT a feature of alluvial soil and is the correct answer.

Additional Information

• Classification by Age: According to their age, alluvial soils are classified into two types: Bhangar (old alluvium) and Khadar (new alluvium).

• Bhangar: This is the older alluvium found in the higher reaches of the plains. It often contains calcareous deposits known as Kankar.

• Khadar: This is the newer alluvium found in the floodplains. It is fine-grained, more fertile, and renewed by annual floods.

• Crops Grown: Because of their high fertility, alluvial soils are ideal for growing a wide variety of crops including Rice, Wheat, Sugarcane, Cotton, Jute, and Pulses.

• Geographical Spread: Apart from the Northern Plains, these soils are also found in the Eastern coastal plains, particularly in the deltas of the Mahanadi, Godavari, Krishna, and Kaveri rivers. They also extend into Rajasthan and Gujarat through a narrow corridor.

• Features and Functions: These soils are easy to till and respond well to irrigation. Their porosity allows for good groundwater storage, making them critical for the food security of India.

Important Points

• Soil Classification: The Indian Council of Agricultural Research (ICAR) classifies Indian soils into eight major categories, where Alluvial soil occupies the first rank in terms of area.

• Color and Texture: The color of alluvial soils varies from light grey to ash grey, depending on the depth of the deposition and the duration of the soil formation process.

• Contrast with Deccan Soil: The Deccan Plateau (covering states like Maharashtra, Madhya Pradesh, and Gujarat) is famous for Black Soil, which is characterized by its self-ploughing capacity and suitability for cotton cultivation, unlike the depositional alluvial

soil.

• Nutrient Profile: While India's alluvial soil is rich in potash, it requires nitrogenous fertilizers for optimal crop yields because of its natural deficiency in nitrogen.

Q86. Answer: (d) -31

Shortcut Trick

=> (−56) ÷ (−14) = 4

=> (−2) × 9 = −18

=> Expression = −9 − 4 − 18

=> = −31

Therefore Answer = −31

Alternate Method

Given:

(−9) − (−56) ÷ (−14) + (−2) × 9

Concept Used:

BODMAS rule

Calculation:

(−9) − (−56) ÷ (−14) + (−2) × 9

=> (−9) − 4 + (−2 × 9)

=> (−9) − 4 + (−18)

=> (−9) − 4 − 18

=> −13 − 18

=> −31

Therefore The correct answer is −31.

Additional Information

BODMAS: Division & multiplication before addition/subtraction

Sign Rule: (− ÷ −) = +, (− × +) = −

Integer Rule: Combine negatives carefully

Exam Tip: Solve inner operations first

Q87. Answer: (d) 1,03,500

Shortcut Trick

=> Income ratio = 6 : 7, Expenditure ratio = 2 : 3

=> Savings same => difference equal

=> 6x − 2y = 7x − 3y => y = x

=> Saving = 6x − 2x = 4x = 69000

=> x = 17250

=> Mohan income = 6x = 103500

Therefore Answer = 103500

Alternate Method

Given:

Income ratio = 6 : 7

Expenditure ratio = 2 : 3

Savings of both = 69000

Formula Used:

Saving = Income − Expenditure

Calculation:

=> Let incomes = 6x and 7x

=> Let expenditures = 2y and 3y

=> Saving of Mohan = 6x − 2y = 69000

=> Saving of David = 7x − 3y = 69000

=> Equate => 6x − 2y = 7x − 3y

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=> y = x

=> Substitute => 6x − 2x = 69000

=> 4x = 69000

=> x = 17250

=> Mohan income = 6x = 103500

Therefore The correct answer is 103500.

Additional Information

Saving Formula: Income − Expenditure

Ratio Concept: Represent unknowns using variables

Key Insight: Equal savings => form equation

Exam Tip: Equate both savings directly

Q88. Answer: (d) 7,28

Shortcut Trick

Mean proportional = √(ab) = 14 => ab = 196

Third proportional: a : b = b : 112 => $b^2 = 112a$

=> Put $a = b^2/112$ in ab = 196

=> $(b^2/112) \times b = 196$ => $b^3 = 196 \times 112$

=> b = 28 => a = 7

Therefore Answer = 7 and 28

Alternate Method

Given:

Mean proportional = 14

Third proportional = 112

Formula:

Mean proportional => √(ab) = 14 => ab = 196

Third proportional => a : b = b : 112 => $b^2 = 112a$

Calculation:

=> From $b^2 = 112a$ => $a = b^2/112$

=> Put in ab = 196

=> $(b^2/112) \times b = 196$

=> $b^3 = 196 \times 112$

=> $b^3 = 21952$

=> b = 28

=> a = 196 ÷ 28 = 7

Therefore Final Answer = 7 and 28

Additional Information

Mean Proportional: √(ab)

Third Proportional: a : b = b : c => $b^2 = ac$

Relation: Combine equations to solve

Tip: Reduce to single variable quickly

Q89. Answer: (a) 1780

Given Statements:

All spoons are forks.

All forks are cups.

Some spoons are plates.

The least possible Venn diagram for the given statements is:

Conclusions:

I. Some forks are plates - True (Since some spoons are plates and all spoons are forks, those plates that overlap with spoons must also overlap with forks. So some forks are plates.)

II. Some cups are plates - True (All forks are cups, and some forks are plates, so those plates are also inside cups. Hence, some cups are plates.)

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So, both conclusions I and II follow.

Hence, the correct answer is "Option 1".

Q90. Answer: (d) 17.8

Shortcut Trick

Use: Mode = 3Median − 2Mean

=> Mode − Mean = 3(Median − Mean)

=> 26.7 = 3(Median − Mean)

=> Median − Mean = 8.9

=> Mode − Median = 26.7 − 8.9 = 17.8

Therefore Answer = 17.8

Alternate Method

Given: Mode − Mean = 26.7

Formula: Mode = 3Median − 2Mean

Calculation:

=> Mode − Mean = (3Median − 2Mean) − Mean

=> = 3Median − 3Mean

=> = 3(Median − Mean)

=> 26.7 = 3(Median − Mean)

=> Median − Mean = 26.7 ÷ 3 = 8.9

=> Mode − Median = (Mode − Mean) − (Median − Mean)

=> = 26.7 − 8.9 = 17.8

Therefore Final Answer = 17.8

Additional Information

Empirical Formula: Mode = 3Median − 2Mean

Relation: Mode − Mean = 3(Median − Mean)

Use: For moderately skewed distributions

Tip: Convert into differences for faster solving

Q91. Answer: (a) HK-JN

The logic followed here is based on the alphabetical position pattern:

Option 1: HK – JN

Option 2: IL – KN

Option 3: MP – OR

Option 4: AD – CF

Thus, HK – JN does not match the group.

Hence, the odd one out is Option 1.

Q92. Answer: (c) Mixed economy

The correct answer is Mixed economy.

Key Points

• After gaining independence in 1947, India adopted a Mixed Economy model. This system was designed to combine the merits of both Capitalism (market economy) and Socialism (planned economy) to suit the socio-economic conditions of a newly independent nation.

• In a mixed economy, both the Public Sector (government-owned) and the Private Sector (individually owned) coexist and contribute to economic growth. The government handles strategic sectors like defense, atomic energy, and heavy infrastructure, while the private sector operates in consumer goods and services.

• The Industrial Policy Resolution of 1948 was the first formal announcement that outlined the mixed economic path, followed by the more comprehensive Industrial Policy Resolution of 1956, which aimed at achieving a socialistic pattern of society.

• The primary goal of this system was to ensure rapid industrialization while preventing the concentration of wealth in a few hands, thereby promoting social justice and equitable distribution of resources.

• The Planning Commission, established in March 1950, played a central role in this system by formulating Five-Year Plans to allocate resources across different sectors of the economy.

Additional Information

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• Capitalist Economy:

• In this system, the means of production are privately owned. Decisions regarding production, investment, and distribution are determined by market forces (supply and demand) rather than government intervention.

• India did not adopt pure capitalism because it was feared that a profit-driven motive alone would ignore the needs of the poor and lead to monopolies.

• Socialist Economy:

• This involves state ownership of all productive resources. Economic activities are centrally planned to meet the needs of society.

• While Jawaharlal Nehru was deeply influenced by the Soviet Union (USSR) model, India rejected total socialism to maintain democratic values and allow for private initiative and property rights.

• Command Economy:

• Often associated with authoritarian socialist regimes, a command economy is one where the government has total control over prices and production levels.

• India's model differed as it allowed a regulated market and private entrepreneurship alongside state control.

• Economic Reforms of 1991:

• Due to a severe Balance of Payments crisis, India introduced Liberalization, Privatization, and Globalization (LPG) reforms under Prime Minister P.V. Narasimha Rao and Finance Minister Dr. Manmohan Singh.

• These reforms reduced government licensing (License Raj) and increased the role of the private sector, further evolving India's mixed economy toward a more market-oriented structure.

Important Points

• Constitutional Basis: The Directive Principles of State Policy (DPSP) in the Constitution of India (specifically Articles 38 and 39) provide the mandate for the state to minimize inequalities in income and ensure that the ownership and control of material resources are distributed to subserve the common good.

• P.C. Mahalanobis: He was a key statistician and the architect of the Second Five-Year Plan (1956–1961). He emphasized the development of capital goods industries through the public sector to make India self-reliant.

• Current Status: Since 2015, the NITI Aayog (National Institution for Transforming India) replaced the Planning Commission to move towards cooperative federalism and a more modern approach to the mixed economy, focusing on policy guidance rather than direct resource allocation.

Q93. Answer: (d) 8,249 sq. kms

The correct answer is 8,249 sq. kms.

Key Points

• The Andaman and Nicobar Islands is a Union Territory of India consisting of 572 islands, of which only about 38 are inhabited. The total geographical area of the archipelago is approximately 8,249 sq. kms.

• The islands are divided into two main groups: the Andaman Islands in the north and the Nicobar Islands in the south. The Andaman group covers an area of about 6,408 sq. kms, while the Nicobar group occupies approximately 1,841 sq. kms.

• This territory is situated in the Bay of Bengal, located roughly 1,200 km from the Indian mainland (Chennai and Kolkata).

• The Ten Degree Channel (10°N latitude) separates the Andaman group from the Nicobar group. It is approximately 150 km wide. Hence, the stated area of 8,249 sq. kms is correct.

• The capital and largest city of the territory is Port Blair, which serves as the primary administrative hub and the entry point for most tourists.

Additional Information

• Geographic Location and Extent:

• The islands extend from 6° to 14° North Latitude and 92° to 94° East Longitude.

• The Andaman Islands are an extension of the Arakan Yoma mountain range of Myanmar.

• The southernmost point of India, Indira Point, is located on the Great Nicobar Island at 6°7'N latitude. It was formerly known as Pygmalion Point.

• Physiography and Peaks:

• The highest point in the Andaman Islands is Saddle Peak, which stands at 732 meters in North Andaman.

• In the Nicobar Islands, the highest elevation is Mount Thullier, reaching 642 meters on Great Nicobar.

• The region is home to India's only active volcano on Barren Island, which last showed significant activity in 2017. Narcondam Island is another volcanic island, classified as extinct.

• Flora and Fauna:

• The territory boasts a forest cover of about 86% of its total land area. The vegetation is primarily Tropical Evergreen, Moist Deciduous, and Mangrove forests.

• The Dugong (Sea Cow) is the official State Animal, while the Andaman Wood Pigeon is the State Bird, and the Andaman

Padauk is the State Tree.

Important Points

• Indigenous Tribes:

• The islands are home to several Particularly Vulnerable Tribal Groups (PVTGs).

• In the Andamans, these include the Great Andamanese, Onge, Jarawa, and the Sentinelese (who remain isolated).

• In the Nicobar Islands, the indigenous groups are the Shompen and the Nicobarese.

• Strategic and Historical Importance:

• Historically, the islands were used by the British as a penal colony, famously housing the Cellular Jail (Kala Pani) in 1906 to imprison Indian revolutionaries.

• During World War II, the islands were occupied by the Japanese from 1942 to 1945.

• Today, the Andaman and Nicobar Command (ANC) is the first and only Tri-service theater command of the Indian Armed Forces, highlighting the region's immense strategic value in the Indian Ocean Region (IOR).

Q94. Answer: (c) 5 km to the east

Given:

Yeti starts from Point A and drives 48 km towards North.

He takes a right turn → 50 km East.

He turns right → 54 km South.

He takes a right turn → 55 km West.

He takes a final right turn → 6 km North and reaches Point P.

So, To reach A from P → move 5 km East

Hence, the correct answer is Option 3.

Q95. Answer: (d) 92.5%

Shortcut Trick

Let actual SP = 10x

=> Given SP = 3x gives 25% loss => CP = 3x ÷ 0.75 = 4x

=> New SP = 77% of actual = 7.7x

=> Profit = 7.7x − 4x = 3.7x

=> Profit% = (3.7x ÷ 4x) × 100 = 92.5%

Therefore Answer = 92.5%

Alternate Method

Given:

SP = (3/10) of actual SP => loss = 25%

Formula: SP = CP × (1 − loss%)

Calculation:

=> Let actual SP = 10x

=> Given SP = 3x

=> 3x = 75% of CP

=> CP = 3x ÷ 0.75 = 4x

=> New SP = 77% of actual = 7.7x

=> Profit = 7.7x − 4x = 3.7x

=> Profit% = (3.7x ÷ 4x) × 100 = 92.5%

Therefore Final Answer = 92.5%

Additional Information

Loss Formula: SP = CP × (1 − loss%)

Profit%: (Profit ÷ CP) × 100

Assumption: Take convenient base like 10x

Tip: Convert % to multiplier for speed

Q96. Answer: (d) Indian National Space Promotion and Authorisation Centre (IN-SPACe)

The correct answer is Indian National Space Promotion and Authorisation Centre (IN-SPACe).

Key Points

• The Indian National Space Promotion and Authorisation Centre (IN-SPACe), an autonomous nodal agency under the Department of Space, issued a Request for Proposal (RfP) in December 2023 (and continuing initiatives into 2024-2025) to establish Space Labs in universities and Higher Education Institutions (HEIs) across India.

• The primary objective of these Space Labs is to provide students and researchers with hands-on experience in satellite fabrication, ground station operations, and space-based application development.

• Under this initiative, IN-SPACe aims to foster the space startup ecosystem by bridging the gap between academic research and industrial requirements in the aerospace sector.

• The RfP outlines the provision of infrastructure support, including Satellite Assembly, Integration, and Testing (AIT) kits, clean rooms, and simulation software to selected institutions.

• This move aligns with the Government of India's vision of Atmanirbhar Bharat, aiming to create a skilled workforce that can contribute to the $44 billion global space economy share targeted by India.

Additional Information

• IN-SPACe (Indian National Space Promotion and Authorisation Centre):

• It was established in June 2020 to serve as a single-window agency for promoting and authorizing private sector participation in space activities.

• Headquartered in Bopal, Ahmedabad, Gujarat, it operates as an independent body to ensure that Non-Governmental Entities (NGEs) can utilize ISRO facilities efficiently.

• The current Chairman of IN-SPACe is Dr. Pawan Kumar Goenka, a renowned figure in the automotive and technology industry.

• Indian Space Research Organisation (ISRO):

• Founded on 15 August 1969, ISRO is the national space agency of India, headquartered in Bengaluru, Karnataka.

• While ISRO focuses on advanced R&D, planetary exploration, and national security missions, IN-SPACe specifically handles the commercial and private enablement aspect.

• New Space India Limited (NSIL):

• Established in March 2019, NSIL is the commercial arm of the Department of Space.

• Its primary function is to commercialize the technologies developed by ISRO and manage launch service contracts for international customers.

• Indian Space Policy 2023:

• The Government approved this policy in April 2023 to clarify the roles of ISRO, NSIL, and IN-SPACe.

• It encourages end-to-end participation of private players in the space sector, from satellite manufacturing to launch vehicle development.

Important Points

• Space Lab Components: These labs typically feature Nano-satellite kits, UHF/VHF/S-band ground stations, and GNSS (Global Navigation Satellite System) receivers for geospatial data analysis.

• Economic Impact: By 2025 and beyond, India aims to increase its share in the global space market from the current 2% to approximately 8-10%.

• Educational Growth: The establishment of these Space Labs in universities facilitates the National Education Policy (NEP) 2020 goals of vocational training and STEM (Science, Technology, Engineering, and Mathematics) excellence.

Q97. Answer: (c) CUK 34

The logic followed here is:

So, 'CUK 34' will replace the question mark in the given series.

Hence, the correct answer is "Option 3".

Q98. Answer: (a) 5766√3

Shortcut Trick

Square area = 8649 => side = √8649 = 93

Perimeter = 4 × 93 = 372

Hexagon side = 372 ÷ 6 = 62

Area = (3√3/2) × 62^2

=> = (3√3/2) × 3844 = 5766√3

Therefore Answer = 5766√3

Alternate Method

Given:

Area of square = 8649 cm^2

Formula:

Square side = √Area

Hexagon area = $(3\sqrt{3}/2) \times a^2$

Calculation:

=> Side of square = √8649 = 93 cm

=> Perimeter of square = 4 × 93 = 372 cm

=> Perimeter of hexagon = 372 cm

=> Side of hexagon = 372 ÷ 6 = 62 cm

=> Area of hexagon = $(3\sqrt{3}/2) \times 62^2$

=> = $(3\sqrt{3}/2) \times 3844$

=> = $5766\sqrt{3}$ cm²

Therefore Final Answer = $5766\sqrt{3}$ cm²

Additional Information

Square Area: side²

Perimeter: Sum of all sides

Hexagon Area: $(3\sqrt{3}/2)a^2$

Tip: Convert perimeter to side first

Q99. Answer: (b) Both conclusions (I) and (II) follow.

Given Statements:

All caps are helmets.

All helmets are hats.

No hat is a crown.

The least possible Venn diagram for the given statements is:

Conclusions:

I. No cap is a crown - True (Since all caps are inside helmets, all helmets are inside hats, and no hat is a crown, caps cannot be crowns. So this conclusion follows.)

II. Some hats are caps - True (All caps are helmets and all helmets are hats, so caps exist inside hats. Hence, some hats are caps.)

So, both conclusions I and II follow.

Hence, the correct answer is "Option 2".

Q100. Answer: (c) 44 cm

Shortcut Trick

Direct formula: Circumference = π × d

=> = (22/7) × 14 = 44

Therefore Answer = 44 cm

Alternate Method

Given:

Diameter = 14 cm

π = 22/7

Formula: Circumference = π × d

Calculation:

=> Circumference = (22/7) × 14

=> = 22 × 2 = 44 cm

Therefore Final Answer = 44 cm

Additional Information

Circumference: πd or 2πr

Radius: r = d/2

π Value: 22/7 (approx)

Tip: Use πd for faster calculation

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