RRB NTPC (Graduate) CBT-I Official Paper (Held On: 18 Mar, 2026 Shift 1) (Previous Year Paper)

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

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Q1. In a certain code language,

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

A – B means 'A is the husband of B',

A × B means 'A is the mother of B' and

A ÷ B means 'A is the brother of B'.

Based on the above information, how is K related to O if 'K + L – M × N ÷ O'?

(a) Father's sister

(b) Mother's mother

(c) Father's mother

(d) Mother's sister

Q2. Let C be a circle with centre O. Let AB be a tangent to C such that AB touches the circle at point P. Let X and Y be any two points on C. If angle APX = 50° and angle BPY = 60°, then find angle PXY and angle PYX, respectively.

(a) 50°, 130°

(b) 50°, 60°

(c) 60°, 50°

(d) 60°, 120°

Q3. Which of the following social reformers established the 'Bahishkrit Hitakarini Sabha' in 1924?

(a) Jyotirao Phule

(b) Jawaharlal Nehru

(c) Baba Amte

(d) B R Ambedkar

Q4. If '+' means '–', '–' means '×', '×' means '÷', '÷' means '+', then what will come in place of the question mark (?) in the following equation?

57 − 7 ÷ 119 + 288 × 2 = ?

(a) 374

(b) 329

(c) 345

(d) 311

Q5. GOAT is related to IQCV in a certain way based on the English alphabetical order. In the same way, OWIB is related to QYKD. To which of the following options is UCOH related, following the same logic?

(a) WERT

(b) QJYU

(c) WJQE

(d) WEQJ

Q6. Which provision in Part II of the Constitution defines one basis for citizenship at the commencement, specifically that the person's either parent was born in India?

(a) Article 5
(b) Article 8
(c) Article 6
(d) Article 9

Q7. What is the maximum value that must be assigned to A so that the 8-digit number 588A9792 is divisible by 4?

(a) 5
(b) 7
(c) 6
(d) 9

Q8. Which folk music form of Uttar Pradesh is traditionally sung during the monsoon season by women?

(a) Lavani
(b) Kajri
(c) Maang
(d) Bhatiali

Q9. Which battle is regarded as the turning point that led to British political control in Bengal and opened the path for British expansion in India?

(a) Battle of Wandiwash
(b) Battle of Plassey
(c) Battle of Buxar
(d) Third Carnatic War

Q10. According to GFRA 2025, what was India's global rank in total forest area?

(a) 15th
(b) 6th
(c) 9th
(d) 12th

Q11. A solid is composed of a cube surmounted by a cuboid. The edge of the cube is x cm. The cuboid placed on top has a square base exactly fitting the top face of the cube, and its height is (x − 4) cm. If the total volume of the solid is 1.5 times the volume of the cube, what is the value of x?

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

Q12. Amir Khusrau, the famous historian, said about a particular language that *'common people do not know it, only the Brahmanas do'.* Which of the following languages did the historian talk about?

(a) Sanskrit
(b) Urdu
(c) Palli
(d) Hindu

Q13. If 6 machines can manufacture 480 components in 8 hours, how many components can 10 machines manufacture in 12 hours, assuming all machines work at the same constant rate?

(a) 1200
(b) 1000
(c) 900
(d) 1440

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Q14. What is the key difference between extensive and intensive farming systems?

(a) Machinery type
(b) Production per land unit
(c) Irrigation used
(d) Size of seed

Q15. Which of the following is a characteristic of all living things?

(a) The ability to reproduce
(b) The ability to speak
(c) The ability to fly
(d) The ability to move

Q16. Consider the following statements regarding the 74th Amendment Act of 1992.

1. It has added a new Part IX-A to the Constitution of India.
2. The Act has also added a new 10th Schedule to the Constitution.
3. The Act provides for the constitution of three types of municipalities in every state.
4. It consists of provisions from Articles 243-P to 243-ZG.

Which of the above statements are correct?

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

Q17. Each of the digits in the number 1847536 is arranged in the ascending order from left to right. The position of how many digits will remain unchanged as compared to that in the original number?

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

Q18. Based on the English alphabetical order, three of the following four are alike in a certain way and thus form a group. Which is the one that does not belong to that group?

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

(a) LIF
(b) PMJ
(c) URQ
(d) ZWT

Q19. Find the value of m, satisfying equation: $(16/5)^{13} \times (5/16)^{16} \times (16/5)^5 = (5/16)^{(6m + 16)}$

(a) -1
(b) 6
(c) -3
(d) 9

Q20. P, Q, R, S, E and F live on six different floors of the same building. The lowermost floor in the building is numbered 1, the floor above it, number 2 and so on till the topmost floor is numbered 6.

E lives on floor number 4. Only two people live between E and R. Only P lives between E and Q. S lives immediately below E.

Who lives on floor number 2?

(a) R
(b) Q
(c) S
(d) F

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Q21. Maria wants to manage startup programs and services that run automatically when Windows 11 starts. Which Windows utility provides dedicated 'Startup' and 'Services' task for this purpose?

(a) MSConfig
(b) Windows Defender
(c) Disk Cleanup
(d) System Restore

Q22. 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 vultures are sparrows. Some sparrows are crows. No crow is a pigeon.

Conclusions:

(I) Some vultures are crows.

(II) No sparrow is a pigeon.

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

Q23. 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, certain mathematical operations 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 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.)

12 – 36 – 51 – 63; 20 – 60 – 75 – 87

(a) 25 – 75 – 90 – 102
(b) 14 – 42 – 57 – 79
(c) 16 – 48 – 63 – 85
(d) 10 – 30 – 55 – 67

Q24. Which significant milestone did the Ministry of Environment, Forest and Climate Change announce on World Environment Day 2025 regarding pollution?

(a) Launch of “One Nation, One Mission: End Plastic Pollution”
(b) Closure of coal plants
(c) Ban on all single-use plastics nationwide
(d) Elimination of non-attainment cities

Q25. The 68th annual Grammy Awards conducted on 1 February 2026, in Los Angeles, honoured which of the following performers as Best New Artist?

(a) Olivia Dean
(b) Leon Thomas
(c) Addison Rae
(d) Lola Young

Q26. The total surface area of a solid hemisphere is 272 cm^2. Its radius (in cm) is:

(Take $\pi = 22/7$)

(a) $\sqrt{(968/33)}$
(b) $\sqrt{(952/33)}$
(c) $\sqrt{(946/33)}$
(d) $\sqrt{(962/33)}$

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Q27. Select the set in which the numbers are related in the same way as are the numbers of the following sets.

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

(7,18,39)

(3,19,28)

(a) (23,4,73)
(b) (16,3,61)
(c) (4,28,20)
(d) (10,5,55)

Q28. The book “Poverty and Un-British Rule in India”, which compiled evidence from British official sources to explain India’s economic drain, was authored by whom?

(a) Dadabhai Naoroji
(b) Gopal Krishna Gokhale
(c) R. C. Dutt
(d) M. G. Ranade

Q29. Which option correctly completes the general word equation for a neutralisation reaction?

Base + Acid → _____ + _____

(a) Metal + Water
(b) Metal + Carbon Dioxide
(c) Salt + Water
(d) Salt + Carbon Dioxide

Q30. What is the diameter of a circle if the numerical value of its area is equal to twice the numerical value of its perimeter?

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

Q31. In a certain code language,

A + B means ‘A is the father of B’

A – B means ‘A is the wife of B’

A × B means ‘A is the sister of B’

A ÷ B means ‘A is the mother of B’.

Based on the above, how is R related to F if ‘R – P + S × N ÷ F'?

(a) Father’s sister
(b) Mother’s mother
(c) Sister
(d) Father’s mother

Q32. The Citizenship Amendment Act, 2019, provides citizenship to individuals belonging to which communities if they entered India before 31st December 2014 from Pakistan or Afghanistan or Bangladesh?

(a) Hindu, Sikh, Buddhist, Jain, Parsi, Christian
(b) Sikh, Christian, Hindu, Jain only
(c) Muslim, Christian, Parsi, Sikh
(d) Hindu, Muslim, Jain, Parsi

Q33. By selling an article at 2/5 of its actual selling price, Akash incurs a loss of 24%.

If he sells it at 84% of its actual selling price, then the profit percentage is

(a) 59.6%
(b) 61.6%

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(c) 58.3%
(d) 57.8%

Q34. JELU is related to NHNV in a certain way based on the English alphabetical order. In the same way, BGMQ is related to FJOR. To which of the following is GKNP related, following the same logic?
(a) HMNQ
(b) LOQQ
(c) KNPQ
(d) JMOQ

Q35. FIBA is related to EJAB in a certain way based on the English alphabetical order. In the same way, ZELU is related to YFKV. To which of the following is COIS related, following the same logic?
(a) BQJV
(b) BPHT
(c) BQGS
(d) BOMS

Q36. 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) RU-TW
(b) FI-JM
(c) DG-FI
(d) LO-NQ

Q37. Which of the given letter-number clusters will replace the question mark (?) in the following series to make it logically complete?
LEF 11 ATU 22 PIJ 33 EXY 44 ?
(a) TMN 55
(b) KGO 66
(c) LIE 55
(d) JDY 56

Q38. The population of a village was 2,90,000. It increased by 15% in the first year and increased by 25% in the second year. Its population after two years is _____.
(a) 3,33,500
(b) 4,16,875
(c) 4,06,000
(d) 3,62,500

Q39. 100 men have provisions for 26 days. If 60 men have left, for how many days the same provisions would last for the remaining men?
(a) 63
(b) 67
(c) 65
(d) 69

Q40. A dealer buys two articles X and Y for Rs. 500 each. He marks each of them at the same price. He sells X by giving two successive discounts of 20% and 45% and still earns Rs. 636 as profit. If he sells Y at a single discount of 67%, then what is the profit percentage on Y?
(a) 69.4%
(b) 70.4%
(c) 69%
(d) 70%

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Q41. Who is credited with the discovery of the electron?

(a) Marie Curie
(b) Ernest Rutherford
(c) Albert Einstein
(d) J.J. Thomson

Q42. What action did the Supreme Court take regarding mining near national parks and wildlife sanctuaries on November 13, 2025?

(a) Permitted mining with restrictions
(b) Reduced protection area to 0.5 km
(c) Banned mining activities within one km
(d) Allowed mining activities anywhere

Q43. How many solutions for given three unknowns are possible to satisfy all these equations?

$-3\alpha + 2\beta + -5\gamma = -14$

$2\alpha - 3\beta + 4\gamma = 10$

$\alpha + \beta + \gamma = 4$

(a) Unique solution
(b) Two solutions
(c) No solution
(d) Infinite solutions

Q44. Walking at 3/7 of his normal speed from his home, Lakshya is 20 minutes late in reaching his office. The usual time taken by him to cover the distance between his home and his office is

(a) 15 minutes
(b) 13 minutes
(c) 5 minutes
(d) 11 minutes

Q45. What should come in place of the question mark (?) in the given series?

23 24 28 37 53 ?

(a) 78
(b) 80
(c) 82
(d) 76

Q46. As per Census of 2011, which of the following states is least densely populated?

(a) Rajasthan
(b) Mizoram
(c) Assam
(d) Arunachal Pradesh

Q47. Which layer of the Earth plays the primary role in generating the planet's magnetic field?

(a) Crust
(b) Mantle
(c) Outer core
(d) Inner core

Q48. In the following number-pairs, the second number is obtained by applying certain mathematical operations to the first number. 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.)

15, 29

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32, 63

(a) 17, 33
(b) 11, 34
(c) 23, 49
(d) 14, 44

Q49. This question is based on the five, three-digit numbers given below.

(Left) 412 368 457 283 396 (Right)

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

NOTE - All operations to be done from left to right.

What will be the resultant if third digit of the highest number is added to the second digit of lowest number ?

(a) 11
(b) 15
(c) 13
(d) 9

Q50. There are 9,632 students in a school and the ratio of boys to girls in the school is 17 : 11, then find the number of boys in the school.

(a) 5,851
(b) 5,828
(c) 5,848
(d) 5,831

Q51. Who initiated a major archaeological or scientific study related to the Harappan site of Rakhigarhi in 2013?

(a) B.B. Lal
(b) R.S. Bisht
(c) Vasant Shinde
(d) Amrendra Nath

Q52. In December 2025, which existing Act does the Viksit Bharat—Guarantee for Rozgar and Ajeevika Mission (Gramin) (VB—G RAM G) Bill, 2025 seek to replace?

(a) Insurance Regulatory and Development Authority Act, 1999
(b) Life Insurance Corporation Act, 1956
(c) Mahatma Gandhi National Rural Employment Guarantee Act, 2005
(d) Insurance Act, 1938

Q53. The abbreviation BIOS stands for:

(a) Basic Internal Output Software
(b) Basic Input/Output System
(c) Board Information Operating Setup
(d) Binary Input/Output Storage

Q54. There are 75 members in group A, 47 members in group B and 15 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. 493, Rs. 397 and Rs. 465, respectively. The overall average amount (in Rs.) spent per member is:

(a) 461
(b) 462
(c) 455
(d) 457

Q55. Four years ago from now, the average age of Amit, Bharat and Chitra was 36 years. Six years ago from now, the average age of Amit and Bharat was 30 years. What was the age of Chitra three years ago from now?

(a) 42 years
(b) 45 years
(c) 40 years

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(d) 43 years

Q56. M, N, O, P, E and F 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 is numbered 6. E lives on the topmost floor. Only three people live between E and M. O lives on a floor below M. N lives on an even-numbered floor. P lives on an odd-numbered floor but not on floor number 5. How many people live between F and M?

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

Q57. In Windows 11, a file with the .msi file extension is primarily designed for which specific function?

(a) Storing formatted Text, Image and Document content
(b) Encoding multimedia audio and video streams
(c) Editing raster and vector images
(d) Executing the installation of software applications

Q58. If $x + 1/X = -3$, find the value of $x^3 + 1/(X^3)$.

(a) -3
(b) -18
(c) 9
(d) 0

Q59. Kartikeyan starts from Point A and drives 37 km towards West. He then takes a right turn, drives 26 km, turns right and drives 42 km. He then takes a right turn and drives 47 km. He takes a final right turn, drives 5 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 degrees turns only unless specified)

(a) 21 km to the North
(b) 20 km to the South
(c) 21 km to the South
(d) 20 km to the North

Q60. If the median of a data is 77.74 less than its mode, then the median of the data exceeds its mean by _____. (Use the empirical formula to find the answer)

(a) 38.87
(b) 37.09
(c) 35.13
(d) 44.11

Q61. If the Government of India revokes the citizenship of an individual for acting against the interests of the country, which constitutional or statutory provision empowers it to do so?

(a) Section 6A of the Citizenship Act, 1955
(b) Article 11 of the Constitution
(c) Section 10 of the Citizenship Act, 1955
(d) Article 5 of the Constitution

Q62. Seven people F, G, H, I, U, V, and W are sitting around a circular table facing the centre of the table. V sits fourth to the left of G. Only three people sit between F and I when counted from the right of I. H sits to the immediate right of F. W is an immediate neighbour of I as well as V. Who sits third to the left of U?

(a) W
(b) I
(c) G
(d) V

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Q63. At what rate (in percentage, rounded off to two decimal place) per year will a sum of money 5 times itself in 22 years on simple interest?

(a) 36.36
(b) 16.18
(c) 18.18
(d) 20.18

Q64. D, E, F, G, S, T and U are sitting around a circular table facing the centre. T sits to the immediate left of S. U sits to the immediate left of D. D sits second to the left of G. E sits third to the left of S. Who sits fourth to the right of F?

(a) S
(b) T
(c) G
(d) D

Q65. Which plant tissue is responsible for transporting water from the roots to the leaves?

(a) Epidermis
(b) Xylem
(c) Phloem
(d) Cortex

Q66. This question is based on the five, three-digit numbers given below.

(Left) 564 487 769 478 546 (Right)

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

NOTE - All operations to be done from left to right.

What will be the resultant if the second digit of the second highest number is added to the third digit of the lowest number?

(a) 12
(b) 10
(c) 14
(d) 11

Q67. Which report, released at the COP30 summit in 2025, highlights the rapid increase in global methane emissions and the need for urgent action to address climate change?

(a) Global Climate Mitigation Outlook Report 2025
(b) International Greenhouse Gas Assessment Report 2025
(c) Worldwide Atmospheric Pollution Trends Report 2025
(d) Global Methane Status Report 2025

Q68. 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:

No elephant is a horse. No horse is a donkey. No horse is a turtle.

Conclusions:

(I) No elephant is a donkey.

(II) Some turtles are donkeys.

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

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Q69. What is the ratio between fourth proportional of 10, 80, 30 and fourth proportional of 7, 28, 19?

(a) 10:7
(b) 29:26
(c) 30:19
(d) 60:19

Q70. The Taiga Type region is best described as which major natural region?

(a) Cold Deserts Region
(b) Cool Temperate Grassland Region
(c) Equatorial Lowland Region
(d) Coniferous Forests Region

Q71. What is rural development concerned with?

(a) Economic growth and social justice
(b) Improvement of foreign trade relations
(c) Expansion of industrial zones
(d) Development of metropolitan areas

Q72. Unlike humans, a computer does not feel tired or bored while repeating the same task all day. This shows which characteristic?

(a) Intelligence
(b) Diligence
(c) Versatility
(d) Speed

Q73. Which temple's garbhagriha houses a Chaturmukha (four-faced) Vishnu image?

(a) Meenakshi Temple, Madurai
(b) Brihadiswara Temple, Thanjavur
(c) Dashavatara Temple, Deogarh
(d) Lakshmana Temple, Khajuraho

Q74. What did the Tax Reforms Committee recommend for Wealth Tax in 1991?

(a) restructuring of estate duty
(b) removal of gift tax
(c) abolition of wealth tax
(d) rationalisation of property tax

Q75. The following table shows the distribution of marks obtained by students in a test.

Marks Range	0-10	10-20	20-30	30-40	40-50
Number of Students	5	12	18	25	10

Find the mode. (Round off to two decimal places.)

(a) 33.65
(b) 32.56
(c) 32.84
(d) 33.18

Q76. Which of the following letter-number clusters will replace the question mark (?) in the given series to make it logically complete?

DCE 19 FEG 14 HGI 9 JIK 4 ?

(a) LLL -1
(b) LKM -1
(c) LJL -2
(d) LPU -2

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Q77. Each of M, N, O, P, Q, R and S has an flight on a different day of a week starting from Monday and ending on Sunday of the same week. S has flight on third last day of the week. Only two people have flight between R and S. Only four people have flight between R and Q. P has flight immediately after N. M doesn't have flight on Monday. On which day does M have a flight?

(a) Friday
(b) Sunday
(c) Saturday
(d) Wednesday

Q78. Mr. X travelled 810 km, 492 km and 988 km at a speed of 30 km/hr, 12 km/hr and 38 km/hr, respectively. Find his average speed in km/hr.

(a) 2520/47
(b) 2416/47
(c) 2418/47
(d) 2417/47

Q79. A shopkeeper purchased 47 dozens of articles at the rate of Rs. 480 per dozen. He sold each one of them at the rate of Rs. 78. What percentage profit did he make?

(a) 93%
(b) 98%
(c) 92%
(d) 95%

Q80. Girish scored 416 marks in an examination and was 79 marks short of 33% of maximum marks. In the same examination, his friend scored 555 marks. What is the percentage of marks scored by his friend?

(a) 37%
(b) 36%
(c) 39%
(d) 38%

Q81. In 2025, which England cricketer was formally knighted during an investiture ceremony held at Windsor Castle on 28 October?

(a) Stuart Broad
(b) James Anderson
(c) Alastair Cook
(d) Joe Root

Q82. Which type of soil is most suitable for cotton cultivation in India?

(a) Laterite soil
(b) Black soil
(c) Red soil
(d) Alluvial soil

Q83. If $x = a\sin\theta$ and $y = a\cos\theta$, then find the relation between x, y and a.

(a) $x^2 + y^2 = a^2$
(b) $x^2 + y^2 = -a^2$
(c) $x^2 - y^2 = -a^2$
(d) $x^2 - y^2 = a^2$

Q84. If 34% of 50 - 4/6 × cbrt512 × √36 = y, then the value of y is

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

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Q85. Folk songs of Haryana are commonly known by which of the following names?

(a) Raganis
(b) Bhand
(c) Bihu
(d) Baul

Q86. Kartik has Rs. 1407 with him. He divides this amount between his two sons, Ishan and Krish, and asks them to invest their respective shares at a compound interest rate of 10% per annum, compounded annually. It is observed that Ishan's investment amounts to the same value after 11 years as Krish's investment does after 12 years. How much (in Rs.) did Kartik give to Krish?

(a) 670
(b) 737
(c) 837
(d) 520

Q87. Refer to the following number and symbol series and answer the question that follows. All numbers are single-digit numbers only.

(Left) 7 8 @ 1 # 4 $ 5 % + ? 8 & 6 % 4 8 9 % (Right)

If all the symbols are dropped from the series, which of the following will be seventh from the right?

(a) 6
(b) 9
(c) 4
(d) 8

Q88. What should come in place of '?' in the given series?

91 93 96 101 108 ?

(a) 121
(b) 123
(c) 119
(d) 117

Q89. 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.

Q. Anita, Bhavna, Charu, Deepa, and Esha, each scored different marks. Who scored the lowest marks?

(I) Bhavna scored more than Anita but less than Charu.

(II) Deepa scored more than Anita but less than Bhavna.

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

Q90. Two automated lab machines start a calibration cycle at the same time.

Machine A completes one cycle every 12 minutes.

Machine B completes one cycle every 18 minutes.

After how many minutes will both machines complete a cycle together again?

(a) 36
(b) 30
(c) 48
(d) 24

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Q91. In which year did the Union Cabinet approve the Employment Linked Incentive (ELI) Scheme, named as 'Pradhan Mantri Viksit Bharat Rozgar Yojana'?

(a) 2021
(b) 2015
(c) 2018
(d) 2025

Q92. Find the minimum value of the quadratic expression $7x^2 - 7x + 22$.

(a) 83/4
(b) 81/4
(c) 55/4
(d) 65/4

Q93. Which of the following countries serves as India's gateway to the ASEAN region by being the only ASEAN nation sharing a land boundary with India?

(a) Myanmar
(b) Bangladesh
(c) Nepal
(d) Bhutan

Q94. As of May 2025, which Indian Union Ministry does Piyush Goyal administer?

(a) Ministry of Commerce and Industry
(b) Ministry of Labour and Employment
(c) Ministry of Skill Development and Entrepreneurship
(d) Ministry of Corporate Affairs

Q95. A tank is filled by three pipes, P, Q and R, with uniform flow. The first two pipes P and Q, operating simultaneously, fill the tank in the same amount of time that it takes for the tank to be filled by pipe R alone. Pipe Q fills the tank 15 hours faster than the first pipe and 12 hours slower than pipe R. What is the time required by pipe P to fill the tank?

(a) 25 hours
(b) 32 hours
(c) 47 hours
(d) 45 hours

Q96. In a certain code language, 'LITE' is coded as '1527' and 'EDIT' is coded as '5124'. What is the code for 'D' in the given code language?

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

Q97. Which of the following themes guided global campaigns for World Polio Day 2025?

(a) End Polio: Every Child, Every Vaccine, Everywhere
(b) Immunization for All Ages across the country
(c) Protecting Children from Diseases, all at once
(d) Vaccines for a Healthy Child and Healthy Future

Q98. In a certain code language, 'kids are playing' is coded as 'pu rs bp' and 'people love kids' is coded as 'rs gu xc'. How is 'kids' coded in that language?

(a) bp
(b) pu
(c) xc
(d) rs

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Q99. The first E-Lok Adalat was held in which year in India?

(a) 2012
(b) 2016
(c) 2020
(d) 2014

Q100. Which Chalukya ruler defeated Harshavardhana on the banks of the Narmada?

(a) Kirttivarman I
(b) Pulakesin II
(c) Mangalesha
(d) Vikramaditya I

ANSWER KEY

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

SOLUTIONS

Q1. Answer: (a) Father's sister

Family Chart:

Decoding the Symbols:

Symbol	•	–	×	÷
Meaning	Sister	Husband	Mother	Brother

Given: K + L – M × N ÷ O

It means: K is the sister of L, L is the husband of M, M is the mother of N, N is the brother of O.

So, K is sister of O's father

Hence, the correct answer is "Option 1".

Q2. Answer: (c) 60°, 50°

Shortcut Trick

Apply the Alternate Segment Theorem: Angle between tangent and chord = Angle in the alternate segment.

For chord PX and tangent AP: angle PYX = angle APX = 50°.

For chord PY and tangent BP: angle PXY = angle BPY = 60°.

Required values: angle PXY = 60° and angle PYX = 50°.

Therefore Answer = 60°, 50°

Alternate Method

Given:

Tangent AB touches circle C at point P. Points X and Y are on the circle. angle APX = 50° and angle BPY = 60°.

Formula used:

Alternate Segment Theorem: The angle between a tangent and a chord through the point of contact is equal to the angle

subtended by the chord in the alternate segment.

A B P X Y 50° 60° 60° 50° Tangent AB at P

Calculations:

According to the Alternate Segment Theorem:

=> Angle between tangent BP and chord PY = Angle subtended by chord PY at point X

=> angle BPY = angle PXY

=> angle PXY = 60°

=> Angle between tangent AP and chord PX = Angle subtended by chord PX at point Y

=> angle APX = angle PYX

=> angle PYX = 50°

Therefore The correct answer is 60°, 50°.

Additional Information

Alternate Segment Theorem

For any chord of a circle, the angle it makes with a tangent through one of its endpoints is equal to the angle subtended by the chord in the alternate segment.

Tangent-Radius Property

A tangent to a circle is perpendicular to the radius at the point of contact (Angle between radius and tangent = 90°).

Angle in Semicircle

The angle subtended by a diameter at any point on the circumference of a circle is always 90°.

Angles in the Same Segment

Angles subtended by the same arc (or chord) at any points on the remaining part of the circle are equal.

Q3. Answer: (d) B R Ambedkar

The correct answer is B R Ambedkar.

Key Points

• The Bahishkrit Hitakarini Sabha was a central institution formed by Dr. B. R. Ambedkar for removing the difficulties of the untouchables and placing their grievances before the government.

• It was established on 20 July 1924 at Bombay (now Mumbai), Maharashtra.

• The main objective of the Sabha was to promote the spread of education among the depressed classes by opening hostels, libraries, and social centers.

• The institution focused on the socio-economic improvement of the Dalit community, aiming to instill a sense of self-respect and dignity. Hence, the association of Dr. B. R. Ambedkar with this Sabha is correct.

• The famous motto of this organization was "Educate, Agitate, Organize," which became a rallying cry for the anti-caste movement in India.

Additional Information

• Jyotirao Phule:

• He was a prominent social reformer from Maharashtra who founded the Satyashodhak Samaj (Truth Seekers' Society) on 24 September 1873.

• He worked extensively for the education of women and lower-caste people, opening the first school for girls in Pune in 1848.

• He was bestowed with the title of Mahatma in 1888 for his selfless service to society.

• Baba Amte:

• Muralidhar Devidas Amte, popularly known as Baba Amte, was a social activist known for his work in the rehabilitation and empowerment of people suffering from leprosy.

• He founded the Anandwan (Forest of Bliss) ashram in 1949 in Chandrapur district, Maharashtra.

• He was awarded the Ramon Magsaysay Award in 1985 and the Padma Vibhushan in 1986.

• Jawaharlal Nehru:

• He was the first Prime Minister of independent India and a central figure in Indian politics before and after independence.

• He served as the President of the Indian National Congress multiple times, notably during the Lahore Session in 1929 where Purna Swaraj (Complete Independence) was declared.

• He is the author of famous books like "The Discovery of India" and "Glimpses of World History."

Important Points

• Dr. B. R. Ambedkar served as the Chairman of the Drafting Committee of the Constitution of India and is widely regarded as the Father of the Indian Constitution.

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• He led the Mahad Satyagraha in 1927 to assert the rights of untouchables to use water from public tanks.

• In 1932, he signed the Poona Pact with Mahatma Gandhi, which secured reserved seats for the Depressed Classes in the provisional legislatures.

• He founded the Independent Labour Party in 1936 and the Scheduled Castes Federation in 1942.

• In his later years, specifically on 14 October 1956, he converted to Buddhism along with lakhs of his followers in Nagpur.

• He was posthumously awarded the Bharat Ratna, India's highest civilian honor, in the year 1990.

Q4. Answer: (a) 374

BODMAS Table:

Given equation: 57 − 7 ÷ 119 + 288 × 2 = ?

Now, if + means '−', − means '×', × means '÷', ÷ means '+', then:

=> 57 × 7 + 119 − 288 ÷ 2

=> 57 × 7 = 399

=> 288 ÷ 2 = 144

=> 399 + 119 − 144

=> 518 − 144

=> 374

Hence, the correct answer is "Option 1".

Q5. Answer: (d) WEQJ

The logic followed here is:

For, GOAT → IQCV

Similarly, OWIB → QYKD

Now, apply the same rule to UCOH:

Here, UCOH → WEQJ

Hence, the correct answer is Option 4.

Q6. Answer: (a) Article 5

The correct answer is Article 5.

Key Points

• Article 5 of the Indian Constitution provides for citizenship at the commencement of the Constitution, which took place on January 26, 1950.

• According to this Article, every person who had their domicile in the territory of India at that time and fulfilled one of the three conditions became a citizen of India.

• The specific condition mentioned in the question is found in Article 5(b), which states that a person becomes a citizen if either of whose parents was born in the territory of India. Hence, the statement regarding parentage as a basis for citizenship is correct under Article 5.

• The other two conditions under Article 5 include being born in the territory of India (Article 5a) or being ordinarily resident in India for not less than five years immediately preceding the commencement (Article 5c).

• This Article was essential to define the initial body of citizens for the newly formed Republic of India following the Partition of 1947.

Additional Information

• Article 6: This article deals with the rights of citizenship of certain persons who have migrated to India from Pakistan. It sets a cutoff date of July 19, 1948, for registration and residency requirements. Hence, Article 6 is not the correct option as it pertains specifically to migration from Pakistan.

• Article 8: This provision grants citizenship rights to persons of Indian origin residing outside India (in foreign countries). Such persons could become citizens if they registered with the diplomatic or consular representative of India in that country. Hence, Article 8 is not the correct option as it relates to the Indian diaspora.

• Article 9: This is a negative provision stating that if any person voluntarily acquires the citizenship of any foreign State, they shall no longer be a citizen of India. India follows the principle of Single Citizenship and does not allow dual citizenship. Hence, Article 9 is not the correct option as it deals with the termination of citizenship.

• Article 11: This article gives the Parliament of India the power to regulate the right of citizenship by law. It ensures that the provisions from Article 5 to 10 do not limit the Parliament's authority to make laws regarding the acquisition and termination of citizenship.

Important Points

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• Part II of the Constitution of India spans from Article 5 to Article 11 and is dedicated entirely to Citizenship.

• The Citizenship Act, 1955 was enacted by the Parliament under the powers granted by Article 11 to provide for the acquisition and determination of citizenship after the commencement of the Constitution.

• Under the Citizenship Act, 1955, citizenship can be acquired in five ways: Birth, Descent, Registration, Naturalization, and Incorporation of Territory.

• India adopted the concept of Single Citizenship from the British Constitution (United Kingdom), which means citizens owe allegiance only to the Union of India and not to individual states, unlike the federal structure in the USA.

• The Ministry of Home Affairs is the nodal ministry in India responsible for matters related to citizenship and naturalization.

Q7. Answer: (d) 9

Shortcut Trick

Divisibility rule for 4: Only the last two digits of the number must be divisible by 4.

Last two digits of 588A9792 are 92.

92 ÷ 4 = 23 (Remainder = 0).

Since 92 is divisible by 4, the digit A can be any value from 0 to 9.

The maximum single-digit value for A is 9.

Therefore Answer = 9

Alternate Method

Given:

Number = 588A9792

Condition: The number must be divisible by 4.

Formula used:

Divisibility by 4: The number formed by the last two digits must be divisible by 4.

Checking Divisibility of 588A9792 by 4 5 8 8 A 9 7 9 2 Any Digit (0-9) Last 2 digits: 92 92 ÷ 4 = 23 (OK)

Calculations:

Identify the last two digits of the number 588A9792, which are 92.

=> Check divisibility of 92 by 4: 92 ÷ 4 = 23.

=> Since 92 is divisible by 4, the value of the digit A does not affect the divisibility of the entire number by 4.

=> The digit A can take any integer value from 0 to 9 inclusive.

=> To find the maximum value of A, we pick the largest single-digit integer.

=> Maximum value of A = 9.

Therefore The correct answer is 9.

Additional Information

Divisibility by 8

A number is divisible by 8 if the last three digits of the number are divisible by 8. For 588A9792, 792 ÷ 8 = 99, so it is also divisible by 8.

Divisibility by 2

A number is divisible by 2 if its last digit is even (0, 2, 4, 6, or 8).

Divisibility by 3

A number is divisible by 3 if the sum of its digits is divisible by 3. Sum = 5+8+8+A+9+7+9+2 = 48 + A.

Divisibility by 11

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

Q8. Answer: (b) Kajri

The correct answer is Kajri.

Key Points

• Kajri is one of the most popular folk music forms of Uttar Pradesh and Bihar, specifically associated with the monsoon season (the month of Sawan). It is traditionally sung by women as they express their feelings of longing for their husbands or lovers while swinging on trees during the rains. Hence, the option Kajri is the correct answer.

• The origin of Kajri is believed to be in the Mirzapur district of Uttar Pradesh. According to local folklore, it is named after Kajli, a woman who sang songs of separation while waiting for her husband.

• It is often performed in two styles: Dhunmuniya Kajri, which is sung in a circle without any musical instruments, and Baithaki Kajri, which is a more formal rendition performed in a seated gathering with instruments like the Harmonium and Tabla.

• The themes of Kajri usually revolve around the beauty of the rainy season, the dark clouds, the greenery, and the divine love

stories of Radha and Lord Krishna.

• The language used in these songs is predominantly Bhojpuri, Maithili, or Awadhi, reflecting the local culture of the Purvanchal region.

Additional Information

• Lavani:

• This is a traditional folk song and dance form from the state of Maharashtra.

• It is characterized by a powerful rhythm provided by the Dholki and is usually performed by women wearing nine-yard long saris (Nauvari).

• It covers various topics like politics, religion, and romance, and was traditionally used to entertain soldiers during the 18th and 19th centuries.

• Bhatiali:

• This is a form of folk music from West Bengal and Bangladesh.

• It is traditionally sung by boatmen (malla) while rowing down the rivers of the Ganges delta.

• The word is derived from 'Bhata', meaning ebb or downstream, as these songs are sung while going with the flow of the river.

• Maand (Maang):

• This is a sophisticated style of folk singing from Rajasthan.

• It is neither purely classical nor purely folk but sits somewhere in between. It is famous for the song 'Kesariya Balam', which welcomes guests to the state.

• It was traditionally patronized by the Rajput royalty and developed in the Bikaner and Jaisalmer regions.

Important Points

• Semi-Classical Integration: Kajri has been adopted into Indian Classical Music, particularly by the Banaras Gharana. Legendary singers like Girija Devi, known as the 'Queen of Thumri', were instrumental in popularizing Kajri on global stages.

• Geographical Identity: While it is the state folk song of Uttar Pradesh, it is also celebrated during the Kajli Teej festival in Varanasi and Mirzapur, where large-scale competitions are held.

• Cultural Impact: Other notable folk forms of Uttar Pradesh include Rasiya (Braj region), Chaiti (sung in the month of Chaitra), and Birha (narrative ballads usually sung by the Ahir community).

• Linguistic Diversity: The Kajri songs often use Braj Bhasha and Bhojpuri dialects, making them an essential part of the Indo-Gangetic cultural heritage.

Q9. Answer: (b) Battle of Plassey

The correct answer is Battle of Plassey.

Key Points

• The Battle of Plassey took place on 23 June 1757 and is widely regarded as the decisive turning point that initiated British political control in India. Hence, the option Battle of Plassey is correct.

• The conflict was fought at Palashi (Plassey), located on the banks of the Bhagirathi River in Bengal, between the forces of the British East India Company and the Nawab of Bengal, Siraj-ud-Daulah.

• The British forces were led by Robert Clive, who utilized the internal conspiracies within the Nawab’s court to his advantage, specifically the betrayal of Mir Jafar, the commander-in-chief of the Nawab's army.

• As a result of this victory, the British East India Company gained significant influence over the administration of Bengal, which was the richest province of India at the time. This provided the British with the financial resources necessary for further military expansion across the subcontinent.

• This battle marked the transition of the East India Company from a mere trading entity to a political power, setting the stage for nearly two centuries of British colonial rule.

Additional Information

• Battle of Buxar (1764):

• Fought on 22nd October 1764, this battle was between the British East India Company, led by Hector Munro, and a combined alliance of Mir Qasim (the Nawab of Bengal), Shuja-ud-Daulah (the Nawab of Awadh), and Shah Alam II (the Mughal Emperor).

• Unlike Plassey, this was a hard-fought military victory that firmly established British sovereignty over Bengal, Bihar, and Odisha.

• It culminated in the Treaty of Allahabad in 1765, which granted Diwani Rights (the right to collect revenues) to the British. Hence, the option Battle of Buxar is incorrect as the primary turning point.

• Battle of Wandiwash (1760):

• This was a crucial battle in South India fought on 22 January 1760 during the Third Carnatic War.

• It took place between the French (under Comte de Lally) and the British (under Sir Eyre Coote) at Wandiwash (Tamil Nadu).

• The decisive British victory effectively ended French imperial ambitions in India, limiting them to small enclaves like Puducherry. Hence, the option Battle of Wandiwash is incorrect.

• Third Carnatic War (1758–1763):

• This was the local manifestation of the global Seven Years' War between Britain and France.

• The conflict concluded with the Treaty of Paris in 1763, which restored French factories in India but prohibited them from fortifying their settlements, ensuring British supremacy among European powers in India. Hence, the option Third Carnatic War is incorrect.

Important Points

• Robert Clive: Often called the "Conqueror of India," his leadership during the Battle of Plassey earned him the title of Governor of Bengal. He introduced the Dual System of Government (1765–1772) in Bengal.

• Siraj-ud-Daulah: The last independent Nawab of Bengal. His execution after the Battle of Plassey signaled the end of independent regional sovereignty in the Bengal region.

• Economic Impact: The control over Bengal allowed the British to stop the flow of gold and silver from London to India to buy goods; instead, they used the local revenues to purchase Indian textiles for export, leading to the drain of wealth.

• Geopolitical Shift: The British victory at Plassey and subsequently Buxar shifted the center of political gravity from the Mughal capital in Delhi to Calcutta (Kolkata).

Q10. Answer: (c) 9th

The correct answer is 9th.

Key Points

• According to the Global Forest Resources Assessment (GFRA) 2025, released by the Food and Agriculture Organization (FAO), India ranks 9th globally in total forest area.

• This marks an improvement from the previous 2020 assessment, where India was ranked 10th.

• Total Forest Area: India holds approximately 72.7 million hectares of forest, accounting for roughly 2% of the world's total forest cover.

• Annual Forest Gain: India continues to maintain the 3rd position worldwide for net annual forest area gain.

• Carbon Sinks: The country ranks 5th globally among top carbon sink nations, with its forests removing roughly 150 million tonnes of

per year.

• Bamboo Resources: India accounts for 11.8 million hectares of bamboo forests, which is nearly 40% of the global bamboo area.

• Top 5 Global Leaders: Over half of the world's forests are located in just five countries: Russia, Brazil, Canada, the USA, and China.

Additional Information

• Global Forest Distribution:

• The world’s total forest area is estimated at 4.1 billion hectares, which is approximately 31% of the total land area.

• More than half (54%) of the world’s forests are located in only five countries: the Russian Federation, Brazil, Canada, the United States of America, and China.

• Russia holds the largest share of the world's forests at 20%, followed by Brazil at 12%.

• Rankings in Forest Gain:

• In previous assessments like GFRA 2020, India was ranked 3rd globally for the average annual net gain in forest area between 2010 and 2020.

• This highlights that while India ranks 12th in total size, its growth rate in forest cover has been among the highest in the world due to government initiatives.

• FAO (Food and Agriculture Organization):

• The FAO is a specialized agency of the United Nations that leads international efforts to defeat hunger and improve nutrition and food security.

• It was founded in October 1945 and is headquartered in Rome, Italy.

• The GFRA report is published by the FAO every five years to help monitor sustainable forest management.

Important Points

• India State of Forest Report (ISFR):

• In addition to international reports, India publishes its own ISFR biennially through the Forest Survey of India (FSI), an organization under the Ministry of Environment, Forest and Climate Change.

• The latest ISFR data aligns with global findings, showing a consistent increase in tree cover and mangrove cover across the country.

• National Forest Policy:

• The National Forest Policy of 1988 set a target for India to have 33% of its total geographical area under forest and tree cover to maintain ecological balance.

• Currently, India's forest and tree cover stands at approximately 24.62% of its total geographical area, as per the last domestic survey.

• Key Drivers:

• Schemes like the National Mission for a Green India (GIM) and the Compensatory Afforestation Fund Management and Planning Authority (CAMPA) are the primary drivers for increasing forest area in India.

• The state of Madhya Pradesh has the largest forest cover in India by area, while Mizoram has the highest forest cover as a percentage of total geographical area.

Q11. Answer: (b) 8

Shortcut Trick

Total Volume = Cube Vol + Cuboid Vol = 1.5 × Cube Vol

=> Cuboid Vol = 0.5 × Cube Vol

Since both share the same base area (x^2), their volume ratio equals their height ratio.

Cuboid Height = 0.5 × Cube Edge => $(x - 4) = 0.5x$

$0.5x = 4 \rightarrow x = 8$

Therefore Answer = 8

Alternate Method

Given:

Edge of cube = x cm

Height of cuboid = $(x - 4)$ cm

Base of cuboid = x cm × x cm (fits top of cube)

Total volume = $1.5 \times x^3$

Formula used:

Volume of cube = $(\text{edge})^3$

Volume of cuboid = Base Area × Height

x (base) x x − 4 Cube Cuboid

Calculations:

Volume of Solid = Volume of Cube + Volume of Cuboid

$\Rightarrow 1.5x^3 = x^3 + [x^2 \times (x - 4)]$

$\Rightarrow 1.5x^3 = x^3 + x^3 - 4x^2$

$\Rightarrow 1.5x^3 = 2x^3 - 4x^2$

$\Rightarrow 4x^2 = 2x^3 - 1.5x^3$

$\Rightarrow 4x^2 = 0.5x^3$

$\Rightarrow 4 = 0.5x$

$\Rightarrow x = 4 \div 0.5 = 8$

Therefore The correct answer is 8.

Additional Information

Volume of Prisms

The volume of any prism (like a cube or cuboid) is calculated as Base Area × Vertical Height.

Diagonal of a Cube

The longest diagonal of a cube with edge length a is given by the formula $d = \sqrt{3} \times a$.

Surface Area of a Cuboid

Total Surface Area (TSA) = $2(lb + bh + hl)$, where l, b, and h are length, breadth, and height respectively.

Combined Volume Rule

When one solid is placed over another, the total volume is simply the arithmetic sum of their individual volumes.

Q12. Answer: (a) Sanskrit

The correct answer is Sanskrit.

Key Points

• Amir Khusrau, the prolific 13th-14th century poet and chronicler, made detailed observations about the linguistic diversity of India in his work titled Nuh Sipihr (The Nine Skies), written in 1318.

• In this text, he listed several languages spoken across the subcontinent, such as Sindhi, Lahori, Kashmiri, Dughri (in Jammu), Ma'bari (in Tamil Nadu), Gauri (in Bengal), and Gujari (in Gujarat).

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• He contrasted these regional languages with Sanskrit, noting that unlike others, it did not belong to any specific geographic region.

• Amir Khusrau remarked that Sanskrit was an ancient language that the common people did not know; its knowledge and use were restricted exclusively to the Brahmanas.

• He praised Sanskrit for its depth and beauty, comparing it to Arabic in terms of its classical structure and its role as a medium for religion, philosophy, and science among the elite priestly class.

Additional Information

• Amir Khusrau (1253–1325):

• Known as the "Tuti-e-Hind" (Parrot of India), he was a Sufi musician, poet, and scholar under the patronage of the Delhi Sultanate.

• He served under seven different rulers, most notably Alauddin Khalji and Ghiyasuddin Tughlaq.

• He is regarded as the "father of Qawwali" and is credited with the invention of the Sitar and the Tabla by modifying existing musical instruments.

• His contribution to Hindavi (a precursor to Hindi and Urdu) makes him a pivotal figure in the linguistic history of North India.

• Historical Context of Sanskrit:

• During the Medieval period, Sanskrit remained the language of high culture and Hindu liturgical practices.

• While the masses spoke Apabhramsa or early forms of regional languages, Sanskrit was the primary language for Dharmic scriptures and legal treatises.

• The observation by Khusrau highlights the social stratification where education in the classical arts was a privilege of the Brahmana community.

Important Points

• Linguistic Landscape: Amir Khusrau was one of the first historians to acknowledge India as a multilingual entity. His documentation helps modern historians understand the geographical distribution of languages in the 14th century.

• Nuh Sipihr: This specific poem was written to celebrate the achievements of Qutbuddin Mubarak Shah. It contains nine chapters (skies) that describe the climate, flora, fauna, and cultures of India.

• Hindavi and Urdu: While Sanskrit was the language of the Brahmanas, Khusrau himself championed Hindavi, which combined Persian vocabulary with local dialects, eventually leading to the development of Urdu and Modern Hindi.

• Khaza'in-ul-Futuh: Another major work by Khusrau which details the military campaigns and conquests of Alauddin Khalji, providing a different perspective than his cultural and linguistic writings.

Q13. Answer: (a) 1200

Shortcut Trick

Work is directly proportional to the product of Machines and Time.

Initial Product = 6 machines × 8 hours = 48 machine-hours

Final Product = 10 machines × 12 hours = 120 machine-hours

Components = 480 × (120 ÷ 48) = 480 × 2.5 = 1200

Therefore Answer = 1200

Alternate Method

Given:

Number of machines (M1) = 6, Time (H1) = 8 hours, Work (W1) = 480 components

Number of machines (M2) = 10, Time (H2) = 12 hours

Formula used:

(M1 × H1) ÷ W1 = (M2 × H2) ÷ W2

Person (Group)	Number of Days (Hours)	Total Work	Efficiency (Units/Hr)
6 Machines	8	480	60
10 Machines	12	1200	100

Efficiency of 1 machine = 60 ÷ 6 = 10 units/hour

Efficiency of 10 machines = 10 × 10 = 100 units/hour

Calculations:

=> (6 × 8) ÷ 480 = (10 × 12) ÷ W2

=> 48 ÷ 480 = 120 ÷ W2

=> 1 ÷ 10 = 120 ÷ W2

=> W2 = 120 × 10 = 1200

Therefore The correct answer is 1200 (Option 1).

Additional Information

Chain Rule Formula

For work problems involving multiple variables, use (M1×D1×H1)/W1 = (M2×D2×H2)/W2, where M is men/machines, D is days, H is hours, and W is work.

Direct and Inverse Proportion

Work is directly proportional to machines and time (W prop. to M × T). Machines are inversely proportional to time (M prop. to 1/T) for a constant amount of work.

Combined Efficiency

Total Efficiency = Number of Units × Efficiency per Unit. If machines work at the same rate, their efficiencies are additive.

Q14. Answer: (b) Production per land unit

The correct answer is Production per land unit.

Key Points

• Extensive farming is characterized by a low input of labor, fertilizers, and capital relative to the land area being farmed. This system results in a lower yield per unit of land but covers vast geographical areas.

• Intensive farming, on the other hand, involves high labor and capital inputs aimed at maximizing the production per land unit. It uses a smaller amount of land to produce a higher output through the heavy use of fertilizers, pesticides, and technology.

• The machinery type used in both systems can vary, but it is not the defining difference; extensive farming often uses large-scale machinery for vast fields, while intensive farming uses specialized equipment for high-yield cycles. Hence, option 1 is incorrect.

• Production per land unit is the fundamental differentiator as it measures the efficiency and intensity of the agricultural output relative to the hectares cultivated. Hence, option 2 is correct.

• Irrigation can be used in both systems depending on the climatic conditions and crop requirements, so it does not serve as the primary distinguishing factor. Hence, option 3 is incorrect.

• The size of seed has no correlation with whether a farming system is extensive or intensive, as seed choice depends on the crop variety and genetic traits. Hence, option 4 is incorrect.

Additional Information

• Extensive Farming Characteristics:

• This system is usually practiced in regions with low population density and abundant land availability, such as the wheat belts of the USA, Canada, Australia, and the steppes of Russia.

• The total production might be high due to the massive size of the farms, but the output per hectare remains relatively low compared to intensive methods.

• It involves minimal use of chemical fertilizers and relies more on the natural fertility of the soil.

• Intensive Farming Characteristics:

• Commonly practiced in densely populated countries like India, China, and Japan, where land is a scarce resource.

• It focuses on Intensive Subsistence Agriculture or Commercial Intensive Farming to meet the high demand for food.

• This method frequently employs Multiple Cropping, where more than one crop is grown on the same piece of land within a single year.

• Economic Impact:

• Intensive farming requires a much higher initial investment and recurring expenditure on High Yielding Variety (HYV) seeds, irrigation infrastructure, and energy.

• Extensive farming is often more environmentally sustainable in terms of chemical runoff but requires significantly more land transformation.

Important Points

• Yield Comparison: In Intensive farming, the yield per unit area is very high, but the yield per person (labor) might be low. In Extensive farming, the yield per unit area is low, but the yield per labor unit is very high due to mechanization.

• Livestock Integration: Extensive systems often include pastoralism and ranching where animals graze over large areas. Intensive systems include factory farming or feedlots where animals are kept in confined spaces with high-calorie feed.

• Green Revolution: The 1960s Green Revolution in India shifted many regions from extensive or traditional subsistence methods toward Intensive Commercial Farming by introducing chemical fertilizers and assured irrigation.

Q15. Answer: (a) The ability to reproduce

The correct answer is The ability to reproduce.

Key Points

• Reproduction is a fundamental process by which living organisms produce offspring or new individuals of their own kind. It is essential for the continuity of a species and prevents its extinction. Living things can reproduce through sexual or asexual methods. For example, bacteria reproduce by binary fission, while mammals reproduce through sexual means. Hence, statement 1 is correct.

• The ability to speak is not a universal characteristic of all living things. Speech involves complex vocal apparatus and neurological structures like the Broca's area in the brain, which is primarily a feature of humans (Homo sapiens). Most animals communicate through sounds, pheromones, or gestures, but they do not "speak" in a linguistic sense, and plants or microorganisms do not speak at all. Hence, statement 2 is incorrect.

• The ability to fly is an evolutionary adaptation for movement in the air, found only in specific groups of organisms. This includes most birds (Aves), many insects, and certain mammals like bats. Thousands of species, including humans, elephants, and all flora (plants), lack the physical structures like wings or pneumatic bones required for flight. Hence, statement 3 is incorrect.

• While all living things show some form of internal movement (such as cytoplasmic streaming or nutrient transport), the "ability to move" in common parlance often refers to locomotion (moving from one place to another). Most plants and fungi are sessile, meaning they remain fixed in one location throughout their life cycle. Hence, statement 4 is incorrect.

Additional Information

• Metabolism: All living organisms undergo chemical reactions to convert nutrients into energy (ATP). This includes anabolism (building molecules) and catabolism (breaking down molecules). It is a defining feature that distinguishes living matter from non-living matter.

• Response to Stimuli: This is also known as irritability or sensitivity. Organisms react to environmental factors such as light, temperature, water, and gravity. For instance, plants exhibit phototropism by growing toward light sources.

• Cellular Organization: Every living thing is composed of cells, which are the basic units of life. Organisms can be unicellular, consisting of a single cell (like Amoeba), or multicellular, consisting of billions of specialized cells (like humans).

• Growth and Development: Living things increase in mass and volume. In multicellular organisms, growth occurs through cell division (mitosis). Unlike non-living things (like a growing crystal), biological growth is intrinsic and regulated by genetic material (DNA).

• Homeostasis: This is the ability of an organism to maintain a stable internal environment despite changes in external conditions. Examples include the regulation of body temperature, pH levels, and glucose concentration in the blood.

Important Points

• The Case of Viruses: Viruses are often considered to be at the threshold of life. They do not exhibit metabolism or reproduction on their own; they require a host cell to replicate. Therefore, they are typically classified as obligate intracellular parasites rather than fully living organisms.

• Excretion: All living things must remove metabolic waste products from their bodies. In animals, this involves organs like the kidneys and lungs, while plants release waste products through stomata or by storing them in falling leaves.

• Respiration: This is the biochemical process where cells obtain energy by combining oxygen and glucose, resulting in the release of carbon dioxide and water. It occurs in the mitochondria of eukaryotic cells.

• Adaptation: Over generations, living things evolve traits that enhance their survival and reproductive success in specific habitats. This process is driven by natural selection as described by Charles Darwin.

Q16. Answer: (a) 1, 3, and 4 only

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

Key Points

• The 74th Amendment Act of 1992 added a new Part IX-A to the Constitution of India, which is titled as 'The Municipalities'. This part constitutionalized the system of Urban Local Bodies (ULBs). Hence, statement 1 is correct.

• The Act added the 12th Schedule to the Constitution, not the 10th Schedule. The 12th Schedule contains 18 functional items of municipalities such as urban planning, regulation of land use, and water supply. The 10th Schedule is related to the Anti-Defection Law added by the 52nd Amendment Act. Hence, statement 2 is incorrect.

• The Act provides for the constitution of three types of municipalities in every state: a Nagar Panchayat for transitional areas, a Municipal Council for a smaller urban area, and a Municipal Corporation for a larger urban area. Hence, statement 3 is correct.

• The provisions of this Act are contained in Articles 243-P to 243-ZG. These articles detail the composition, reservation of seats, duration, and powers of the municipalities. Hence, statement 4 is correct.

Additional Information

• Historical Background: The 74th Constitutional Amendment Act was passed in 1992 during the tenure of Prime Minister P.V. Narasimha Rao. It came into force on June 1, 1993. Before this, urban local bodies did not have a uniform constitutional status across India.

• Types of Municipalities:

• Nagar Panchayat: Established for an area in transition from a rural area to an urban area.

• Municipal Council: Established for a smaller urban area.

• Municipal Corporation: Established for a larger urban area, often found in major cities like Mumbai, Delhi, and Kolkata.

• Reservation of Seats: The Act mandates the reservation of seats for Scheduled Castes (SCs) and Scheduled Tribes (STs) in every municipality in proportion to their population. It also provides for a mandatory reservation of not less than one-third of the total number of seats for women.

• Duration: Every municipality is given a five-year term of office from the date of its first meeting. If dissolved earlier, elections must be held within six months from the date of dissolution.

Important Points

• State Election Commission: The superintendence, direction, and control of the preparation of electoral rolls and the conduct of all elections to the municipalities are vested in the State Election Commission.

• State Finance Commission: The Governor of a state shall, after every five years, constitute a Finance Commission to review the financial position of the municipalities and make recommendations regarding the distribution of taxes between the State and the municipalities.

• Committee for District Planning: Under Article 243-ZD, every state must constitute a District Planning Committee to consolidate the plans prepared by the panchayats and municipalities in the district.

• Metropolitan Planning Committee: Under Article 243-ZE, every metropolitan area shall have a Metropolitan Planning Committee to prepare a draft development plan for the metropolitan area as a whole.

• 12th Schedule Items: Some of the 18 functional items include roads and bridges, public health, fire services, slum improvement, and urban poverty alleviation programs.

Q17. Answer: (a) Two

The logic followed here is:

Given number: 1847536

Logic: Arrange the digits in ascending order and compare positions with the original number.

Original number: 1 8 4 7 5 3 6

Ascending order: 1 3 4 5 6 7 8

Original Digit	New Digit	Position Status
1	1	Same
8	3	Not Same
4	4	Same
7	5	Not Same
5	6	Not Same
3	7	Not Same
6	8	Not Same

Unchanged digits = 2

Hence, the correct answer is Option 1.

Q18. Answer: (c) URQ

The logic followed here is based on the alphabetical position pattern:

Option 1: LIF

Option 2: PMJ

Option 3: URQ

Option 4: ZWT

Thus, URQ is different from the rsty given options.

Hence, the odd one out is Option 3.

Q19. Answer: (c) -3

Shortcut Trick

Convert all bases to (5/16): $(16/5)^{13}$ becomes (5/16)^(−13) and (16/5)^5 becomes (5/16)^(−5).

LHS powers sum = −13 + 16 − 5 = −2.

Equate LHS power to RHS power: 6m + 16 = −2.

6m = −18 => m = −3.

Therefore Answer = -3

Alternate Method

Given:

$(16/5)^{13} \times (5/16)^{16} \times (16/5)^5 = (5/16)^{(6m + 16)}$

Formula used:

$(a/b)^n = (b/a)^{(-n)}$ and $a^x \times a^y = a^{(x + y)}$

$(16/5)^{13}$ Power: $-13 \times (5/16)^1$^6 Power: $16 \times (16/5)^5$ Power: -5 Total LHS Exponent (Base 5/16) = $-13 + 16 - 5 = -2$ Equate exponents: $6m + 16 = -2$

Calculations:

Change all terms on LHS to base (5/16):

$(5/16)^{(-13)} \times (5/16)^{16} \times (5/16)^{(-5)} = (5/16)^{(6m + 16)}$

$\Rightarrow (5/16)^{((-13 + 16 - 5))} = (5/16)^{((6m + 16))}$

$\Rightarrow (5/16)^{(-2)} = (5/16)^{((6m + 16))}$

$\Rightarrow -2 = 6m + 16$

$\Rightarrow 6m = -2 - 16$

$\Rightarrow 6m = -18$

$\Rightarrow m = -18 \div 6 = -3$

Therefore The correct answer is -3.

Additional Information

Laws of Exponents (Product Rule)

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

Negative Exponent Property

A base with a negative exponent is the reciprocal of the base with a positive exponent: $(a/b)^{(-n)} = (b/a)^n$.

Property of Equality

If the bases on both sides of an equation are equal (and not 0, 1, or −1), then their exponents must be equal: If $a^x = a^y$, then $x = y$.

Q20. Answer: (d) F

The logic followed here is:

Given: P, Q, R, S, E and F live on six different floors of the same building.

The lowermost floor is numbered 1 and the topmost is 6.

E lives on floor number 4.

Only two people live between E and R.

Only P lives between E and Q.

S lives immediately below E.

Floor	Person
6	R
5	Q
4	E
3	P
2	F
1	S

Now, the person living on floor number 2 is F

Hence, the correct answer is Option 4.

Q21. Answer: (a) MSConfig

The correct answer is MSConfig.

Key Points

• MSConfig, officially known as the System Configuration Utility, is a powerful administrative tool used to troubleshoot the Windows startup process and manage how the operating system boots.

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• It provides a dedicated Services tab that lists all the services that start when the computer boots, allowing users to enable or disable them. This is crucial for identifying third-party services that might be causing system instability. Hence, the statement regarding managing services is correct.

• The utility also contains a Startup tab. In older versions of Windows, this tab allowed direct management of startup programs; however, in Windows 10 and Windows 11, this tab provides a direct link to the Task Manager to manage these applications. Hence, the statement regarding managing startup programs is correct.

• One of its primary functions is to facilitate a Clean Boot. By disabling all non-Microsoft services and startup items via MSConfig, users can determine if background applications are interfering with Windows 11 performance or specific software installations.

• The tool was first introduced by Microsoft in Windows 98 and has been a staple in every version since, including Windows XP, Windows 7, Windows 10, and Windows 11. It is located in the C:\Windows\System32 directory and can be launched by typing "msconfig" in the Run dialog box (Win + R).

Additional Information

• Windows Defender (Microsoft Defender Antivirus):

• It is the built-in security software for Windows 11 that provides real-time protection against malware, viruses, and ransomware.

• It operates as part of the Windows Security suite and does not have the primary function of managing general startup programs or system services for troubleshooting.

• Disk Cleanup:

• This is a maintenance utility designed to free up storage space on the Hard Disk Drive (HDD) or Solid State Drive (SSD).

• It scans the system for temporary files, setup logs, Recycle Bin contents, and cached data that can be safely deleted to improve efficiency. It has no role in managing startup services.

• System Restore:

• This is a recovery tool that allows users to revert the computer's state (including system files, installed applications, and Windows Registry) to a previous point in time, known as a Restore Point.

• It is used to fix system malfunctions after a driver update or software installation gone wrong, rather than managing the daily startup list.

• Task Manager:

• In Windows 11, the Task Manager (accessed via Ctrl + Shift + Esc) is the modern interface for managing Startup Apps.

• It provides data on the "Startup Impact" of each application, categorized as High, Medium, or Low, helping users optimize their boot time.

Important Points

• MSConfig Tabs: The utility consists of five main tabs: General (for selection of boot modes like Normal, Diagnostic, or Selective), Boot (to manage Safe Mode and boot logs), Services, Startup, and Tools (to launch other administrative utilities).

• Diagnostic Startup: This feature in MSConfig allows Windows to start with only basic services and drivers, which is the first step in advanced troubleshooting for OS errors.

• Number of Services: A typical Windows 11 installation may have over 200 services, and MSConfig allows users to "Hide all Microsoft services" to focus specifically on third-party software conflicts.

Q22. Answer: (a) Neither conclusion I nor II follows.

Given Statements:

All vultures are sparrows.

Some sparrows are crows.

No crow is a pigeon.

The least possible Venn diagram for the given statements is:

Conclusions:

I. Some vultures are crows - False (Vultures are fully inside sparrows, and only some sparrows are crows. There is no necessary overlap between vultures and crows, so this does not follow.)

II. No sparrow is a pigeon - False (Only crows are stated to have no relation with pigeons. Sparrows may or may not be pigeons, so this conclusion does not necessarily follow.)

So, neither conclusion I nor II follows.

Hence, the correct answer is "Option 1".

Q23. Answer: (a) 25 – 75 – 90 – 102

The logic followed here is:

Logic: The pattern is based on ×3, +15, +12 alternately in both given sets.

For, 12 – 36 – 51 – 63

=> 12 × 3 = 36

=> 36 + 15 = 51

=> 51 + 12 = 63

For, 20 – 60 – 75 – 87

=> 20 × 3 = 60

=> 60 + 15 = 75

=> 75 + 12 = 87

Now, checking the options using the same pattern:

Option 1) 25 – 75 – 90 – 102

=> 25 × 3 = 75

=> 75 + 15 = 90

=> 90 + 12 = 102

Option 2) 14 – 42 – 57 – 79

=> 14 × 3 = 42

=> 42 + 15 = 57

=> 57 + 12 = 69 ≠ 79

Option 3) 16 – 48 – 63 – 85

=> 16 × 3 = 48

=> 48 + 15 = 63

=> 63 + 12 = 75 ≠ 85

Option 4) 10 – 30 – 55 – 67

=> 10 × 3 = 30

=> 30 + 15 = 45 ≠ 55

Hence, the correct answer is Option 1.

Q24. Answer: (a) Launch of “One Nation, One Mission: End Plastic Pollution”

The correct answer is Launch of “One Nation, One Mission: End Plastic Pollution”.

Key Points

• On World Environment Day, June 5, 2025, the Ministry of Environment, Forest and Climate Change (MoEFCC) officially announced the national initiative titled “One Nation, One Mission: End Plastic Pollution” to streamline waste management across India.

• The mission serves as a comprehensive roadmap to eliminate plastic leakage into terrestrial and aquatic ecosystems by the year 2030, aligning with Global Environmental Goals and the United Nations Environment Programme (UNEP) mandates.

• This initiative integrates all 28 States and 8 Union Territories under a single regulatory framework to ensure uniformity in the enforcement of plastic bans and recycling protocols, moving away from fragmented state-level policies.

• A primary focus of this mission is the stringent implementation of Extended Producer Responsibility (EPR), where Producers, Importers, and Brand Owners (PIBOs) are held legally accountable for the entire lifecycle of their plastic products.

• The MoEFCC emphasized that the mission would promote the Circular Economy by incentivizing industries to invest in R&D for sustainable alternatives like compostable plastics, seaweed-based packaging, and reusable delivery systems.

Additional Information

• World Environment Day:

• It is celebrated every year on June 5 and was established by the United Nations General Assembly in 1972 during the Stockholm Conference on the Human Environment.

• The day serves as the UN's primary vehicle for encouraging awareness and action for the protection of our environment, hosted by a different country each year with a specific theme.

• Single-Use Plastic (SUP) Ban in India:

• India had previously taken a massive step by banning 19 identified single-use plastic items with high littering potential and low utility, effective from July 1, 2022.

• Items included in the earlier ban were plastic sticks for balloons, earbuds with plastic sticks, candy sticks, ice-cream sticks, and plastic cutlery like plates, cups, and straws.

• National Clean Air Programme (NCAP):

• Launched in January 2019, it is a long-term, time-bound national strategy to tackle the air pollution problem across the country.

• It targets Non-attainment cities (cities that do not meet National Ambient Air Quality Standards) with an objective to reduce Particulate Matter (PM2.5 and PM10) concentration by 20-30%.

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• Plastic Waste Management (Amendment) Rules:

• The Government of India notified these rules in 2021 and 2022 to provide a legal framework for EPR and to phase out plastic carry bags with a thickness of less than 120 microns by December 31, 2022.

• These rules categorize plastic packaging into four categories: Rigid, Flexible, Multi-layered, and Compostable plastics to facilitate better segregation and recycling.

Important Points

• Mission Monitoring: The “One Nation, One Mission” will be monitored through a Centralized Digital Dashboard managed by the Central Pollution Control Board (CPCB) to track real-time progress of plastic waste collection and processing.

• Financial Incentives: The Ministry of Finance and MoEFCC have proposed Tax Rebates for startups working in the Green Technology sector, specifically those focusing on upcycling plastic waste into construction materials.

• Global Treaty on Plastics: This announcement is a significant step towards India's commitment to the Intergovernmental Negotiating Committee (INC), which is working on a Global Plastic Treaty to be finalized by the end of 2024 or early 2025.

• Public Participation: The mission includes a "Jan Andolan" (People's Movement) component, encouraging Urban Local Bodies (ULBs) to reward Zero-Waste households and promoting "Refuse, Reduce, Reuse, and Recycle" at the grassroots level.

Q25. Answer: (a) Olivia Dean

The correct answer is Olivia Dean.

Key Points

• The 68th annual Grammy Awards were held on February 1, 2026, at the Crypto.com Arena in Los Angeles, California, honoring the best musical achievements released during the 2025 eligibility year.

• Olivia Dean emerged as the winner in the Best New Artist category, a major feat in the General Field of the awards. She was recognized for her soulful vocals and the significant commercial and critical breakthrough of her music during the 2025 period. Hence, the option Olivia Dean is the correct answer.

• The Best New Artist category is designed for a performer who releases, during the Eligibility Year, the first recording which establishes their public identity. It is one of the most prestigious "Big Four" categories alongside Album of the Year, Record of the Year, and Song of the Year.

• In the 68th edition, the eligibility rules required that an artist must have released a minimum of five singles/tracks or one album and must not have been entered in this category more than three times previously.

• Other nominees like Leon Thomas, Addison Rae, and Lola Young were also strong contenders who demonstrated exceptional growth in their respective genres, but Olivia Dean's overall impact and artistic breakthrough were deemed the most significant by the Recording Academy voters.

Additional Information

• The Recording Academy:

• Founded in 1957, it is a United States-based organization of music professionals, including performers, songwriters, producers, and engineers. It is the body responsible for organizing the Grammy Awards.

• The Recording Academy aims to improve the cultural condition and quality of life for music and its makers. Its headquarters are located in Santa Monica, California.

• Grammy Award History:

• The first Grammy Awards ceremony was held on May 4, 1959, simultaneously in Los Angeles and New York City. It was originally called the Gramophone Awards.

• The trophy is a gilded gramophone, handcrafted by Billings Artworks in Colorado. It represents excellence in the recording arts and sciences.

• Nomination and Voting Process:

• Entries are submitted by members and record companies. They are then screened for eligibility and genre placement by experts.

• The voting is conducted by Voting Members of the Recording Academy, ensuring a peer-reviewed selection process that emphasizes technical proficiency and artistic integrity over chart positions or sales figures.

• Geographical Significance:

• Los Angeles serves as the primary hub for the ceremony, reflecting its status as a global center for the entertainment and music industry. The 68th Grammys continued this tradition, drawing thousands of international industry leaders to the city.

Important Points

• Best New Artist Evolution: Over the years, the Recording Academy has updated the rules for this category to reflect the changing nature of the music industry, such as removing the strict limit on the number of albums released to accommodate the rise of streaming and EPs.

• Cultural Impact: Winning a Grammy often results in a significant "Grammy Bump," where an artist's sales, streaming numbers, and touring opportunities increase substantially due to the global visibility of the event.

• The "Big Four": The Best New Artist award is unique because it can only be won once in a performer's career, unlike the other

three General Field categories which can be won multiple times.

Q26. Answer: (b) √(952/33)

Shortcut Trick

Total surface area (TSA) of solid hemisphere = $3\pi r^2$

$3 \times 22/7 \times r^2 = 272$

$66/7 \times r^2 = 272$

$r^2 = (272 \times 7) \div 66 = 952/33$

$r = \sqrt{(952/33)}$

Therefore Answer = $\sqrt{(952/33)}$

Alternate Method

Given:

Total surface area (TSA) of solid hemisphere = 272 cm^2

Value of $\pi = 22/7$

Formula used:

TSA of solid hemisphere = Curved Surface Area + Base Area = $2\pi r^2 + \pi r^2 = 3\pi r^2$

r Solid Hemisphere TSA = $3\pi r^2 = 272$ cm^2

Calculations:

$3 \times (22/7) \times r^2 = 272$

$\Rightarrow (66/7) \times r^2 = 272$

$\Rightarrow r^2 = (272 \times 7) \div 66$

$\Rightarrow r^2 = (136 \times 7) \div 33$

$\Rightarrow r^2 = 952 \div 33$

$\Rightarrow r = \sqrt{(952/33)}$

Therefore The correct answer is option (2).

Additional Information

Curved Surface Area (CSA)

The area of the curved part of a hemisphere is $2\pi r^2$.

Volume of Hemisphere

The amount of space occupied by a hemisphere is $(2/3)\pi r^3$.

Sphere Formulas

For a full sphere, TSA = $4\pi r^2$ and Volume = $(4/3)\pi r^3$.

Relation between TSA and CSA

For a solid hemisphere, TSA = CSA + Area of circular base = $2\pi r^2 + \pi r^2 = 3\pi r^2$.

Q27. Answer: (a) (23,4,73)

The logic followed here is:

Logic: The third number is obtained by multiplying the first number by 3 and then adding the second number.

For, (7, 18, 39)

$\Rightarrow 7 \times 3 = 21$

$\Rightarrow 21 + 18 = 39$

For, (3, 19, 28)

$\Rightarrow 3 \times 3 = 9$

$\Rightarrow 9 + 19 = 28$

Now, checking the options using the same pattern:

Option 1) (23, 4, 73)

$\Rightarrow 23 \times 3 = 69$

$\Rightarrow 69 + 4 = 73$

Option 2) (16, 3, 61)

$\Rightarrow 16 \times 3 = 48$

$\Rightarrow 48 + 3 = 51 \neq 61$

Option 3) (4, 28, 20)

=> 4 × 3 = 12

=> 12 + 28 = 40 ≠ 20

Option 4) (10, 5, 55)

=> 10 × 3 = 30

=> 30 + 5 = 35 ≠ 55

Hence, the correct answer is Option 1.

Q28. Answer: (a) Dadabhai Naoroji

The correct answer is Dadabhai Naoroji.

Key Points

• Dadabhai Naoroji was the distinguished author of the book “Poverty and Un-British Rule in India”, which was published in the year 1901.

• The book is famous for providing a systematic and evidence-based explanation of the economic drain of wealth from India to Britain during the colonial period.

• He used the term "Un-British" to highlight that the exploitative economic policies practiced in India were contrary to the fair and democratic traditions of the British system in their own country.

• Naoroji was the first person to make an attempt to estimate the national income of India. In the year 1867-68, he calculated the per capita income of Indians to be Rs. 20 per year.

• The primary features of his work included the “Drain of Wealth” theory, which argued that Britain was siphoning off India's resources through taxes, salaries, and trade without giving any equivalent economic return.

Additional Information

• Gopal Krishna Gokhale:

• He was a moderate leader of the Indian National Congress and served as its President in 1905 during the Banaras session.

• Known as the political mentor of Mahatma Gandhi, he founded the Servants of India Society in 1905 to train Indians to devote their lives to the cause of the country.

• R. C. Dutt (Romesh Chunder Dutt):

• He was a retired ICS officer and a contemporary of Naoroji who also focused on economic history.

• He authored the influential book “The Economic History of India” in two volumes (published in 1902 and 1904), which provided a detailed survey of the economic impact of British rule.

• M. G. Ranade (Mahadev Govind Ranade):

• Commonly known as the “Father of Indian Economics”, he was a founding member of the Indian National Congress and a judge of the Bombay High Court.

• His applications of economic theory to the Indian context were compiled in the book “Essays on Indian Economics”, published in 1898.

• Dadabhai Naoroji's Political Career:

• He earned the designation of the “Grand Old Man of India” for his long-standing service to the national movement.

• He was the first Indian to be elected as a Member of Parliament (MP) in the British House of Commons, representing Finsbury Central from 1892 to 1895.

• He served as the President of the Indian National Congress on three occasions: 1886, 1893, and 1906.

Important Points

• The Drain of Wealth occurred through several channels, most notably the “Home Charges”, which included interest on public debt, pensions for British officials, and military expenses incurred in England.

• The East India Association was founded by Naoroji in London in the year 1866 to lobby British Parliament members and the public about Indian grievances.

• The facts and data presented by Naoroji in his book were revolutionary at the time because they used the British government's own statistical reports to prove the impoverishment of India.

• In the Calcutta session of 1906, under the presidency of Dadabhai Naoroji, the Indian National Congress explicitly adopted “Swaraj” (Self-government) as its political goal for the first time.

Q29. Answer: (c) Salt + Water

The correct answer is Salt + Water.

Key Points

• A neutralisation reaction is a fundamental chemical process where an acid and a base react quantitatively with each other to produce salt and water.

• In this specific chemical interaction, the hydrogen ions (H+) provided by the acid react with the hydroxide ions (OH-) provided by

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the base to form water (H_2O) molecules.

• The salt produced in the reaction is an ionic compound formed from the cation (positive ion) of the base and the anion (negative ion) of the acid.

• The general word equation representing this process is: Acid + Base → Salt + Water. This equation represents the elimination of acidic and basic properties of the reactants.

• These reactions are typically exothermic in nature, meaning heat energy is released into the surroundings during the formation of the products.

Additional Information

• Nature of Acids and Bases:

• Acids are substances that release hydrogen ions (H^+) in aqueous solutions and have a pH value ranging from 0 to 6.9. Examples include Hydrochloric acid (HCl) and Sulfuric acid (H_2SO_4).

• Bases are substances that release hydroxide ions (OH^-) in aqueous solutions and have a pH value ranging from 7.1 to 14. Examples include Sodium hydroxide (NaOH) and Potassium hydroxide (KOH).

• Formation of Salt:

• The type of salt formed depends on the specific acid and base used. For example, the reaction between Hydrochloric acid (HCl) and Sodium hydroxide (NaOH) yields Sodium chloride (NaCl), commonly known as table salt.

• The reaction between Sulfuric acid (H_2SO_4) and Calcium hydroxide ($Ca(OH)_2$) produces Calcium sulfate ($CaSO_4$).

• Practical Applications of Neutralisation:

• Agriculture: If the soil is too acidic, farmers treat it with bases like quick lime (Calcium oxide) or slaked lime (Calcium hydroxide) to ensure optimal pH for crop growth.

• Medicine: To treat indigestion caused by excess Hydrochloric acid in the stomach, patients take antacids such as Milk of Magnesia (Magnesium hydroxide), which is a mild base.

• Waste Treatment: Industrial effluents containing acids are neutralized with basic chemicals before being released into water bodies to prevent environmental damage.

• Biological Stings: An ant sting injects formic acid into the skin, which can be neutralized by rubbing moist baking soda (Sodium hydrogen carbonate) or calamine solution (containing Zinc carbonate) on the affected area.

Important Points

• Indicators: To identify the completion of a neutralisation reaction, chemical indicators like Phenolphthalein or Methyl orange are used. In a titration, the end-point is reached when the acid is completely neutralized by the base, often indicated by a color change.

• pH Scale: The concept of the pH scale was introduced by S.P.L. Sorensen in 1909. A neutral solution (like pure water) has a pH value of 7 at 25 degrees Celsius.

• Strength of Reactants:

• Reaction between a strong acid and a strong base results in a neutral salt (pH 7).

• Reaction between a strong acid and a weak base results in an acidic salt (pH < 7).

• Reaction between a weak acid and a strong base results in a basic salt (pH > 7).

Q30. Answer: (a) 8 units

Shortcut Trick

Area = 2 × Perimeter

$\pi r^2 = 2 \times (2\pi r)$

$\pi r^2 = 4\pi r$

r = 4 units

Diameter = $2r = 2 \times 4 = 8$

Therefore Answer = 8 units

Alternate Method

Given:

Numerical value of Area = 2 × Numerical value of Perimeter

Formula used:

Area of circle (A) = πr^2

Perimeter of circle (P) = $2\pi r$

Diameter (D) = $2r$

Center Diameter (D = 2r) Area = 2 × Perimeter

Calculations:

Let the radius of the circle be r units.

=> Area = πr^2

=> Perimeter = $2\pi r$

According to the given condition:

=> $\pi r^2 = 2 \times (2\pi r)$

=> $\pi r^2 = 4\pi r$

=> r = 4 units

=> Diameter (D) = 2 × r

=> Diameter = 2 × 4 = 8 units

Therefore The correct answer is 8 units.

Additional Information

Area of Circle

The total region enclosed within the circle: $A = \pi r^2$ or $A = (\pi/4)D^2$.

Circumference

The boundary length of the circle: $C = 2\pi r$ or $C = \pi D$.

Radius and Diameter Relation

The diameter is the largest chord passing through the center: D = 2r.

Area of Semicircle

Exactly half of the circle area: $A = (1/2)\pi r^2$.

Q31. Answer: (b) Mother's mother

Family Chart:

Decoding the Symbols:

Symbol	•	–	×	÷
Meaning	Father	Wife	Sister	Mother

Given: R – P + S × N ÷ F

It means: R is the wife of P, P is the father of S, S is the sister of N, N is the mother of F

So, R is the mother of F's mother.

Hence, the correct answer is "Option 2".

Q32. Answer: (a) Hindu, Sikh, Buddhist, Jain, Parsi, Christian

The correct answer is Hindu, Sikh, Buddhist, Jain, Parsi, Christian.

Key Points

• The Citizenship Amendment Act, 2019 (CAA) aims to provide Indian citizenship to persecuted religious minorities from three specific neighboring countries.

• The Act specifically applies to individuals belonging to six communities: Hindu, Sikh, Buddhist, Jain, Parsi, and Christian. These groups are considered minorities in their respective home countries of Pakistan, Afghanistan, and Bangladesh.

• To be eligible under this Act, the individuals must have entered India on or before the cut-off date of 31st December 2014.

• The Citizenship Amendment Act, 2019, amends the Citizenship Act, 1955, to facilitate a faster path to citizenship for these specific groups by reducing the residency requirement for naturalization.

• Under the new provisions, the requirement of residence in India for these individuals has been reduced from 11 years to just 5 years.

Additional Information

• Exemptions for Tribal Areas: The provisions of the Citizenship Amendment Act, 2019 do not apply to tribal areas of Assam, Meghalaya, Mizoram, or Tripura as included in the Sixth Schedule of the Constitution of India.

• Inner Line Permit (ILP): The CAA also excludes areas regulated under the Inner Line Permit system. This currently includes the states of Arunachal Pradesh, Nagaland, Manipur, and Mizoram. This is to protect the distinct cultural and indigenous identity of these regions.

• Legal Status: Before this amendment, "illegal migrants" were prohibited from acquiring Indian citizenship. The 2019 Act ensures that the defined six communities from the three countries will no longer be treated as illegal migrants for the purpose of the Citizenship Act.

• Overseas Citizen of India (OCI): The Act also contains provisions regarding the cancellation of OCI registration if the cardholder violates any law notified by the Central Government.

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Important Points

• Notification of Rules: Although the Parliament of India passed the bill in December 2019, the Ministry of Home Affairs (MHA) officially notified the Citizenship (Amendment) Rules, 2024, on 11th March 2024.

• Constitutional Framework: Matters related to citizenship in India are governed by Articles 5 to 11 under Part II of the Constitution of India. However, these articles do not provide a permanent law; the Parliament has the power under Article 11 to regulate the right of citizenship by law.

• Application Process: The application for citizenship under CAA is handled through an online portal, and the entire process is designed to be digital to ensure transparency and efficiency.

• Designated Authority: The Empowered Committee headed by the Director (Census Operations) of the state or Union Territory concerned is the final authority to grant citizenship under these rules.

Q33. Answer: (a) 59.6%

Shortcut Trick

2/5 of Actual Selling Price (ASP) = 100% − 24% = 76% of CP.

=> Actual SP = 76% × 5 ÷ 2 = 190% of CP.

New Selling Price = 84% of Actual SP = 84% × 190% of CP.

=> New SP = 0.84 × 190% = 159.6% of CP.

Profit % = 159.6% − 100% = 59.6%.

Therefore Answer = 59.6%

Alternate Method

Given:

Loss = 24% when SP = 2/5 of Actual SP. Target SP = 84% of Actual SP.

Formula used:

Selling Price (SP) = CP × (100 − Loss%)/100 | Profit % = [(SP − CP) ÷ CP] × 100

CP = 100 New SP = 159.6 Actual SP = 190 Profit: 59.6% 2/5 ASP = 76

Calculations:

Let Cost Price (CP) = 100 units.

=> If Loss = 24%, then Selling Price (SP1) = 100 − 24 = 76 units.

=> Given SP1 = 2/5 × Actual SP.

=> 76 = 2/5 × Actual SP => Actual SP = (76 × 5) ÷ 2 = 190 units.

=> New Selling Price (SP2) = 84% of Actual SP = 0.84 × 190.

=> New SP2 = 159.6 units.

=> Profit = SP2 − CP = 159.6 − 100 = 59.6 units.

=> Profit % = (59.6 ÷ 100) × 100 = 59.6%.

Therefore The correct answer is option (1).

Additional Information

Successive Percentage

When a value is changed by a% and then by b%, net change = [a + b + (a × b)/100]%.

Marked Price and Discount

Selling Price = Marked Price × (100 − Discount%)/100. Also, CP × (100 + P%) = MP × (100 − D%).

Profit and Loss Basics

Profit % = (Profit/CP) × 100 and Loss % = (Loss/CP) × 100. Profit/Loss is always calculated on Cost Price unless stated otherwise.

Q34. Answer: (c) KNPQ

The logic followed here is:

For, JELU → NHNV

Similarly, BGMQ → FJOR

Now, apply the same rule to GKNP:

Here, GKNP → KNPQ

Hence, the correct answer is Option 3.

Q35. Answer: (b) BPHT

The logic followed here is:
For, FIBA → EJAB
Similarly, ZELU → YFKV
Now, apply the same rule to COIS:
Here, COIS → BPHT
Hence, the correct answer is Option 2.

Q36. Answer: (b) FI-JM

The logic followed here is based on the alphabetical position pattern:
Option 1: RU – TW
Option 2: FI – JM
Option 3: DG – FI
Option 4: LO – NQ
Thus, FI – JM is different from the rest given options.
Hence, the odd one out is Option 2.

Q37. Answer: (a) TMN 55

The logic followed here is:
So, 'TMN 55' will replace the question mark in the given series.
Hence, the correct answer is "Option 1".

Q38. Answer: (b) 4,16,875

Shortcut Trick
Net percentage increase = x + y + (xy ÷ 100)
Net change = 15 + 25 + (15 × 25 ÷ 100) = 40 + 3.75 = 43.75%
Final Population = Initial × (100 + net change)%
Final Population = 2,90,000 × 1.4375 = 4,16,875
Therefore Answer = 4,16,875
Alternate Method
Given:
Initial population = 2,90,000
Increase in 1st year (r1) = 15%
Increase in 2nd year (r2) = 25%
Formula used:
Final Population = P × (1 + r1/100) × (1 + r2/100)
2,90,000 Initial +15% 3,33,500 Year 1 +25% 4,16,875 Year 2 Total Growth = 43.75%
Calculations:
Population after 1st year = 2,90,000 × (1 + 15/100)
=> 2,90,000 × 1.15 = 3,33,500
=> Population after 2nd year = 3,33,500 × (1 + 25/100)
=> 3,33,500 × 1.25 = 4,16,875
Therefore The correct answer is 4,16,875 (Option 2).
Additional Information
Successive Percentage Change
When a value is increased by x% and then by y%, the net change is given by [x + y + (xy/100)]%.
Population Decrease Formula
If the population decreases annually by r%, the population after n years is $P \times (1 - r/100)^n$.
Effective Rate for Three Years
For three successive changes x%, y%, and z%, first calculate the net of x and y, then use that result with z.

Q39. Answer: (c) 65

Shortcut Trick

Ratio of Men = 100 : 40 = 5 : 2

Since provisions are constant, Day ratio is inverse of Men ratio.

Ratio of Days = 2 : 5

Given: 2 units = 26 days → 1 unit = 13 days

Remaining days = 5 units = 5 × 13 = 65 days

Therefore Answer = 65

Alternate Method

Given:

Initial number of men (M1) = 100

Initial number of days (D1) = 26

Number of men who left = 60

Formula used:

Total Work (Provision) = LCM of all given days (or M1 × D1)

Efficiency = Total Work ÷ Number of Days

Person	Number of Days	Total Work	Efficiency
100 Men	26	2600 units	100 units/day
40 Men	D2	40 units/day	

Remaining men = 100 − 60 = 40

New Days = 2600 ÷ 40 = 65 days

Calculations:

Total provision = M1 × D1 = 100 × 26 = 2600 units

=> Number of remaining men (M2) = 100 − 60 = 40

=> New duration (D2) = Total provision ÷ M2

=> D2 = 2600 ÷ 40 = 65 days

Therefore The correct answer is 65.

Additional Information

Chain Rule (MDH Formula)

For work done by men in certain hours and days: (M1×D1×H1)/W1 = (M2×D2×H2)/W2.

Inverse Proportion

When the amount of provision is constant, the number of men is inversely proportional to the number of days (M prop. to 1/D).

Work and Efficiency

Efficiency is the amount of work done per unit of time. Total Work = Efficiency × Time.

Q40. Answer: (b) 70.4%

Shortcut Trick

SP of X = 500 + 636 = 1136

Net multiplier for X (20% & 45% discount) = 0.80 × 0.55 = 0.44

Multiplier for Y (67% discount) = 1 − 0.67 = 0.33

SP of Y = (0.33 ÷ 0.44) × 1136 = (3/4) × 1136 = 852

Profit % on Y = [(852 − 500) ÷ 500] × 100 = 70.4%

Therefore Answer = 70.4%

Alternate Method

Given:

Cost Price (CP) of X and Y = Rs. 500 each. Profit on X = Rs. 636. Discounts on X = 20% and 45%. Discount on Y = 67%.

Formula used:

Selling Price (SP) = CP + Profit | SP = MP × (100 − D%)/100 | Profit % = (Profit ÷ CP) × 100

CP (500) MP SP X (1136) SP Y (852) 56% Dis 67% Dis

Calculations:

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SP of article X = CP + Profit = 500 + 636 = Rs. 1136

=> Effective discount on X = 20 + 45 − (20 × 45 ÷ 100) = 65 − 9 = 56%

=> SP of X = MP × (100 − 56)% = 0.44 × MP

=> 1136 = 0.44 × MP => MP = 1136 ÷ 0.44

=> SP of article Y (at 67% discount) = MP × (100 − 67)% = 0.33 × MP

=> SP of Y = 0.33 × (1136 ÷ 0.44) = 1136 × (3 ÷ 4) = Rs. 852

=> Profit on Y = SP of Y − CP = 852 − 500 = Rs. 352

=> Profit % on Y = (352 ÷ 500) × 100 = 70.4%

Therefore The correct answer is 70.4%.

Additional Information

Successive Discount Formula

Total Discount for two successive discounts a% and b% = [a + b − (a × b ÷ 100)]%.

Profit Percentage

Profit % = (Profit ÷ Cost Price) × 100. It is always calculated on the base of Cost Price unless stated otherwise.

Marked Price and Selling Price

Selling Price = Marked Price − Discount. Also, SP = MP × (100 − Discount%) ÷ 100.

Successive Percentage Multipliers

For multiple changes, net multiplier = m1 × m2 × ... × m_n. For example, 20% discount is a multiplier of 0.80.

Q41. Answer: (d) J.J. Thomson

The correct answer is J.J. Thomson.

Key Points

• J.J. Thomson, a British physicist, is universally credited with the discovery of the electron in the year 1897.

• The discovery was made through his experiments with cathode ray tubes (CRT), where he observed that the rays were deflected by electric and magnetic fields, indicating they were composed of negatively charged particles.

• He initially named these particles "corpuscles," but the name was later changed to "electron," a term proposed by George Johnstone Stoney in 1891.

• Thomson succeeded in measuring the charge-to-mass ratio (e/m) of the electron, which proved that these particles were much smaller than the Hydrogen atom and were fundamental constituents of all atoms.

• For his theoretical and experimental investigations on the conduction of electricity by gases and the subsequent discovery of the electron, J.J. Thomson was awarded the Nobel Prize in Physics in 1906.

Additional Information

• Ernest Rutherford:

• Known as the "father of nuclear physics," he discovered the atomic nucleus in 1911 through the famous Alpha Ray Scattering Experiment (or Gold Foil Experiment).

• He is also credited with the discovery of the proton in 1917 and the concept of radioactive half-life.

• He was awarded the Nobel Prize in Chemistry in 1908 for his investigations into the disintegration of elements and the chemistry of radioactive substances.

• Marie Curie:

• A Polish-French physicist and chemist who conducted pioneering research on radioactivity.

• She discovered the elements Polonium (named after her native country, Poland) and Radium in 1898.

• She remains the only person to win Nobel Prizes in two different scientific categories: Physics (1903) and Chemistry (1911).

• Albert Einstein:

• A German-born theoretical physicist famous for developing the Theory of Relativity (Special and General).

• He formulated the mass-energy equivalence equation $E=mc^2$, which is considered the world's most famous equation.

• He received the Nobel Prize in Physics in 1921 for his services to theoretical physics, and especially for his discovery of the law of the photoelectric effect.

• James Chadwick:

• He was a British physicist who discovered the neutron in 1932, a subatomic particle with no electrical charge located in the nucleus.

• This discovery was crucial for the development of nuclear fission and the atomic bomb. He was awarded the Nobel Prize in Physics in 1935.

Important Points

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• Atomic Models: Following the discovery of the electron, J.J. Thomson proposed the "Plum Pudding Model" of the atom, where negatively charged electrons were embedded in a uniform sphere of positive charge.

• Electron Properties: The electron carries a negative elementary charge of approximately -1.602 x 10^-¹^9 Coulombs. Its rest mass is approximately 9.109 x 10^-³¹ kilograms.

• Subatomic Timeline:

• 1897: Discovery of Electron by J.J. Thomson.

• 1911/1917: Discovery of Nucleus/Proton by Ernest Rutherford.

• 1932: Discovery of Neutron by James Chadwick.

• Applications: The understanding of electrons is fundamental to electronics, electricity, chemistry (bonding), and technologies such as Electron Microscopes and Particle Accelerators.

Q42. Answer: (c) Banned mining activities within one km

The correct answer is Banned mining activities within one km.

Key Points

• The Supreme Court of India has mandated that every protected forest, national park, and wildlife sanctuary across the country must have a mandatory Eco-Sensitive Zone (ESZ) of a minimum of one kilometre starting from their demarcated boundaries.

• As per the judicial directive, mining activities are strictly prohibited within the national parks and wildlife sanctuaries, and this ban extends to the 1 km buffer zone or ESZ.

• This decision was primarily influenced by the landmark T.N. Godavarman Thirumulpad vs. Union of India case, which focuses on the conservation of forest land and biodiversity.

• The court also ruled that no permanent structures can be built within the ESZ, ensuring that the area acts as a "shock absorber" for the environment and prevents human encroachment into fragile ecosystems.

• The Supreme Court emphasized that the state must act as a trustee of the natural resources and ensure the protection of wildlife for future generations.

Additional Information

• Eco-Sensitive Zones (ESZs):

• These are ecologically fragile areas notified by the Ministry of Environment, Forest and Climate Change (MoEFCC) around Protected Areas.

• The Environment (Protection) Act, 1986 serves as the legal framework for declaring these zones.

• The main objective of ESZs is to regulate human activities in the vicinity of National Parks and Wildlife Sanctuaries to minimize negative impacts on the ecosystem.

• National Parks and Wildlife Sanctuaries:

• A National Park is an area with a high level of protection where no human activity or private land ownership is allowed under the Wildlife Protection Act, 1972.

• Wildlife Sanctuaries are areas where some human activities, such as grazing or resource collection, may be permitted as long as they do not interfere with the well-being of the animals.

• India currently has over 100 National Parks and more than 500 Wildlife Sanctuaries.

• Regulatory Framework:

• Activities in these zones are classified into three categories: Prohibited (e.g., commercial mining, polluting industries), Regulated (e.g., felling of trees), and Permitted (e.g., organic farming, rainwater harvesting).

Important Points

• Implementation: The Chief Wildlife Warden of each state or union territory is responsible for preparing a list of all existing structures within the ESZ and submitting a report to the Supreme Court.

• Exceptions: In cases where the statutory threshold of one kilometre is difficult to maintain due to existing habitats or geographic constraints, the Supreme Court provides a mechanism for state governments to approach the Central Empowered Committee (CEC) for modifications.

• Impact of Mining: Mining near protected areas leads to habitat fragmentation, noise pollution, and water contamination, which severely affects the flora and fauna of the region.

• Judicial Oversight: The Supreme Court has consistently used the Public Trust Doctrine to ensure that environmental protection takes precedence over commercial interests such as mining and quarrying.

Q43. Answer: (d) Infinite solutions

Shortcut Trick

Sum all three equations: (−3 + 2 + 1)α + (2 − 3 + 1)β + (−5 + 4 + 1)γ = −14 + 10 + 4

Simplifying the sum: 0α + 0β + 0γ = 0 => 0 = 0

Since the sum results in 0 = 0, the equations are linearly dependent and consistent.

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With 3 variables and only 2 independent equations, the system has infinitely many solutions.

Therefore Answer = Infinite solutions

Alternate Method

Given:

Eq 1: $-3\alpha + 2\beta - 5\gamma = -14$

Eq 2: $2\alpha - 3\beta + 4\gamma = 10$

Eq 3: $\alpha + \beta + \gamma = 4$

Formula used:

Consistency Rule: If the determinant of coefficients (D) is 0 and all minor determinants (D_α, D_β, D_γ) are 0, the system has infinite solutions.

Plane 1 (Eq 1) Plane 2 (Eq 2) Plane 3 (Eq 3) Infinite Solutions (Line)

Calculations:

Adding Equation 1 and Equation 2:

=> $(-3\alpha + 2\alpha) + (2\beta - 3\beta) + (-5\gamma + 4\gamma) = -14 + 10$

=> $-\alpha - \beta - \gamma = -4$

=> $\alpha + \beta + \gamma = 4$

=> Observe that this result is identical to Eq 3.

=> This means Equation 3 is redundant. We only have 2 independent linear equations for 3 variables.

=> Since the equations are consistent and have a free variable, there are infinite solutions.

Therefore The correct answer is (4).

Additional Information

Unique Solution Condition

A system of linear equations has a unique solution if the determinant of the coefficient matrix is non-zero ($D \neq 0$).

No Solution (Inconsistent)

A system has no solution if the determinant D = 0, but at least one of the minor determinants (D_α, D_β, or D_γ) is non-zero.

Infinite Solutions (Geometrical Meaning)

For three variables, infinite solutions occur when the three planes intersect in a common line or are all the same plane.

Cramer's Rule

A method using determinants to solve systems of linear equations where $\alpha = D_\alpha \div D$, $\beta = D_\beta \div D$, and $\gamma = D_\gamma \div D$.

Q44. Answer: (a) 15 minutes

Shortcut Trick

Speed ratio (Usual : New) = 7 : 3

Distance is constant Therefore Time ratio (Usual : New) = 3 : 7

Difference in time units = 7 − 3 = 4 units

Given difference = 20 minutes → 4 units = 20 minutes

1 unit = 5 minutes → Usual time = 3 units = 3 × 5 = 15 minutes

Therefore Answer = 15 minutes

Alternate Method

Given:

New speed = 3/7 of normal speed

Late time = 20 minutes

Formula used:

Distance = Speed × Time

When distance is constant, Time is inversely proportional to Speed.

Home Office Usual: Speed=S, Time=T New: Speed=3/7 S, Time=T+20 Distance (D) is Constant

Calculations:

Let the usual speed be S and usual time be T.

=> Distance = S × T

=> New Speed = (3/7) × S

=> New Time = T + 20

=> Distance = (3/7)S × (T + 20)

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=> S × T = (3/7)S × (T + 20)

=> T = 3/7 (T + 20)

=> 7T = 3T + 60

=> 4T = 60

=> T = 15 minutes

Therefore The correct answer is 15 minutes.

Additional Information

Inverse Proportion Rule

When the distance is constant, the ratio of speeds is the inverse of the ratio of times taken: S1/S2 = T2/T1.

Direct Formula for Usual Time

Usual Time = [n ÷ (d − n)] × t, where speed becomes n/d of usual speed and t is the time difference.

Average Speed

For two equal distances covered at speeds x and y, the average speed = (2 × x × y) ÷ (x + y).

Speed Conversion

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

Q45. Answer: (a) 78

The logic followed here is:

thus, "78" will replace the question mark in the given series.

Hence, the correct option is "Option 1".

Q46. Answer: (d) Arunachal Pradesh

The correct answer is Arunachal Pradesh.

Key Points

• According to the 2011 Census, Arunachal Pradesh recorded the lowest population density in India.

• The population density of Arunachal Pradesh is just 17 persons per square kilometer. This is due to its rugged mountainous terrain and vast forest cover.

• Population density is a measurement of population per unit area; for the Census, it is calculated as the number of persons per square kilometer.

• The total population of Arunachal Pradesh was approximately 13,83,727 as per the 2011 data, spread across a geographical area of 83,743 square kilometers.

• The low density in this Northeastern state is a result of geographical constraints, limited habitable land, and the presence of dense Himalayan forests. Hence, the statement regarding Arunachal Pradesh being the least densely populated is correct.

Additional Information

• Mizoram:

• It is the second least densely populated state in India.

• As per the 2011 Census, Mizoram has a population density of 52 persons per square kilometer.

• The state is known for its high literacy rate, which was recorded at 91.33% in 2011.

• Rajasthan:

• It is the largest state in India by area, covering about 10.4% of the country's total land.

• Despite its size, its population density is 200 persons per square kilometer, which is lower than the national average due to the Thar Desert.

• The total population of Rajasthan in 2011 was 6.85 crores.

• Assam:

• Located in the Northeast, it has a significantly higher population density compared to its neighbors.

• The density of Assam is 398 persons per square kilometer, exceeding the national average.

• It is a major producer of tea and petroleum in India.

• Sikkim:

• It is the third least densely populated state with 86 persons per square kilometer.

• It holds the record for being the least populous state in India with a total population of 6,10,577 in 2011.

Important Points

• National Density: The overall population density of India increased from 324 in 2001 to 382 persons per square kilometer in the 2011 Census.

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• Most Densely Populated State: Bihar is the most densely populated state in India, with 1106 persons per square kilometer. It overtook West Bengal (1028) in the 2011 survey.

• Union Territories: Delhi has the highest population density among all states and Union Territories, with a staggering 11,320 persons per square kilometer.

• Andaman and Nicobar Islands: This UT has the lowest density among Union Territories, with only 46 persons per square kilometer.

• Historical Context: The Census of 2011 was the 15th census of India and the 7th since Independence. The slogan was "Our Census, Our Future."

Q47. Answer: (c) Outer core

The correct answer is Outer core.

Key Points

• The Outer core is the layer of the Earth primarily responsible for generating the magnetic field through a process called the Geodynamo. This layer is situated at a depth of approximately 2,900 kilometers to 5,150 kilometers below the Earth's surface.

• It is composed mainly of liquid iron and nickel. Unlike the inner core, the outer core remains in a liquid state because the temperature (ranging from 4,000°C to 6,000°C) is high enough to overcome the pressure at that depth.

• The rotation of the Earth, combined with convection currents in the liquid metal, causes the movement of electrically conducting fluids. This movement creates electrical currents, which in turn generate the geomagnetic field.

• This magnetic field extends from the Earth's interior out into space, where it interacts with the solar wind to form the magnetosphere. This is vital for protecting the atmosphere from harmful radiation.

• The thickness of the outer core is roughly 2,200 kilometers, making it a massive reservoir of kinetic energy converted into magnetic energy.

Additional Information

• Crust:

• The Crust is the outermost solid shell of the Earth. It ranges in thickness from about 5 kilometers (under oceans) to 70 kilometers (under mountain ranges).

• It is primarily composed of silicates and aluminum (Sial) and silicates and magnesium (Sima). While it contains some magnetic minerals like magnetite, it does not generate the global magnetic field. Hence, this option is incorrect.

• Mantle:

• The Mantle lies beneath the crust and extends to a depth of about 2,900 kilometers. It makes up about 84% of the Earth's total volume.

• It consists of solid rock that behaves like a viscous fluid over geological time. While convection in the mantle drives plate tectonics, it does not possess the electrical conductivity required to generate a magnetic field. Hence, this option is incorrect.

• Inner core:

• The Inner core is the Earth's innermost layer, with a radius of about 1,220 kilometers. It is a solid sphere composed mostly of iron and nickel.

• Despite extreme temperatures of 5,400°C, it remains solid due to the immense pressure exerted by the outer layers. It helps stabilize the magnetic field but is not the primary site of its generation. Hence, this option is incorrect.

Important Points

• Magnetic Reversals: The Earth's magnetic field is not static; the magnetic poles flip periodically over hundreds of thousands of years. This phenomenon is recorded in the magnetization of oceanic crust.

• Auroras: The interaction between the Earth's magnetic field and charged particles from the sun produces the Aurora Borealis (Northern Lights) and Aurora Australis (Southern Lights).

• Composition Discovery: Scientists discovered the liquid nature of the Outer core by observing that S-waves (secondary seismic waves) cannot pass through it during an earthquake, while P-waves (primary waves) are refracted.

• Age of the Field: Studies of paleomagnetism suggest the Earth has had a magnetic field for at least 3.5 billion years, which has been crucial for the evolution and survival of life on the planet.

Q48. Answer: (a) 17, 33

The logic followed here is:

Logic: The second number is formed by multiplying the first number by itself and then subtracting 1.

For, (15, 29)

=> 15 × 2 = 30

=> 30 − 1 = 29

For, (32, 63)

=> 32 × 2 = 64

=> 64 − 1 = 63

Now, checking the options using the same pattern:

Option 1) (17, 33)

=> 17 × 2 = 34

=> 34 − 1 = 33

Option 2) (11, 34)

=> 11 × 2 = 22

=> 22 − 1 = 21 ≠ 34

Option 3) (23, 49)

=> 23 × 2 = 46

=> 46 − 1 = 45 ≠ 49

Option 4) (14, 44)

=> 14 × 2 = 28

=> 28 − 1 = 27 ≠ 44

Hence, the correct answer is Option 1.

Q49. Answer: (b) 15

The logic followed here is:

Given numbers: 412, 368, 457, 283, 396

Logic: Find the highest and lowest numbers, then perform the required operation.

Highest number = 457

→ Third digit = 7

Lowest number = 283

→ Second digit = 8

Result = 7 + 8 = 15

Hence, the correct answer is Option 2.

Q50. Answer: (c) 5,848

Shortcut Trick

Ratio Boys : Girls = 17 : 11

Total Ratio parts = 17 + 11 = 28 units

28 units = 9,632

1 unit = 9,632 ÷ 28 = 344

Number of boys = 17 units = 17 × 344 = 5,848

Therefore Answer = 5,848

Alternate Method

Given:

Total number of students = 9,632

Ratio of boys to girls = 17 : 11

Formula used:

Quantity of a part = (Ratio of that part ÷ Sum of ratio parts) × Total Quantity

Boys (17x) Girls (11x) Total Students = 9,632 Sum of parts = 17 + 11 = 28 Boys = 5,848

Calculations:

Sum of ratio parts = 17 + 11 = 28

=> 28 units = 9,632

=> 1 unit = 9,632 ÷ 28

=> 1 unit = 344

=> Number of boys = 17 × 344

=> Number of boys = 5,848

Therefore The correct answer is 5,848.

Additional Information

Compound Ratio

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For two ratios a : b and c : d, the compounded ratio is (a × c) : (b × d).

Mean Proportional

The mean proportional between two numbers a and b is given by √(a × b).

Duplicate Ratio

The duplicate ratio of a : b is $a^2 : b^2$, and the sub-duplicate ratio is √a : √b.

Fourth Proportional

If a, b, c, d are in proportion (a:b = c:d), then d is the fourth proportional, calculated as d = (b × c) ÷ a.

Q51. Answer: (c) Vasant Shinde

The correct answer is Vasant Shinde.

Key Points

• The major archaeological study and scientific excavation at the Harappan site of Rakhigarhi in 2013 were initiated by Vasant Shinde. At the time, he was the Vice-Chancellor of the Deccan College Post-Graduate and Research Institute, Pune.

• The excavation was a collaborative project involving the Haryana State Archaeology Department and international experts to conduct DNA analysis on ancient skeletal remains. This was one of the first times such advanced scientific techniques were applied to Harappan remains.

• The study aimed to understand the genetic ancestry of the Harappan people and their lifestyle. Vasant Shinde and his team focused on Mound 7 at the site, which served as a cemetery, uncovering several human skeletons. Hence, the statement regarding his initiation in 2013 is correct.

• Under his leadership, the research provided breakthrough evidence regarding the Indus Valley Civilization, particularly through the publication of ancient DNA results in 2019, which suggested a lack of Steppe pastoralist ancestry in the early Harappans.

• The work of Vasant Shinde helped establish Rakhigarhi as the largest site of the Harappan Civilization, spanning over 550 hectares, which is significantly larger than Mohenjo-daro.

Additional Information

• Rakhigarhi Site Details:

• Location: The site is located in the Hisar district of the state of Haryana, India. It is situated in the Ghaggar-Hakra river plain, often identified with the mythological Saraswati River.

• Chronology: The site shows a continuous occupation from the Early Harappan (Pre-Indus) phase around 3500 BCE to the Mature Harappan phase ending around 1900 BCE.

• Discovery: The site was first discovered by Suraj Bhan in the 1960s, but major excavations only began much later.

• Important Findings at Rakhigarhi:

• Archaeologists have discovered mud-brick walls, a sophisticated drainage system, and terracotta artifacts including toys and figurines.

• Significant artifacts include steatite seals, gold jewelry, and semi-precious stones, indicating that the city was a major trade and manufacturing hub.

• The DNA study conducted on a skeleton from Rakhigarhi (known as I6113) refuted the Aryan Invasion Theory by proving that the genetic makeup of the Harappans contributes significantly to the modern South Asian gene pool.

Important Points

• Amrendra Nath: He is a renowned archaeologist from the Archaeological Survey of India (ASI) who conducted the first major phase of excavations at Rakhigarhi between 1997 and 2000. His work identified the site as a metropolis.

• R.S. Bisht: Ravindra Singh Bisht is famous for his extensive excavations at Dholavira in Gujarat and Banawali in Haryana. He is known for uncovering the sophisticated water management systems of the Harappans.

• B.B. Lal: Braj Basi Lal was a former Director-General of the ASI. He is best known for his excavations at Kalibangan (Rajasthan) and his work on the Painted Grey Ware (PGW) culture and sites related to Indian epics.

• In the Union Budget 2020-21, the Government of India announced that Rakhigarhi would be developed as one of the five iconic sites with on-site museums to promote heritage tourism.

Q52. Answer: (c) Mahatma Gandhi National Rural Employment Guarantee Act, 2005

The correct answer is Mahatma Gandhi National Rural Employment Guarantee Act, 2005.

Key Points

• The Viksit Bharat—Guarantee for Rozgar and Ajeevika Mission (Gramin) (VB—GRAM G) Bill, 2025 is proposed as a transformative piece of legislation intended to modernize the rural employment framework in India.

• This Bill specifically seeks to replace the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), which was enacted in the year 2005. Hence, the statement regarding the replacement of the 2005 Act is correct.

• The VB—GRAM G mission aims to transition from a purely demand-driven manual labor scheme to a more holistic livelihood (Ajeevika) mission that emphasizes skill development and the creation of productive assets in rural areas.

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• The primary objective of this 2025 Bill is to align rural development with the national goal of becoming a Viksit Bharat (Developed India) by the year 2047.

• It introduces updated guidelines for wage payments, employment generation, and technological integration, such as AI-based monitoring of work sites across the country.

Additional Information

• Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), 2005:

• Origin: This Act was passed in September 2005 under the Ministry of Rural Development.

• Features: It provides a legal guarantee for at least 100 days of unskilled manual work in a financial year to every rural household whose adult members volunteer for it.

• Impact: It has been a social security net for millions, significantly reducing rural-to-urban migration and enhancing purchasing power in villages.

• Insurance Regulatory and Development Authority (IRDA) Act, 1999:

• Function: This Act established the IRDAI as a statutory body to regulate and promote the insurance and re-insurance industries in India.

• Context: It is unrelated to rural employment missions but governs private and public insurance providers.

• Life Insurance Corporation (LIC) Act, 1956:

• History: This Act was passed in 1956 to nationalize the insurance sector, leading to the formation of the Life Insurance Corporation of India.

• Application: It focuses on providing life insurance and investment services rather than guaranteed rozgar (employment).

• Insurance Act, 1938:

• Oldest Act: This is the fundamental law governing the insurance business in India, providing the legal framework for licensing and capital requirements.

Important Points

• Viksit Bharat Vision: The VB—GRAM G Bill is a strategic component of the government's Vision 2047, targeting zero poverty and sustainable infrastructure in every Gram Panchayat.

• Asset Creation: Unlike the older manual labor focus, the 2025 Bill prioritizes climate-resilient assets, including check dams, solar-powered community centers, and water harvesting systems.

• Digital Transformation: The transition involves the use of Direct Benefit Transfer (DBT) for wage payments, ensuring that funds reach the bank accounts of workers without leakage.

• Skill Integration: A key feature of the new mission is the integration of vocational training, allowing rural youth to graduate from unskilled to semi-skilled employment roles.

Q53. Answer: (b) Basic Input/Output System

The correct answer is Basic Input/Output System.

Key Points

• The abbreviation BIOS stands for Basic Input/Output System. It is a critical piece of firmware that is pre-installed on a personal computer's motherboard and is the first software to run when the machine is powered on.

• The primary function of the BIOS is to manage the communication between the Operating System (OS) and the hardware components such as the Hard Drive, Video Adapter, Keyboard, Mouse, and Printer.

• Upon starting the computer, the BIOS performs a diagnostic routine known as the Power-On Self-Test (POST). This process checks if the system's hardware, including the Central Processing Unit (CPU), Random Access Memory (RAM), and Storage Devices, are functioning correctly before handng over control to the Bootloader.

• It contains a Bootstrap Loader, which is a small program responsible for locating the Operating System on the Hard Drive or SSD and loading it into the System Memory to initiate the user environment.

• The BIOS is typically stored on a Non-volatile ROM (Read-Only Memory) chip, such as an EPROM or Flash Memory, ensuring that the instructions are not lost when the power is turned off.

Additional Information

• UEFI (Unified Extensible Firmware Interface): Modern computers have largely replaced the traditional Legacy BIOS with UEFI. UEFI supports larger Hard Drives (greater than 2.2 Terabytes), offers faster Boot Times, provides a Graphical User Interface (GUI) with mouse support, and includes Secure Boot features to prevent malware from loading during startup.

• CMOS (Complementary Metal-Oxide-Semiconductor): While the BIOS software is stored in ROM, the user-defined settings (such as System Time, Date, and Boot Priority) are stored in a small amount of RAM called the CMOS chip. This chip is kept active by a small CMOS Battery (usually a CR2032 Lithium coin cell) even when the computer is unplugged.

• History and Origin: The term BIOS was first coined by Gary Kildall in 1975. It was originally part of the CP/M operating system, describing the hardware-specific part of the system that loaded during boot and interacted directly with the hardware.

• Flashing the BIOS: To fix bugs or add support for new hardware (like a newer generation Processor), the BIOS can be updated

through a process called Flashing. This involves overwriting the existing Firmware with a newer version provided by the Motherboard Manufacturer.

• Accessibility: Users can access the BIOS Setup Utility during the early stages of booting by pressing specific keys, commonly F2, F10, F12, or Delete, depending on the manufacturer like Dell, HP, or ASUS.

Important Points

• Firmware vs Software: It is important to distinguish that BIOS is Firmware, meaning it is low-level code embedded directly into a hardware chip, whereas an Operating System like Windows 11 or Linux is high-level Software.

• Hardware Initialization: Without a functioning BIOS, a computer would not know how to "wake up" its hardware components or where to find the Operating System, rendering the device a "brick."

• Drivers: In the early days of computing, the BIOS provided the primary Drivers for hardware; however, in modern systems, the Operating System loads its own advanced Device Drivers after the initial boot process is complete.

Q54. Answer: (d) 457

Shortcut Trick

Total members = 75 + 47 + 15 = 137

Let assumed average = 450

Deviations: A = 75×(+43), B = 47×(−53), C = 15×(+15)

Net total deviation = 3225 − 2491 + 225 = 959

Average deviation = 959 ÷ 137 = 7

Overall Average = 450 + 7 = 457

Therefore Answer = 457

Alternate Method

Given:

Group A: 75 members, Average = Rs. 493

Group B: 47 members, Average = Rs. 397

Group C: 15 members, Average = Rs. 465

Formula used:

Combined Average = (n1x1 + n2x2 + n3x3) ÷ (n1 + n2 + n3)

Rs. 493 (A) 75 Members Rs. 397 (B) 47 Members Rs. 465 (C) 15 Overall Average = Rs. 457

Calculations:

Total amount spent = (75 × 493) + (47 × 397) + (15 × 465)

=> Total amount = 36975 + 18659 + 6975

=> Total amount = 62609

=> Total members = 75 + 47 + 15 = 137

=> Overall average = 62609 ÷ 137 = 457

Therefore The correct answer is 457 (Option 4).

Additional Information

Combined Average

When multiple groups are combined, the total average is the total sum of all items divided by the total number of items: x_(comb) = (Σn_ix_i) ÷ Σn_i.

Deviation Method

To simplify calculations, assume a mean A. The actual mean is A + (Σf_id_i ÷ Σf_i), where d_i is the deviation of each value from A.

Weighted Average

Weighted average is used when some data points contribute more to the final average than others: Average = (w1x1 + w2x2) ÷ (w1 + w2).

Q55. Answer: (b) 45 years

Shortcut Trick

Current Average of (Amit+Bharat+Chitra) = 36 + 4 = 40 years.

Current Average of (Amit+Bharat) = 30 + 6 = 36 years.

Chitra's current age = Group Average + (Deviation × Count) = 40 + (40 − 36) × 2 = 48 years.

Chitra's age 3 years ago = 48 − 3 = 45 years.

Therefore Answer = 45 years

Alternate Method

Given:

Average age of Amit, Bharat and Chitra (4 years ago) = 36 years

Average age of Amit and Bharat (6 years ago) = 30 years

Formula used:

Total Age = Average Age × Number of Persons

Present Age = Age n years ago + n

Total (Amit+Bharat+Chitra) Now 120 yrs Total (Amit+Bharat) Now 72 yrs Chitra Now = 48 Chitra Age (3 yrs ago) = 45 years
Result: 45 years

Calculations:

Current Total age of Amit, Bharat and Chitra = (36 + 4) × 3

=> Total age = 40 × 3 = 120 years

Current Total age of Amit and Bharat = (30 + 6) × 2

=> Total age = 36 × 2 = 72 years

Chitra's current age = Total (A+B+C) − Total (A+B)

=> Chitra's current age = 120 − 72 = 48 years

Chitra's age three years ago = 48 − 3 = 45 years

Therefore The correct answer is 45 years (Option 2).

Additional Information

Average Age Change

If the average age of n people is x years, then n years ago the average was (x − n) and n years later it will be (x + n).

Finding Age of an Excluded Member

Age of excluded person = (Initial Total Sum) − (Final Total Sum) = (Initial Count × Initial Avg) − (Final Count × Final Avg).

Weighted Average

The combined average of two groups with sizes n1, n2 and averages a1, a2 is (n1a1 + n2a2) ÷ (n1 + n2).

Q56. Answer: (d) Two

The logic followed here is:

Given: M, N, O, P, E and F live on six different floors of the same building.

The lowermost floor is numbered 1, the floor above it is numbered 2 and so on till the topmost floor is numbered 6.

E lives on the topmost floor.

Only three people live between E and M.

O lives on a floor below M.

N lives on an even-numbered floor.

P lives on an odd-numbered floor but not on floor number 5.

Floor	Person
6	E
5	F
4	N
3	O
2	M
1	P

Now, people between F and M = 2.

Hence, the correct answer is Option 4.

Q57. Answer: (d) Executing the installation of software applications

The correct answer is Executing the installation of software applications.

Key Points

• The .msi file extension stands for Microsoft Installer, which is now formally known as the Windows Installer. Its primary purpose in Windows 11 and earlier versions is to manage the installation, maintenance, and removal of software.

• An .msi file functions as a relational database package. It contains all the necessary information, such as files, registry keys, component relationships, and shortcuts, required to install a specific piece of software.

• When a user double-clicks an .msi file, the Windows Installer service (msiexec.exe) is triggered to read the package and execute the defined installation scripts.

• One of the most critical features of the .msi format is its transactional nature. If an installation fails midway, the Windows Installer can perform a rollback, returning the system to its original state before the process began.

• In corporate environments, .msi files are preferred because they support silent installations and can be easily deployed across multiple computers using Group Policy Objects (GPO) or Microsoft Endpoint Configuration Manager.

Additional Information

• Comparison with .exe files: While both .msi and .exe can be used for installation, an .exe is a generic executable file that may contain its own setup engine. In contrast, an .msi file specifically relies on the Windows Installer engine built into the operating system.

• MSIX format in Windows 11: With the release of Windows 10 and Windows 11, Microsoft introduced the .msix format. It is a modern packaging format that combines the best features of MSI, AppX, and App-V to provide a more secure and reliable application deployment experience.

• Multimedia and Image Formats: Other extensions mentioned in the options serve different purposes. For example, .mp4 or .mkv are used for multimedia audio and video, while .psd or .svg are used for raster and vector images. These are not related to software installation.

• Uninstallation and Repair: Because .msi files track every change made to the Windows Registry and file system, they allow users to repair a corrupted installation or perform a clean uninstallation through the Control Panel or Settings app.

• Customization: Developers can use MST (Microsoft Transform) files along with an .msi to customize the installation process for different groups of users without modifying the original installer package.

Important Points

• Security: Since .msi files can execute scripts and modify system files, Windows 11 uses User Account Control (UAC) to prompt for administrator permissions before allowing the installation to proceed.

• Version History: The Windows Installer was first introduced in 1999 with Office 2000 and has since become the standard for Windows software distribution.

• Deployment: The .msi format is highly standardized, ensuring that software vendors provide a predictable user experience during the setup process regardless of the hardware or specific Windows build.

Q58. Answer: (b) -18

Shortcut Trick

If $x + 1/x = k$, then $x^3 + 1/x^3 = k^3 - 3k$.

Given: $k = -3$.

Value = $(-3)^3 - 3 \times (-3)$.

Value = $-27 + 9$.

Value = -18.

Therefore Answer = -18

Alternate Method

Given:

$x + 1/x = -3$

Formula used:

$(a + b)^3 = a^3 + b^3 + 3ab(a + b)$

$x + 1/x = -3$ Cubing $x^3 + 1/x^3 = ?$

Calculations:

Cubing both sides of the given equation:

$\Rightarrow (x + 1/x)^3 = (-3)^3$

$\Rightarrow x^3 + (1/x)^3 + 3 \times x \times (1/x) \times (x + 1/x) = -27$

$\Rightarrow x^3 + 1/x^3 + 3(x + 1/x) = -27$

$\Rightarrow x^3 + 1/x^3 + 3(-3) = -27$

$\Rightarrow x^3 + 1/x^3 - 9 = -27$

$\Rightarrow x^3 + 1/x^3 = -27 + 9 = -18$

Therefore The correct answer is -18.

Additional Information

Square Identity

If $x + 1/x = k$, then $x^2 + 1/x^2 = k^2 - 2$.

Negative Cubic Identity

If $x - 1/x = k$, then $x^3 - 1/x^3 = k^3 + 3k$.

Plus to Minus Conversion

The relationship between $(x + 1/x)$ and $(x - 1/x)$ is: $(x + 1/x)^2 - (x - 1/x)^2 = 4$.

Fourth Power Identity

If $x + 1/x = k$, then $x^4 + 1/x^4 = (k^2 - 2)^2 - 2$.

Q59. Answer: (a) 21 km to the North

Given:

Kartikeyan starts from A and drives 37 km West.

He turns right → 26 km North.

He turns right → 42 km East.

He turns right → 47 km South.

He turns right → 5 km West and reaches point P.

So, To reach A from P → move 21 km North.

Hence, the correct answer is Option 1.

Q60. Answer: (a) 38.87

Shortcut Trick

In a moderately skewed distribution, the difference between Mode and Median is exactly twice the difference between Median and Mean.

Logic: (Mode − Median) = 2 × (Median − Mean)

Given: Mode − Median = 77.74

Calculation: Median − Mean = 77.74 ÷ 2 = 38.87

Therefore Answer = 38.87

Alternate Method

Given:

Mode − Median = 77.74

Formula used:

Empirical Formula: Mode = 3 Median − 2 Mean

Mean Median Mode Mode − Median = 77.74 x = ? Relationship: (Mode − Median) = 2 × (Median − Mean) 77.74 = 2 × x

Calculations:

Using the empirical relation: Mode = 3 Median − 2 Mean

=> Subtracting Median from both sides:

=> Mode − Median = 3 Median − 2 Mean − Median

=> Mode − Median = 2 Median − 2 Mean

=> Mode − Median = 2 × (Median − Mean)

=> 77.74 = 2 × (Median − Mean)

=> Median − Mean = 77.74 ÷ 2

=> Median − Mean = 38.87

Therefore The correct answer is 38.87.

Additional Information

Empirical Relationship

For a moderately skewed distribution, the relationship is Mode = 3 Median − 2 Mean. This is also written as (Mean − Mode) = 3(Mean − Median).

Symmetrical Distribution

In a perfectly symmetrical distribution (like the Normal Distribution), the Mean, Median, and Mode are all equal (Mean = Median = Mode).

Skewness and the Median

The Median always lies between the Mean and the Mode in a skewed distribution. It is a more robust measure of central tendency than the Mean for skewed data.

Types of Skewness

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Positively skewed: Mean > Median > Mode. Negatively skewed: Mode > Median > Mean.

Q61. Answer: (c) Section 10 of the Citizenship Act, 1955

The correct answer is Section 10 of the Citizenship Act, 1955.

Key Points

• Section 10 of the Citizenship Act, 1955 deals with the Deprivation of Citizenship. It empowers the Central Government to deprive a citizen of India of their citizenship if it is obtained by fraud, false representation, or concealment of any material fact, or if the citizen has shown disloyalty to the Constitution of India, or has unlawfully traded or communicated with an enemy during a war. Hence, statement 3 is correct.

• Section 6A was inserted into the Citizenship Act, 1955 following the Assam Accord in 1985. It provides special provisions for citizenship to persons covered by the Assam Accord, specifically those who migrated from Bangladesh to Assam before 1 January 1966 or between 1 January 1966 and 24 March 1971. It does not primarily deal with revocation for acting against national interests. Hence, statement 1 is incorrect.

• Article 11 of the Constitution of India gives the Parliament the power to regulate the right of citizenship by law. It states that nothing in Articles 5 to 10 shall derogate from the power of Parliament to make any provision with respect to the acquisition and termination of citizenship. While it provides the constitutional basis for the Citizenship Act, the specific power to revoke citizenship lies within the statutory provisions of the Act itself. Hence, statement 2 is incorrect.

• Article 5 provides for citizenship at the commencement of the Constitution on 26 January 1950. It defines who became a citizen of India based on domicile and birth in the territory of India, or if their parents were born in India, or if they were ordinarily resident for not less than 5 years. It does not contain provisions for the revocation of citizenship by the government. Hence, statement 4 is incorrect.

Additional Information

• Acquisition of Citizenship: The Citizenship Act, 1955 prescribes five ways of acquiring citizenship: Birth, Descent, Registration, Naturalization, and Incorporation of Territory.

• By Birth: Every person born in India on or after 26 January 1950 but before 1 July 1987 is a citizen by birth.

• By Naturalization: A person can acquire citizenship if they have resided in India for 12 years and fulfill other qualifications mentioned in the Third Schedule of the Act.

• Termination of Citizenship: The Act mentions three methods of losing citizenship:

• Renunciation: A voluntary act by which a person holding Indian citizenship also holding citizenship of another country gives up their Indian citizenship.

• Termination: Happens when an Indian citizen voluntarily acquires the citizenship of another country; their Indian citizenship automatically terminates.

• Deprivation: A compulsory termination of citizenship by the Central Government under Section 10 based on grounds like disloyalty, fraud, or continuous residence outside India for 7 years.

• Ministry of Home Affairs: The Ministry of Home Affairs is the nodal ministry in India responsible for matters related to citizenship, naturalization, and the implementation of the Citizenship Act.

Important Points

• Single Citizenship: Unlike federal structures like the USA, India provides for Single Citizenship to promote fraternity and unity among the people. This concept is borrowed from the British Constitution.

• Constitutional Provisions: Part II of the Constitution (Articles 5-11) deals with citizenship. These articles only identified persons who became citizens at the time of independence and did not provide permanent laws, leaving that task to the Parliament.

• Citizenship Amendment Act (CAA) 2019: This amendment seeks to provide Indian citizenship to persecuted minorities (Hindus, Sikhs, Buddhists, Jains, Parsis, and Christians) from Afghanistan, Bangladesh, and Pakistan who entered India on or before 31 December 2014.

• Overseas Citizenship of India (OCI): Introduced in 2005, it provides certain rights to the Indian Diaspora but does not grant voting rights or the right to hold constitutional posts, as India does not allow dual citizenship.

Q62. Answer: (b) I

The logic followed here is:

Given: Seven people G, V, W, I, F, H and U are sitting around a circular table facing the centre.

V sits fourth to the left of G.

W is an immediate neighbour of both I and V.

Only three people sit between F and I when counted from the right of I.

H sits to the immediate right of F.

So, Third to the left of U is I.

Hence, the correct answer is "Option 2".

Q63. Answer: (c) 18.18

Shortcut Trick

If a sum becomes n times in T years, Rate R = [(n − 1) × 100] ÷ T

Here, n = 5 and T = 22 years

R = [(5 − 1) × 100] ÷ 22

R = 400 ÷ 22 = 18.1818...

Therefore Answer = 18.18

Alternate Method

Given:

Principal becomes 5 times itself (Amount A = 5P). Time T = 22 years.

Formula used:

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

Year 0 Principal (P) Year 22 Amount (5P) Interest = 4P

Calculations:

Let Principal (P) = 100

=> Amount (A) = 5 × 100 = 500

=> Simple Interest (SI) = A − P = 500 − 100 = 400

=> 400 = (100 × R × 22) ÷ 100

=> 400 = 22 × R

=> R = 400 ÷ 22 = 18.1818...

Therefore The correct answer is 18.18 (Option 3).

Additional Information

Amount Formula

Total Amount A = P + SI = P × [1 + (R × T) ÷ 100], where P is Principal, R is Rate, and T is Time.

Time for n times

To find the time (T) required for a sum to become n times at rate R, use T = [(n − 1) × 100] ÷ R.

SI vs CI difference

The difference between Compound Interest and Simple Interest for 2 years is given by CI − SI = P × (R ÷ 100)².

Q64. Answer: (c) G

The logic followed here is:

Given: D, E, F, G, S, T and U are sitting around a circular table facing the centre.

T sits to the immediate left of S.

U sits to the immediate left of D.

D sits second to the left of G.

E sits third to the left of S.

Now, starting from F and moving fourth to the right, we reach G.

Hence, the correct answer is "Option 3".

Q65. Answer: (b) Xylem

The correct answer is Xylem.

Key Points

• Xylem is a specialized type of vascular tissue in tracheophytes (vascular plants) that is primarily responsible for the conduction of water and dissolved minerals from the roots to the stems and leaves.

• The transport in xylem is unidirectional, meaning the movement of substances occurs only in the upward direction, from the bottom to the top of the plant.

• It provides mechanical strength to the plant body due to the presence of lignified cell walls in its components.

• The xylem consists of four main types of cells: Tracheids, Vessels (also known as trachea), Xylem Parenchyma, and Xylem Fibres.

• Except for xylem parenchyma, all other xylem elements are dead cells at maturity, which facilitates the efficient flow of water under high tension.

• Tracheids and vessels are the main conducting elements; they are tube-like structures that allow water to move through the plant via capillary action and transpiration pull.

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Additional Information

• Phloem:

• Phloem is the other major vascular tissue responsible for the translocation of organic nutrients, especially sucrose (sugar), produced during photosynthesis.

• Unlike xylem, the transport in phloem is bidirectional (multi-directional), moving food from the source (leaves) to the sink (roots, fruits, and storage organs).

• It is composed of Sieve tubes, Companion cells, Phloem parenchyma, and Phloem fibres. Most of these cells are living at maturity.

• Epidermis:

• The Epidermis is the outermost layer of cells covering the entire surface of the plant, including roots, stems, leaves, flowers, and seeds.

• Its primary function is protection against mechanical injury, water loss (via the cuticle), and pathogen entry.

• In leaves, it contains specialized pores called stomata, which are regulated by guard cells for gas exchange and transpiration.

• Cortex:

• The Cortex is a region of ground tissue located between the epidermis and the vascular cylinder (stele) in roots and stems.

• It is mostly composed of parenchyma cells and serves functions like storage of food (starch) and transport of water and minerals from the epidermis to the vascular center.

• In some plants, the innermost layer of the cortex is differentiated into the endodermis, which regulates the flow of materials into the xylem.

Important Points

• Mechanism of Water Transport: The movement of water in the xylem is driven by two main forces: Root Pressure (which pushes water up from the bottom, significant in small plants or at night) and Transpiration Pull (which sucks water up from the leaves due to evaporation).

• Ascent of Sap: The upward movement of water and minerals through the xylem is scientifically termed the Ascent of Sap. This process is explained by the Cohesion-Tension Theory, proposed by Dixon and Jolly in 1894.

• Historical Context: The term Xylem was introduced by Carl Nägeli in 1858, derived from the Greek word "xylon", meaning wood, as xylem forms the bulk of the wood in perennial plants.

• Environmental Factors: The rate of transport in the xylem is heavily influenced by external factors like temperature, humidity, wind speed, and light intensity, as these directly affect the rate of transpiration.

Q66. Answer: (c) 14

The logic followed here is:

Given numbers: 564, 487, 769, 478, 546

Logic: Find the second highest and lowest numbers, then perform the required operation.

Arranging in descending order: 769, 564, 546, 487, 478

Second highest number = 564

→ Second digit = 6

Lowest number = 478

→ Third digit = 8

Result = 6 + 8 = 14

Hence, the correct answer is Option 3.

Q67. Answer: (d) Global Methane Status Report 2025

The correct answer is Global Methane Status Report 2025.

Key Points

• The Global Methane Status Report 2025 was a landmark document released during the COP30 summit, which took place in Belém, Brazil, in November 2025. This report provides a comprehensive assessment of global methane emission trends and the efficacy of current mitigation strategies.

• The report highlights that methane (CH_4) is a powerful greenhouse gas, responsible for approximately 30% of the total rise in global temperatures since the Industrial Revolution. It underscores that while methane has a shorter atmospheric lifespan than CO_2, its warming potential is significantly higher.

• According to the findings, global methane emissions from human activities must be reduced by nearly 45% by 2030 to stay within the 1.5°C warming limit set by the Paris Agreement. The 2025 report identified that emissions have continued to rise despite the Global Methane Pledge initiated in 2021.

• The Global Methane Status Report 2025 was jointly prepared by the International Energy Agency (IEA) and the Climate and Clean Air Coalition (CCAC), under the auspices of the United Nations Environment Programme (UNEP). It serves as a critical tool

for policymakers to identify "super-emitters" and implement targeted regulations.

• The report emphasizes the "triple-win" of methane reduction: slowing climate change, improving air quality by reducing ground-level ozone, and enhancing energy security through the capture of leaked natural gas.

Additional Information

• Characteristics of Methane:

• Methane is the primary component of natural gas. It has an atmospheric lifetime of about 12 years, which is much shorter than carbon dioxide, which can persist for centuries.

• Despite its short life, its Global Warming Potential (GWP) is more than 80 times that of CO2 over a 20-year period, making it a "short-lived climate pollutant" (SLCP) with immediate impact.

• Primary Sources of Emissions:

• Agriculture: This sector accounts for roughly 40% of anthropogenic methane, primarily from livestock enteric fermentation and rice cultivation.

• Energy: The oil and gas industry and coal mining contribute about 35% of emissions through venting, flaring, and fugitive leaks.

• Waste Management: Landfills and wastewater treatment plants are responsible for approximately 20% of emissions due to the anaerobic decomposition of organic matter.

• The Global Methane Pledge:

• Launched at COP26 in Glasgow (2021), this initiative saw over 150 countries commit to a collective goal of reducing methane emissions by at least 30% from 2020 levels by the year 2030.

• COP30 Significance:

• The 30th Conference of the Parties (COP30) is often referred to as the "Amazon COP" because of its location in Brazil. It marks a critical juncture for nations to submit their updated Nationally Determined Contributions (NDCs) for 2035.

Important Points

• Monitoring Technologies: The Global Methane Status Report 2025 utilizes data from advanced satellites like MethaneSAT and the International Methane Emissions Observatory (IMEO) to track real-time leaks across the globe.

• Health Impacts: Reducing methane is vital because it is a precursor to tropospheric ozone. Higher ozone levels cause respiratory illnesses and lead to the loss of millions of tonnes of crop yields annually.

• Economic Viability: The IEA reports that nearly 40% of methane emissions from fossil fuel operations could be avoided at no net cost because the value of the captured gas exceeds the cost of the abatement measures.

• MARS Initiative: The Methane Alert and Response System (MARS) was scaled up by 2025 to provide high-resolution data to governments to fix large leaks immediately, a feature highlighted as a success in the 2025 report.

Q68. Answer: (b) Neither conclusion (I) nor (II) follows.

Given Statements:

No elephant is a horse.

No horse is a donkey.

No horse is a turtle.

The least possible Venn diagram for the given statements is:

Conclusions:

I. No elephant is a donkey - False (Since no relationship is given between elephant and donkey, they may or may not overlap. So it does not necessarily follow.)

II. Some turtles are donkeys - False (No relationship is given between turtles and donkeys, so this cannot be assumed.)

So, neither conclusion I nor II follows.

Hence, the correct answer is "Option 2".

Q69. Answer: (d) 60:19

Shortcut Trick

Fourth proportional (D) = (B × C) ÷ A

For (10, 80, 30): D1 = (80 × 30) ÷ 10 = 240

For (7, 28, 19): D2 = (28 × 19) ÷ 7 = 76

Required Ratio = 240 : 76 = 60 : 19

Therefore Answer = 60:19

Alternate Method

Given:

Set 1: 10, 80, 30

Set 2: 7, 28, 19

Formula used:

If a, b, c, d are in proportion, then a/b = c/d => d = (b × c) / a

Set 1 (10, 80, 30, x) 10 : 80 :: 30 : x x = 240 Set 2 (7, 28, 19, y) 7 : 28 :: 19 : y y = 76 Ratio x : y = 240 : 76 = 60 : 19

Calculations:

Let x be the fourth proportional of 10, 80, 30.

=> 10/80 = 30/x

=> 1/8 = 30/x => x = 30 × 8 = 240

Let y be the fourth proportional of 7, 28, 19.

=> 7/28 = 19/y

=> 1/4 = 19/y => y = 19 × 4 = 76

Required Ratio = x : y = 240 : 76

=> Ratio = (240 ÷ 4) : (76 ÷ 4) = 60 : 19

Therefore The correct answer is 60:19 (Option 4).

Additional Information

Mean Proportional

The mean proportional between two numbers a and b is given by √(a × b).

Third Proportional

The third proportional of a and b is the value c such that a:b = b:c, calculated as $c = b^2 \div a$.

Invertendo and Alternendo

If a:b = c:d, then b:a = d:c (Invertendo) and a:c = b:d (Alternendo).

Duplicate Ratio

The duplicate ratio of a:b is $a^2 : b^2$, while the sub-duplicate ratio is √a : √b.

Q70. Answer: (d) Coniferous Forests Region

The correct answer is Coniferous Forests Region.

Key Points

• The Taiga Type region is characterized by its vast expanse of coniferous forests, which consist primarily of needle-leaved evergreen trees. Hence, statement 4 is correct.

• It is the world's largest land biome, making up nearly 29% of the world’s forest cover. It is also widely known as the Boreal Forest in North America.

• The region is predominantly located in the high latitudes of the Northern Hemisphere, specifically between 50°N and 70°N. It is absent in the Southern Hemisphere due to the lack of large landmasses at those latitudes.

• The climate of the Taiga is characterized by extremely long, cold winters and short, cool summers. The annual temperature range is the highest among all biomes, with temperatures dropping as low as -54°C in winter and reaching 30°C in summer.

• The term 'Taiga' is a Russian word that refers to a marshy pine forest or a vast coniferous forest.

Additional Information

• Geographical Distribution: The Taiga belt stretches across Northern Russia (Siberia), Canada, Alaska, and parts of Scandinavia (Norway, Sweden, and Finland).

• Vegetation Characteristics: The dominant flora includes Evergreen Conifers such as Spruce, Fir, and Pine. These trees have a conical shape to allow snow to slide off easily and needle-like leaves with a thick waxy cuticle to minimize transpiration and survive frost.

• Soil Type: The soils in this region are known as Podzols. They are typically acidic, ash-grey in color, and nutrient-poor because the cold climate slows down the decomposition of organic matter.

• Economic Importance: The Taiga is the primary source of softwood in the world. Lumbering is a major industry, and the wood is used extensively for the production of paper, pulp, rayon, matches, and newsprint.

• Wildlife: The region is home to many fur-bearing animals that have adapted to the cold with thick coats, such as the Sable, Mink, Ermine, Arctic Fox, Lynx, and Siberian Tiger.

Important Points

• Cold Deserts Region: This region is characterized by extreme aridity and low temperatures throughout the year. Examples include Antarctica, Greenland, and the Gobi Desert. In India, the Ladakh region is a prime example of a Cold Desert. Hence, statement 1 is incorrect.

• Cool Temperate Grassland Region: These are vast treeless plains found in the interior of continents. They are known by different names such as Steppes (Eurasia), Prairies (North America), Pampas (South America), Veld (South Africa), and Downs (Australia).

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They are dominated by nutritious grasses rather than forests. Hence, statement 2 is incorrect.

• Equatorial Lowland Region: Located between 0° and 10° North and South of the equator, this region experiences high temperature and heavy rainfall (convectional) throughout the year. It is home to Tropical Rainforests (Selvas), characterized by high biodiversity and hardwood trees. Hence, statement 3 is incorrect.

• Environmental Role: The Taiga acts as a massive carbon sink, helping to regulate global climate by absorbing large amounts of carbon dioxide from the atmosphere.

Q71. Answer: (a) Economic growth and social justice

The correct answer is Economic growth and social justice.

Key Points

• Rural development is a comprehensive term that focuses on the action for the social and economic upliftment of rural areas. It is concerned with the improvement of the quality of life and economic well-being of people living in relatively isolated and sparsely populated areas.

• The core objective of rural development is Economic growth and social justice. It aims at increasing productivity and providing equitable opportunities to the rural population to ensure that the benefits of growth reach the poorest of the poor. Hence, statement 1 is correct.

• It involves the development of infrastructure, such as roads, electricity, and irrigation, alongside social components like literacy, healthcare, and sanitation.

• Rural development is not concerned with the improvement of foreign trade relations, as that falls under the domain of International Trade and the Ministry of Commerce and Industry. Hence, statement 2 is incorrect.

• The expansion of industrial zones generally pertains to urban industrialization and the manufacturing sector, rather than the multi-dimensional development of rural livelihoods. Hence, statement 3 is incorrect.

• The development of metropolitan areas is the focus of urban planning and the Ministry of Housing and Urban Affairs, which is distinct from the challenges faced by rural communities. Hence, statement 4 is incorrect.

Additional Information

• Constitutional Framework: In India, the 73rd Constitutional Amendment Act of 1992 provided a legal basis for rural local self-government. It mandated the creation of Panchayati Raj Institutions (PRIs) to empower people at the village, intermediate, and district levels to plan for economic development and social justice.

• Demographic Fact: According to the 2011 Census, approximately 68.8% of India's population lives in rural areas. This highlights the critical importance of rural development for the overall National Income and GDP growth of the country.

• Key Government Schemes:

• MGNREGA (2005): The Mahatma Gandhi National Rural Employment Guarantee Act ensures 100 days of wage employment in a financial year to every household to enhance livelihood security.

• PMGSY (2000): The Pradhan Mantri Gram Sadak Yojana was launched to provide all-weather road connectivity to unconnected rural habitations.

• Deendayal Antyodaya Yojana - National Rural Livelihoods Mission (DAY-NRLM): Aimed at poverty alleviation through the promotion of Self-Help Groups (SHGs).

• Dimensions of Rural Development: It encompasses human resource development (literacy, especially female literacy, education, and skill development), land reforms, and the development of productive resources of each locality.

Important Points

• Social Justice Element: This involves the eradication of poverty and reducing inequalities in income and wealth. It also focuses on the inclusion of marginalized sections like Scheduled Castes (SC), Scheduled Tribes (ST), and women in the development process.

• Economic Growth Element: This refers to the sustained increase in the agricultural output, rural industries, and services sector within rural geographies to improve the per capita income of rural residents.

• Sustainability: Modern rural development emphasizes sustainable development, ensuring that the use of natural resources like water and soil does not compromise the needs of future generations.

Q72. Answer: (b) Diligence

The correct answer is Diligence.

Key Points

• Diligence is a core characteristic of a computer that allows it to perform repetitive tasks for long periods without showing signs of fatigue, tiredness, or lack of concentration. Hence, the statement regarding a computer not feeling tired or bored is correct.

• Unlike human beings, who may lose focus or become physically exhausted after working for a few hours, a computer maintains the same consistency and efficiency from the first instruction to the millionth.

• This feature makes computers highly reliable for data processing, automated manufacturing, and round-the-clock monitoring systems where human intervention would be limited by biological constraints.

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• A computer does not suffer from boredom; it can execute the exact same algorithm trillions of times without any variance in the output quality, provided the hardware and software remain stable.

• Intelligence (Option 1): A computer possesses no native intelligence or I.Q.; it only follows pre-programmed instructions provided by humans. It cannot take independent decisions outside its logic gates. Hence, this statement is incorrect.

Additional Information

• Speed: A computer works at a very high velocity, capable of performing millions of instructions per second (MIPS). While humans calculate in seconds or minutes, computers operate in micro-seconds, nano-seconds, and even pico-seconds. Hence, the statement describing speed as the answer is incorrect.

• Versatility: This refers to the flexibility of a computer to perform completely different types of work at the same time. For example, a user can use a computer to write a document, listen to music, and download a file simultaneously. Hence, the statement describing versatility as the answer is incorrect.

• Accuracy: Computers are highly accurate and perform every calculation with the same precision. If the input data is correct, the result will be 100% accurate. Errors in computing usually occur due to human errors or faulty logic rather than the machine itself.

• Storage Capacity: A computer has an in-built memory where it can store a vast amount of data. Data can be stored in secondary storage devices like Hard Disk Drives (HDD), Solid State Drives (SSD), or Cloud storage for future retrieval.

• Reliability: Because computers are electronic components with low failure rates, they are considered reliable. They are designed for robustness to handle complex computations in scientific research, banking, and space exploration.

Important Points

• GIGO (Garbage In, Garbage Out): This is a fundamental computing principle which states that the quality of output is determined by the quality of input. If incorrect data is fed into the system, the computer will produce an incorrect result, regardless of its diligence.

• No Feeling: Computers are machines and do not have emotions, feelings, tastes, or intuition. They cannot judge a situation based on experience or morality like a human being can.

• Automation: Once a task or program is started, a computer can work automatically without human intervention until the task is completed, which is a direct application of its diligence.

Q73. Answer: (d) Lakshmana Temple, Khajuraho

The correct answer is Lakshmana Temple, Khajuraho.

Key Points

• The Lakshmana Temple is located in Khajuraho, in the Chhatarpur district of Madhya Pradesh, India. It is one of the most magnificent and well-preserved temples of the Khajuraho Group of Monuments.

• The temple was built by the Chandela King Yashovarman between 930 AD and 950 AD. It is dedicated to Lord Vishnu, specifically in the form of Vaikuntha Vishnu.

• The Garbhagriha (sanctum sanctorum) of the temple houses a unique Chaturmukha or four-faced image of Vishnu. While the main faces visible to the devotee are the Human face in the center, the Narasimha (lion) face on one side, and the Varaha (boar) face on the other, it represents the complete Vaikuntha iconography which historically includes a fourth face (Kapila) at the back.

• This temple follows the Nagara style of architecture and is built on a Panchayatana plan, meaning the main shrine is surrounded by four smaller subsidiary shrines at the corners of the high platform.

• The temple is renowned for its intricate carvings and erotic sculptures, which are a hallmark of the Chandela dynasty's artistic achievements in the 10th century.

Additional Information

• Dashavatara Temple, Deogarh:

• Located in the Lalitpur district of Uttar Pradesh, this temple dates back to the Gupta Period (around 500 AD).

• It is one of the earliest known Panchayatana temples in North India.

• While it is dedicated to Vishnu and features the famous Sheshashayi Vishnu relief, it does not house the Chaturmukha idol in the main sanctum like the Lakshmana temple.

• Meenakshi Temple, Madurai:

• Located on the southern bank of the Vaigai River in Tamil Nadu, it is a masterpiece of Dravidian architecture.

• The temple is primarily dedicated to Meenakshi (a form of Goddess Parvati) and Sundareshwarar (a form of Lord Shiva).

• It features massive Gopurams (gateway towers) covered in thousands of colorful stone figures of gods and demons.

• Brihadiswara Temple, Thanjavur:

• Built by Emperor Raja Raja Chola I and completed in 1010 AD, it is also known as the Rajarajeshwaram temple.

• It is a UNESCO World Heritage Site and is dedicated to Lord Shiva.

• It features one of the largest Shiva Lingas in India and a massive monolithic Nandi (bull) statue.

Important Points

• The Lakshmana Temple is significant because it was the first of the major temples built by the Chandelas in their capital, Khajuraho.

• The iconography of the Vaikuntha Vishnu idol is highly specific; the human face represents Vasudeva, the lion face represents Sankarshana (Narasimha), and the boar face represents Pradyumna (Varaha). This reflects the Pancharatra philosophy of Vaishnavism.

• The Khajuraho Group of Monuments was designated a UNESCO World Heritage Site in 1986 due to its unique architectural style and historical importance.

• Architecturally, the temple consists of an Ardhamandapa (entrance porch), Mandapa (hall), Maha-mandapa, and the Vimana (shrine tower) over the Garbhagriha.

Q74. Answer: (c) abolition of wealth tax

The correct answer is abolition of wealth tax.

Key Points

• The Tax Reforms Committee, also known as the Chelliah Committee, was set up in August 1991 by the Ministry of Finance under the leadership of Dr. Raja J. Chelliah.

• The committee recommended the abolition of wealth tax on all productive assets such as shares, securities, and bank deposits to encourage investment in the formal economy. Hence, the statement regarding the abolition of wealth tax is correct.

• It suggested that the Wealth Tax should be confined only to non-productive assets like residential houses (excluding one house), motor cars, jewelry, bullion, and aircraft/yachts.

• The committee aimed to create a tax system that was simple, broad-based, and had moderate rates to improve compliance and revenue collection.

• The implementation of these recommendations led to a significant shift in India's taxation policy during the liberalization period of 1991, moving away from high tax rates and complex exemptions.

Additional Information

• Raja J. Chelliah: He was a prominent Indian economist and the founding chairman of the National Institute of Public Finance and Policy (NIPFP). He is often referred to as the "Father of Tax Reforms" in India for his role in modernization.

• Income Tax Reforms: The committee recommended a three-tier personal income tax structure with rates of 20%, 30%, and 40% to reduce the burden on honest taxpayers and minimize evasion.

• Corporate Tax: It suggested reducing the corporate tax rate to 45% and eventually aligning it with personal income tax rates to maintain parity and encourage business growth.

• Indirect Tax (Customs and Excise): The Chelliah Committee proposed a drastic reduction in customs duties to make Indian industry globally competitive and suggested the introduction of a Value Added Tax (VAT) system to streamline excise duties.

• Broadening the Tax Base: One of the core themes was to bring more individuals and entities into the tax net by simplifying procedures and removing unnecessary exemptions and deductions.

Important Points

• Wealth Tax Act, 1957: Wealth tax was originally governed by this Act in India, which levied tax on the net wealth of individuals, Hindu Undivided Families (HUFs), and companies.

• Estate Duty: This was a tax levied on the total value of property passing on the death of a person. It was abolished in India in 1985 because it failed to achieve its objective of reducing wealth inequality and was difficult to administer.

• Gift Tax: Introduced in 1958, it was later abolished in October 1998. However, gifts above a certain value were later made taxable under the Income Tax Act in the hands of the recipient.

• Final Abolition of Wealth Tax: Following the long-term trajectory set by the 1991 reforms, Wealth Tax was completely abolished by the Union Government in the Budget of 2015-16 presented by Arun Jaitley.

• Surcharge on Super-Rich: To compensate for the loss of revenue from wealth tax, the government introduced an additional surcharge of 2% on individuals with a taxable income exceeding Rs. 1 crore annually.

Q75. Answer: (d) 33.18

Shortcut Trick

Modal Class = 30-40 (Highest frequency f1 = 25)

Class parameters: l = 30, h = 10, f0 = 18 (preceding), f2 = 10 (succeeding)

Frequency differences: d1 = 25 − 18 = 7 and d2 = 25 − 10 = 15

Mode = l + [d1 ÷ (d1 + d2)] × h

Mode = 30 + [7 ÷ (7 + 15)] × 10 = 30 + 3.18

Therefore Answer = 33.18

Alternate Method

Given:

Frequency distribution: 0-10 (5), 10-20 (12), 20-30 (18), 30-40 (25), 40-50 (10)
Modal class (highest frequency) = 30-40
Lower limit (l) = 30, Frequency (f1) = 25, Pre-modal frequency (f0) = 18, Post-modal frequency (f2) = 10, Class width (h) = 10
Formula used:
Mode = l + [(f1 − f0) ÷ (2f1 − f0 − f2)] × h
5 12 18 25 10 0 10 20 30 40 50 Marks Range Frequency Modal Class (30-40)
Calculations:
Identify parameters: l = 30, f1 = 25, f0 = 18, f2 = 10, h = 10
=> Mode = 30 + [(25 − 18) ÷ (2 × 25 − 18 − 10)] × 10
=> Mode = 30 + [7 ÷ (50 − 28)] × 10
=> Mode = 30 + [7 ÷ 22] × 10
=> Mode = 30 + (70 ÷ 22)
=> Mode = 30 + 3.1818...
Rounding to two decimal places, we get 33.18.
Therefore The correct answer is 33.18. (Option 4).
Additional Information
Mean of Grouped Data
Calculated as $\Sigma f_i x_i \div \Sigma f_i$, where x_i is the class mark (midpoint) of each interval.
Median of Grouped Data
Median = l + [(N÷2 − cf) ÷ f] × h, where cf is the cumulative frequency of the class preceding the median class.
Empirical Relationship
For moderately skewed distributions: Mode = 3 Median − 2 Mean.
Modal Class
The class interval with the highest frequency in a grouped frequency distribution.

Q76. Answer: (b) LKM -1

The logic followed here is:
So, 'LKM -1' will replace the question mark in the given series.
Hence, the correct answer is "Option 2".

Q77. Answer: (c) Saturday

Given: Each of M, N, O, P, Q, R and S has a flight on a different day of a week starting from Monday to Sunday.
S has flight on third last day of the week.
Only two people have flight between R and S.
Only four people have flight between R and Q.
P has flight immediately after N.
M doesn’t have flight on Monday.

Day	Person
Monday	O
Tuesday	R
Wednesday	N
Thursday	P
Friday	S
Saturday	M
Sunday	Q

Now, M has flight on Saturday
Hence, the correct answer is "Option 3".

Q78. Answer: (d) 2417/47

Shortcut Trick

Total Distance = 810 + 492 + 988 = 2290 km

Individual Times = (810 ÷ 30) + (492 ÷ 12) + (988 ÷ 38) = 27 + 41 + 26 = 94 hours

Average Speed = Total Distance ÷ Total Time = 2290 ÷ 94 = 1145 ÷ 47

On dividing 1145 by 47, we get 24 as quotient and 17 as remainder.

Therefore Answer = 24 17/47

Alternate Method

Given:

Distance 1 (d1) = 810 km, Speed 1 (s1) = 30 km/hr

Distance 2 (d2) = 492 km, Speed 2 (s2) = 12 km/hr

Distance 3 (d3) = 988 km, Speed 3 (s3) = 38 km/hr

Formula used:

Average Speed = Total Distance ÷ Total Time

Time = Distance ÷ Speed

810 km 30 km/hr 492 km 12 km/hr 988 km 38 km/hr Total Journey = 2290 km

Calculations:

Time taken for first part (t1) = 810 ÷ 30 = 27 hours

=> Time taken for second part (t2) = 492 ÷ 12 = 41 hours

=> Time taken for third part (t3) = 988 ÷ 38 = 26 hours

=> Total Distance = 810 + 492 + 988 = 2290 km

=> Total Time = 27 + 41 + 26 = 94 hours

=> Average Speed = 2290 ÷ 94

=> Average Speed = 1145 ÷ 47 = 24 17/47 km/hr

Therefore The correct answer is option (4).

Additional Information

Average Speed for Equal Distances

If a person travels two equal distances at speeds x and y, the average speed is given by (2 × x × y) ÷ (x + y).

Relative Speed

When two objects move in the same direction, relative speed is s1 − s2. When moving in opposite directions, it is s1 + s2.

Unit Conversion

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

Average Speed for Equal Time Intervals

If a person travels for equal time intervals at speeds x and y, the average speed is the arithmetic mean (x + y) ÷ 2.

Q79. Answer: (d) 95%

Shortcut Trick

Profit percentage is independent of the total quantity (47 dozens).

CP of 1 article = 480 ÷ 12 = 40

SP of 1 article = 78

Ratio CP : SP = 40 : 78 = 20 : 39

Profit % = [(39 − 20) ÷ 20] × 100 = 19 × 5 = 95%

Therefore Answer = 95%

Alternate Method

Given:

CP of 1 dozen articles = Rs. 480, SP of each article = Rs. 78, Total quantity = 47 dozens

Formula used:

Profit % = [(SP − CP) ÷ CP] × 100

CP = Rs. 40 Profit = Rs. 38 Total SP = Rs. 78 (CP per article = 480 ÷ 12)

Calculations:

CP of 1 article = 480 ÷ 12 = Rs. 40

=> SP of 1 article = Rs. 78

=> Profit per article = 78 − 40 = Rs. 38

=> Profit % = (38 ÷ 40) × 100

=> Profit % = 38 × 2.5 = 95%

Therefore The correct answer is 95% (Option 4).

Additional Information

Profit and Loss Percentage

Profit % = (Profit ÷ CP) × 100 and Loss % = (Loss ÷ CP) × 100. Both are always calculated on the Cost Price unless specified otherwise.

Marked Price and Discount

Selling Price = Marked Price − Discount. Discount % is always calculated on the Marked Price (MP).

Successive Discounts

If two discounts d1% and d2% are given, the effective discount is [d1 + d2 − (d1 × d2 ÷ 100)]%.

Quantity Independence

The profit or loss percentage remains the same regardless of the total quantity sold, as long as the CP and SP per unit remain constant.

Q80. Answer: (a) 37%

Shortcut Trick

According to the question, 33% marks = 416 + 79 = 495.

Value of 1% marks = 495 ÷ 33 = 15 marks.

Friend's marks = 555.

Friend's percentage = 555 ÷ 15 = 37%.

Therefore Answer = 37%

Alternate Method

Given:

Girish marks = 416

Shortage from 33% of max marks = 79

Friend marks = 555

Formula used:

Percentage = (Marks obtained ÷ Maximum marks) × 100

0 Girish (416) 33% (495) Friend (555) Max (1500) + 79 Friend Percentage = 37%

Calculations:

Let the maximum marks be X.

=> 33% of X = 416 + 79

=> 0.33 × X = 495

=> X = 495 ÷ 0.33 = 1500

=> Maximum marks = 1500

=> Friend marks = 555

=> Friend percentage = (555 ÷ 1500) × 100

=> Friend percentage = 555 ÷ 15 = 37%

Therefore The correct answer is 37% (Option 1).

Additional Information

Basic Percentage Formula

Percentage = (Component Value ÷ Base Value) × 100. It is always calculated relative to the maximum possible value or total.

Percentage Change

Percentage Increase/Decrease = (Difference ÷ Original Value) × 100.

Maximum Marks Concept

In examination problems, 'Maximum Marks' always represents the 100% level of the exam.

Q81. Answer: (b) James Anderson

The correct answer is James Anderson.

Key Points

• The legendary England fast bowler, James Anderson, was formally knighted for his services to cricket. This honor recognizes his

status as one of the greatest players in the history of the sport.

• The investiture ceremony took place at Windsor Castle, a royal residence in the United Kingdom. He was bestowed the title of Knight Bachelor by the Prince of Wales (Prince William).

• Anderson was included in the King's Birthday Honours List in 2024, shortly after he announced his retirement from international cricket. His career spanned an incredible 22 years at the highest level.

• He is widely celebrated for being the most prolific fast bowler in Test cricket history, having taken 704 wickets in 188 matches. He is the only pace bowler to surpass the 700-wicket milestone, trailing only spinners Muttiah Muralitharan and Shane Warne.

• The recognition makes him one of the few English cricketers to receive a Knighthood while still closely involved with the team (currently serving as a bowling consultant for the England national side).

Additional Information

• Career and Statistics:

• James Anderson, born on July 30, 1982, in Burnley, Lancashire, made his Test debut in 2003 against Zimbabwe at Lord's.

• He holds the record for the most Test matches played by an England player (188) and is second globally only to India's Sachin Tendulkar, who played 200 matches.

• He played his final Test match at Lord's in July 2024 against the West Indies, where he took his final wicket to reach the 704 mark.

• Other Notable English Knights in Cricket:

• Sir Alastair Cook: The former England captain and leading run-scorer was knighted in 2019 for his services to cricket.

• Sir Andrew Strauss: Knighted in 2019 alongside Cook, he served as England captain and Director of Cricket.

• Sir Ian Botham: One of the greatest all-rounders, knighted in 2007 for his services to cricket and charity.

• The Knight Bachelor Title:

• A Knight Bachelor is a man who has been knighted by the monarch but not as a member of one of the organized orders of chivalry. It is the most ancient sort of British knighthood.

• Recipients are addressed with the title "Sir" before their first name.

Important Points

• Evolution of Awards: Before being knighted, James Anderson was awarded an OBE (Officer of the Order of the British Empire) in 2015 for his services to the game.

• Lancashire Connection: Throughout his domestic career, he represented Lancashire County Cricket Club, where the pavilion end at Old Trafford was named the James Anderson End in 2017.

• Impact on Pace Bowling: Anderson is noted for his mastery of swing bowling, particularly in English conditions. He is the first seamer to reach 600 and then 700 Test wickets, setting a benchmark for longevity in a physically demanding role.

• Current Role: Since his retirement in 2024, he has transitioned into coaching, mentoring the next generation of England bowlers like Gus Atkinson and Matthew Potts.

Q82. Answer: (b) Black soil

The correct answer is Black soil.

Key Points

• Black soil is considered the most suitable for the cultivation of cotton in India, which is why it is often referred to as Black Cotton Soil or Regur Soil.

• This soil type is primarily formed from the weathering of volcanic rocks (basalt) and is largely found in the Deccan Trap region, covering states like Maharashtra, Gujarat, Madhya Pradesh, and parts of Karnataka and Andhra Pradesh.

• A distinctive feature of this soil is its high moisture retention capacity; it swells and becomes sticky when wet and develops deep cracks during the dry season, which aids in self-aeration or "self-plowing" of the soil.

• Chemically, Black soil is rich in lime, iron, magnesium, calcium carbonate, and potash, which are essential nutrients for the growth of the cotton plant, although it is generally poor in phosphorus, nitrogen, and organic matter.

• The clayey texture of the soil ensures that it can hold water for long periods, which is vital for cotton as it requires a steady supply of moisture during its early growth stages.

Additional Information

• Alluvial Soil:

• It is the most widespread and productive soil type in India, covering about 40% of the total land area.

• Deposited by the Indus, Ganga, and Brahmaputra river systems, it is rich in potash and phosphoric acid but poor in nitrogen.

• It is highly suitable for crops like wheat, paddy, sugarcane, and pulses.

• Red Soil:

• This soil develops on crystalline igneous rocks in areas of low rainfall in the eastern and southern parts of the Deccan Plateau.

• The red color is due to a wide diffusion of iron oxide in crystalline and metamorphic rocks; it looks yellow when it occurs in a

hydrated form.

• It is commonly found in Tamil Nadu, Odisha, and Chhattisgarh and is used for pulses, millets, and tobacco.

• Laterite Soil:

• Formed under conditions of high temperature and heavy rainfall, leading to intense leaching (the washing away of nutrients like silica and lime).

• It is acidic in nature and poor in organic matter, making it less fertile unless treated with manures and fertilizers.

• It is found in the Western Ghats, Odisha, and parts of the North-east; it is excellent for growing cashew nuts, tea, and coffee.

Important Points

• Cotton Cultivation Requirements: Cotton is a Kharif crop that requires 6 to 8 months to mature. It thrives in climates with a temperature between 21°C and 30°C.

• Climatic Conditions: For successful harvesting, cotton needs at least 210 frost-free days and bright sunshine during its growth.

• Global Position: India is one of the largest producers of cotton in the world, and the textile industry remains a backbone of the Indian economy.

• Geographical Distribution: The Black soil region of the Deccan Plateau is the primary cotton-producing belt, particularly the tapti and narmada river valleys.

Q83. Answer: (a) $x^2 + y^2 = a^2$

Shortcut Trick

Square and sum both equations to eliminate the parameter θ.

Apply the fundamental identity: $\sin^2\theta + \cos^2\theta = 1$.

The sum $x^2 + y^2$ equals $a^2(\sin^2\theta + \cos^2\theta)$, which simplifies to a^2.

This result represents a circle with radius a centered at the origin.

Therefore Answer = $x^2 + y^2 = a^2$

Alternate Method

Given:

$x = a \sin\theta$

$y = a \cos\theta$

Formula used:

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

θ y = a cosθ (Adjacent) x = a sinθ (Opposite) Hypotenuse (a) $x^2 + y^2 = a^2$

Calculations:

From the given equations:

=> $\sin\theta = x \div a$

=> $\cos\theta = y \div a$

Squaring both equations:

=> $\sin^2\theta = x^2 \div a^2$

=> $\cos^2\theta = y^2 \div a^2$

Adding the two squared equations:

=> $\sin^2\theta + \cos^2\theta = (x^2 \div a^2) + (y^2 \div a^2)$

=> $1 = (x^2 + y^2) \div a^2$

=> $x^2 + y^2 = a^2$

Therefore The correct answer is (1).

Additional Information

Pythagorean Identities

Fundamental relations in trigonometry: $\sin^2\theta + \cos^2\theta = 1$, $1 + \tan^2\theta = \sec^2\theta$, and $1 + \cot^2\theta = \csc^2\theta$.

Parametric Form of a Circle

A circle with radius r centered at origin has parametric equations $x = r \cos\theta$ and $y = r \sin\theta$, yielding $x^2 + y^2 = r^2$.

Elimination of Parameter

For functions involving secθ and tanθ, use the subtraction method: $(x/a)^2 - (y/b)^2 = \sec^2\theta - \tan^2\theta = 1$.

Q84. Answer: (c) -15

Shortcut Trick

Break the expression into two parts: A = 34% of 50 and B = (4/6) × $\sqrt[3]{512}$ × $\sqrt{36}$.

Step 1: A = 34% of 50 = 0.34 × 50 = 17.

Step 2: B = (4/6) × 8 × 6 = 4 × 8 = 32.

Step 3: y = A − B = 17 − 32 = −15.

Therefore Answer = −15

Alternate Method

Given:

Expression: y = 34% of 50 − (4/6) × ³√512 × √36

Formula used:

VBODMAS Rule: Vinculum, Bracket, Of, Division, Multiplication, Addition, Subtraction.

34% of 50 17 (4/6) × 8 × 6 32 − −15 Result (y)

Calculations:

Step 1: Simplify 34% of 50

=> (34 ÷ 100) × 50 = 17

Step 2: Simplify the radical terms ³√512 and √36

=> ³√512 = 8 (since $8^3 = 512$)

=> √36 = 6 (since $6^2 = 36$)

Step 3: Solve the multiplication part

=> (4 ÷ 6) × 8 × 6 = 4 × 8 = 32

Step 4: Perform the subtraction

=> y = 17 − 32

=> y = −15

Therefore The correct answer is (3) -15.

Additional Information

VBODMAS Rule

It defines the order of operations: Vinculum, Brackets, Of, Division, Multiplication, Addition, Subtraction. Here, 'Of' is treated as multiplication but solved before regular division/multiplication.

Percentage Interchange

x% of y is equal to y% of x. For example, 34% of 50 is the same as 50% of 34, which is 17.

Cube Roots and Square Roots

Memorizing basic roots helps speed up calculations: √36 = 6, √64 = 8, ³√216 = 6, ³√512 = 8, and ³√729 = 9.

Q85. Answer: (a) Raganis

The correct answer is Raganis.

Key Points

• Folk songs of Haryana are primarily and popularly known as Raganis. These songs are an integral part of the state's cultural identity and are often performed during social gatherings, festivals, and folk theatre. Hence, the option Raganis is correct.

• Raganis are deeply rooted in the Saang (or Swang) tradition, which is a popular folk theatre form in Haryana, Rajasthan, and Uttar Pradesh. The songs narrate stories of bravery, mythology, romance, and moral values.

• The most legendary figure associated with the development of Raganis and Saang is Pandit Lakhmi Chand (born in 1903), who is often referred to as the Suryakavi (Sun Poet) of Haryana. His compositions are still widely sung across the state.

• These folk songs are traditionally accompanied by musical instruments such as the Sarangi, Harmonium, Dholak, Khadtal, and Ghara (earthen pot).

• The themes of Haryanvi Raganis vary from historical legends like Raja Harishchandra to local folklore and contemporary social issues, making them a versatile medium of oral storytelling.

Additional Information

• Bhand:

• The Bhand refers to traditional folk entertainers or jesters found in North India, Pakistan, and Nepal.

• They are particularly famous in Kashmir (known as Bhand Pather) and Punjab. Their performances involve satire, mimicry, and slapstick comedy to entertain the public.

• Bihu:

• Bihu is the most important folk dance and music tradition of the state of Assam.

• It is performed during the Rongali Bihu festival, which marks the Assamese New Year in April. The songs are characterized by brisk rhythms and themes of love and nature.

• Baul:

• Baul is a group of mystic minstrels from Bengal (comprising West Bengal and Bangladesh).

• Their music is a unique blend of Sufism and Vaishnavism. In 2005, the Baul tradition was included in the list of Masterpieces of the Oral and Intangible Heritage of Humanity by UNESCO.

• Haryanvi Culture and Festivals:

• Apart from Raganis, Haryana is known for its vibrant dances like Phag (performed during Holi), Loor (performed by women in the month of Phalguna), and Ghoomar.

• The Surajkund International Crafts Mela, held annually in February in Faridabad, is a major event that showcases the folk arts and songs of Haryana to a global audience.

Important Points

• Geographical Spread: While Raganis are native to Haryana, they are also popular in the Braj region and parts of Western Uttar Pradesh due to linguistic and cultural similarities.

• Evolution: Modern Haryanvi music has seen a shift towards electronic beats, but the traditional Ragani remains the foundation of rural entertainment and cultural heritage.

• Linguistic Feature: The lyrics are usually in Haryanvi, a dialect of Hindi, which adds a distinct earthy and robust tone to the musical delivery.

Q86. Answer: (a) 670

Shortcut Trick

Ratio of shares (Ishan : Krish) = (1 + R/100)^(Time Diff) : 1

Difference in time = 12 − 11 = 1 year

Ratio = $(1 + 10/100)^1 : 1 = 1.1 : 1 = 11 : 10$

Total units = 11 + 10 = 21 units → Rs. 1407

Krish's share (10 units) = (1407 ÷ 21) × 10 = 67 × 10 = 670

Therefore Answer = 670

Alternate Method

Given:

Total amount = Rs. 1407, Rate (R) = 10% per annum, Time for Ishan (T1) = 11 years, Time for Krish (T2) = 12 years.

Formula used:

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

Ishan (I) Krish (K) 11 Years 12 Years A Total P = Rs. 1407 | Rate = 10%

Calculations:

Let the shares of Ishan and Krish be I and K respectively.

I + K = 1407

As per the question: $I \times (1 + 10/100)^{11} = K \times (1 + 10/100)^{12}$

=> $I \times (1.1)^{11} = K \times (1.1)^{12}$

=> $I \div K = (1.1)^{12} \div (1.1)^{11} = 1.1$

=> I ÷ K = 11 ÷ 10

=> Ratio of shares I : K = 11 : 10

=> Krish's share = (10 ÷ 21) × 1407

=> Krish's share = 10 × 67 = 670

Therefore The correct answer is 670.

Additional Information

Compound Interest Formula

The amount A accumulated after n years is $A = P(1 + r/100)^n$, where P is the principal and r is the annual interest rate.

Share Distribution Logic

In CI problems where amounts are equal after different time periods, the person with the shorter time period always receives a larger share: P1/P2 = (1 + r/100)^((t2 − t1)).

Effective Rate of Interest

For 10% rate for 2 years, the effective CI rate is r + r + (r × r)/100 = 21%.

Difference between CI and SI

The difference for 2 years is $P(R/100)^2$ and for 3 years is $[P(R/100)^2 \times (3 + R/100)]$.

Q87. Answer: (c) 4

Given: (Left) 7 8 @ 1 # 4 $ 5 % + ? 8 & 6 % 4 8 9 % (Right)

Now,

Remove all the symbols:

Numbers → 7 8 1 4 5 8 6 4 8 9

Position from right: 7 8 1 4 5 8 6 4 8 9

Hence, the correct answer is Option 3.

Q88. Answer: (c) 119

The logic followed here is:

thus, "119" will replace the question mark in the given series.

Hence, the correct option is "Option 3".

Q89. Answer: (a) Both statements I and II together are NOT sufficient to answer the question

Given Statements:

I. Bhavna scored more than Anita but less than Charu.

II. Deepa scored more than Anita but less than Bhavna.

Analysis:

I. From Statement I → We get Charu > Bhavna > Anita, but no comparison with Deepa and Esha → Not sufficient.

II. From Statement II → We get Bhavna > Deepa > Anita, but no comparison with Charu and Esha → Not sufficient.

Using both I and II together → We get Charu > Bhavna > Deepa > Anita, but Esha is still not compared with others, so the lowest scorer cannot be uniquely identified.

Hence, the correct answer is Option 1.

Q90. Answer: (a) 36

Shortcut Trick

To find the time when both machines complete a cycle together again, calculate the Least Common Multiple (LCM) of their cycle times.

Cycle times are 12 minutes and 18 minutes.

Identify the larger number: 18. Multiples of 18 are 18 (not divisible by 12) and 36 (divisible by 12).

LCM(12, 18) = 36 minutes.

Therefore Answer = 36

Alternate Method

Given:

Time for Machine A to complete one cycle = 12 minutes

Time for Machine B to complete one cycle = 18 minutes

Formula used:

Time for both machines to complete together = LCM of individual cycle times

Start (0 min) A (12m) A (24m) A (36m) B (18m) B (36m) Together at 36 min

Calculations:

Find the prime factors of each number:

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

=> $18 = 2 \times 3 \times 3 = 2 \times 3^2$

To find the LCM, take the highest power of each prime factor present in the numbers:

=> $LCM(12, 18) = 2^2 \times 3^2$

=> $LCM(12, 18) = 4 \times 9 = 36$

Therefore The correct answer is 36.

Additional Information

Least Common Multiple (LCM)

LCM is the smallest positive integer that is perfectly divisible by each of the given numbers. It is used to find simultaneous occurrences of events with different frequencies.

Highest Common Factor (HCF)

HCF (or GCD) is the largest positive integer that divides each of the numbers without leaving a remainder.

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Relation between LCM and HCF

For any two positive integers a and b: LCM(a, b) × HCF(a, b) = a × b.

LCM Applications

Commonly used for problems involving traffic lights, bells ringing at different intervals, or runners on a circular track meeting at the starting point.

Q91. Answer: (d) 2025

The correct answer is 2025.

Key Points

• The Union Cabinet approved the Employment Linked Incentive (ELI) Scheme, titled Pradhan Mantri Viksit Bharat Rozgar Yojana (PM-VBRY), on 1st July 2025.

• The scheme was initially announced in the Union Budget 2024-25 as part of the "Prime Minister's Package for Employment and Skilling"

• Effective Date: The scheme came into effect on 1st August 2025.

• Registration Period: Benefits apply to jobs created between 1st August 2025 and 31st July 2027.

• Financial Outlay: It has a total budgetary outlay of Rs. 99,446 Crore.

• Job Creation Target: Aims to incentivize the creation of more than 3.5 Crore jobs over a period of two years.

• Implementation: It is managed by the Ministry of Labour & Employment through the Employees' Provident Fund Organisation (EPFO).

Additional Information

• Scheme A: First-Time Employees

• This component focuses on individuals entering the workforce for the first time in the formal sector.

• The government provides a Direct Benefit Transfer (DBT) of one month's wage, up to Rs. 15,000, paid in three installments directly to the employee's EPFO account.

• The eligibility criteria include a monthly salary of up to Rs. 1,00,000, ensuring that a broad range of graduates and diploma holders can benefit.

• Scheme B: Job Creation in Manufacturing

• This scheme specifically targets the manufacturing sector, which has high potential for mass employment.

• Incentives are provided to both the employee and the employer with respect to their EPFO contributions during the first four years of employment.

• It aims to encourage companies to scale up their production capacity by reducing the cost of hiring additional manpower.

• Scheme C: Support to Employers

• This component is sector-agnostic and provides direct support to employers for every additional job created.

• The government reimburses the employer's EPFO contribution up to Rs. 3,000 per month for two years for each new employee hired.

• This incentive is applicable for employees earning a salary up to Rs. 1,00,000 per month, facilitating job creation in both the service and industrial sectors.

Important Points

• The scheme is implemented and monitored by the Ministry of Labour and Employment through the Employees' Provident Fund Organisation (EPFO), ensuring transparency and direct reaching of benefits.

• A key feature of PM-VBRY is its focus on formalization; it requires beneficiaries to have a Universal Account Number (UAN) and be registered on the e-Shram portal or EPFO.

• The scheme aligns with the government's broader strategy to enhance Ease of Doing Business by reducing the financial burden of statutory contributions on small and medium enterprises (MSMEs).

• By linking incentives directly to employment generation, the government aims to bridge the gap between skill development and actual job placement, fostering a more robust industrial ecosystem in India.

Q92. Answer: (b) 81/4

Shortcut Trick

For a quadratic expression $ax^2 + bx + c$ where $a > 0$, the minimum value is given by $(4ac - b^2) \div 4a$.

Identify coefficients: a = 7, b = −7, and c = 22.

Substitute values: Min Value = $[4 \times 7 \times 22 - (-7)^2] \div (4 \times 7)$.

Calculation: Min Value = $[616 - 49] \div 28 = 567 \div 28$.

Simplify by dividing both by 7: $567 \div 7 = 81$ and $28 \div 7 = 4$.

Therefore Answer = 81/4

Alternate Method

Given:

Quadratic expression: $7x^2 - 7x + 22$

Formula used:

The minimum value of $f(x) = ax^2 + bx + c$ occurs at $x = -b \div 2a$.

Vertex (1/2, 81/4) $y = 7x^2 - 7x + 22$ Min Value = 81/4

Calculations:

Compare the expression with $ax^2 + bx + c$: $a = 7$, $b = -7$, $c = 22$.

=> x-coordinate of the vertex = $-(-7) \div (2 \times 7) = 7 \div 14 = 1/2$.

=> Minimum value = $f(1/2) = 7(1/2)^2 - 7(1/2) + 22$.

=> Minimum value = $7(1/4) - 7/2 + 22 = 7/4 - 14/4 + 88/4$.

=> Minimum value = $(7 - 14 + 88) \div 4 = 81/4$.

Therefore The correct answer is 81/4.

Additional Information

Maximum Value of a Quadratic

If the coefficient $a < 0$, the parabola opens downward and the expression has a maximum value at $-D \div 4a$, where $D = b^2 - 4ac$.

Vertex of a Parabola

The vertex of the quadratic function $y = ax^2 + bx + c$ is the point $(-b \div 2a, -D \div 4a)$, representing the extreme point of the curve.

Discriminant and Roots

The term $D = b^2 - 4ac$ determines the nature of roots. If $D < 0$ and $a > 0$, the quadratic expression is always positive for all real values of x.

Q93. Answer: (a) Myanmar

The correct answer is Myanmar.

Key Points

• Myanmar is the only ASEAN (Association of Southeast Asian Nations) member country that shares a land boundary with India, making it India's gateway to Southeast Asia.

• The two nations share a land border of approximately 1,643 km. This boundary is shared by four North-Eastern states of India: Arunachal Pradesh, Nagaland, Manipur, and Mizoram.

• Beyond the land border, India and Myanmar also share a maritime boundary in the Bay of Bengal.

• The strategic location of Myanmar is central to India's "Act East Policy," which aims to promote economic, strategic, and cultural relations with the vast Asia-Pacific region.

• Myanmar acts as a buffer between India and China and is the only country that sits at the intersection of India's "Neighborhood First" policy and its "Act East" policy.

Additional Information

• ASEAN (Association of Southeast Asian Nations):

• It was established on 8th August 1967 in Bangkok, Thailand, with the signing of the ASEAN Declaration (Bangkok Declaration).

• The 10 member states are Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam.

• The motto of ASEAN is "One Vision, One Identity, One Community." Its Secretariat is located in Jakarta, Indonesia.

• Other Options Analysis:

• Bangladesh: While it shares the longest land border with India (4,096.7 km), it is not a member of ASEAN; it is a member of SAARC and BIMSTEC.

• Nepal: It is a landlocked country sharing a border with India but is not part of the ASEAN group.

• Bhutan: Like Nepal, it is a Himalayan neighbor and SAARC member but does not belong to ASEAN.

Important Points

• Connectivity Projects:

• Kaladan Multi-Modal Transit Transport Project: This project connects the Sittwe port in Myanmar to the Mizoram state in India, providing an alternate route to the North-East.

• India-Myanmar-Thailand Trilateral Highway: A 1,360 km long highway under construction that will connect Moreh (India) to Mae Sot (Thailand) via Myanmar, significantly boosting trade and tourism.

• Trade and Cooperation:

• India is Myanmar's fourth-largest trading partner. Major exports from India include pharmaceuticals, machinery, and iron/steel, while imports consist largely of pulses, beans, and timber.

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• The Free Movement Regime (FMR) historically allowed tribes living along the border to travel 16 km into either country without a visa, reflecting the deep-rooted ethnic and cultural ties.

Q94. Answer: (a) Ministry of Commerce and Industry

The correct answer is Ministry of Commerce and Industry.

Key Points

• Piyush Vedprakash Goyal is currently serving as the Union Minister of Commerce and Industry in the Government of India. He assumed this office following the formation of the 18th Lok Sabha cabinet in June 2024. Hence, the statement regarding his administration of this ministry is correct.

• In the 2024 General Elections, he contested and won from the Mumbai North Lok Sabha constituency in Maharashtra. He won by a massive margin of over 3,63,000 votes, marking his first direct election to the lower house of Parliament.

• Prior to his election to the Lok Sabha, he served as a member of the Rajya Sabha from the state of Maharashtra since 2010. He also held the prestigious position of Leader of the House in the Rajya Sabha from July 2021 to June 2024.

• Under his administration, India achieved a significant milestone in international trade, with total exports (merchandise and services) reaching an all-time high of over $776 billion during the 2022-23 financial year.

• The Ministry of Commerce and Industry is responsible for formulating and implementing Foreign Trade Policy (FTP) and promoting Foreign Direct Investment (FDI) through the Department for Promotion of Industry and Internal Trade (DPIIT).

Additional Information

• Ministry of Labour and Employment: As of the 2024 cabinet reshuffle, this ministry is administered by Mansukh Mandaviya. This ministry is responsible for protecting the interests of workers and promoting a healthy work environment.

• Ministry of Skill Development and Entrepreneurship: Currently, this portfolio is held by Jayant Chaudhary, who serves as the Minister of State (Independent Charge). The ministry focuses on the Skill India Mission to enhance the employability of the Indian youth.

• Ministry of Corporate Affairs: This ministry is administered by Nirmala Sitharaman, who also holds the Ministry of Finance. It regulates corporate entities in India under the Companies Act, 2013 and the Insolvency and Bankruptcy Code (IBC).

• Piyush Goyal's Background: He is a professional Chartered Accountant and was a 2nd-rank holder in the All-India Chartered Accountants examination. He also holds a law degree from the Government Law College, Mumbai.

• Past Portfolios: Piyush Goyal has previously handled several high-profile ministries, including the Ministry of Railways (2017-2021), Ministry of Coal (2014-2019), and Ministry of Consumer Affairs, Food and Public Distribution (2020-2024).

Important Points

• Department for Promotion of Industry and Internal Trade (DPIIT): Operating under the Ministry of Commerce and Industry, DPIIT is the nodal agency for the Startup India initiative and monitors Industrial Policy and Intellectual Property Rights (IPR).

• G20 Sherpa: Piyush Goyal was appointed as India’s G20 Sherpa in 2021, where he played a crucial role in shaping the agenda for India’s G20 Presidency in 2023 before handing over the charge to Amitabh Kant.

• Free Trade Agreements (FTAs): During his tenure, India signed landmark Free Trade Agreements such as the India-UAE Comprehensive Economic Partnership Agreement (CEPA) and the India-Australia Economic Cooperation and Trade Agreement (ECTA) in 2022.

• Make in India: The ministry is the primary driver of the Make in India program, which aims to transform India into a global manufacturing hub by encouraging domestic production and Ease of Doing Business.

Q95. Answer: (d) 45 hours

Shortcut Trick

Let the time taken by pipe R alone be x hours.

Then time for Q = x + 12 and time for P = (x + 12) + 15 = x + 27.

Since P + Q = R, use the excess time shortcut: $x = \sqrt{(a \times b)}$.

Here, a = 27 (excess of P) and b = 12 (excess of Q).

$x = \sqrt{(27 \times 12)} = \sqrt{324} = 18$ hours.

Time required by P = x + 27 = 18 + 27 = 45 hours.

Therefore Answer = 45 hours

Alternate Method

Given:

P + Q combined time = R alone time.

Pipe Q is 15 hours faster than P (Time P = Time Q + 15).

Pipe Q is 12 hours slower than R (Time Q = Time R + 12).

Formula used:

Total Work = LCM of all given days

Efficiency = Total Work ÷ Number of Days

Person	Number of Hours	Total Work	Efficiency
R	x	x(x + 12)(x + 27)	(x + 12)(x + 27)
Q	x + 12	x(x + 27)	
P	x + 27	x(x + 12)	

Combined Efficiency of P and Q = Efficiency of R

$x(x + 12) + x(x + 27) = (x + 12)(x + 27)$

Calculations:

$x^2 + 12x + x^2 + 27x = x^2 + 27x + 12x + 324$

$\Rightarrow 2x^2 + 39x = x^2 + 39x + 324$

$\Rightarrow 2x^2 - x^2 = 324$

$\Rightarrow x^2 = 324$

$\Rightarrow x = 18$ hours (Time for pipe R)

$\Rightarrow$ Time for pipe P = x + 27 = 18 + 27 = 45 hours

Therefore The correct answer is 45 hours, which is option (4).

Additional Information

Combined Time Shortcut

If A and B together take T hours, and A takes (T + a) and B takes (T + b) hours individually, then $T = \sqrt{(a \times b)}$.

Negative Work (Outlet Pipes)

If an outlet pipe is present, its efficiency is subtracted from the total efficiency. Total rate = Rate_(Inlet) − Rate_(Outlet).

Capacity Calculation

Total Capacity = Efficiency × Time. If flow rate (e.g., liters/min) is given, Capacity = Flow Rate × Time taken to fill.

Work and Wages

Wages are always distributed in the ratio of the efficiency (work done) of the pipes or individuals involved.

Q96. Answer: (a) 4

The logic followed here is:

Given:

LITE → 1527

EDIT → 5124

Hence, the code for D is 4.

Hence, the correct answer is Option 1.

Q97. Answer: (a) End Polio: Every Child, Every Vaccine, Everywhere

The correct answer is End Polio: Every Child, Every Vaccine, Everywhere.

Key Points

• The theme "End Polio: Every Child, Every Vaccine, Everywhere" has been adopted for the 2025 global campaigns to emphasize the final push toward total eradication. This theme highlights the necessity of reaching the most remote and vulnerable children to ensure no one is left behind in the immunization process. Hence, statement 1 is correct.

• World Polio Day is observed annually on October 24. This date was chosen to honor the birth of Jonas Salk, the American medical researcher who developed the first successful Inactivated Poliovirus Vaccine (IPV).

• The Global Polio Eradication Initiative (GPEI), which includes partners like WHO, Rotary International, UNICEF, and the CDC, uses this theme to mobilize resources and political will. The campaign focuses on the Strategy 2022–2026, which aims to interrupt all poliovirus transmission globally.

• The statement "Immunization for All Ages across the country" is a generic health slogan often associated with broader World Immunization Week activities but is not the specific theme for the 2025 Polio Day. Hence, statement 2 is incorrect.

• The phrase "Protecting Children from Diseases, all at once" does not align with the official branding of the GPEI for the year 2025. Hence, statement 3 is incorrect.

• "Vaccines for a Healthy Child and Healthy Future" is a common advocacy phrase but lacks the specific call to action required for the World Polio Day 2025 campaign. Hence, statement 4 is incorrect.

Additional Information

• Understanding Poliomyelitis:

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• Polio is a highly infectious viral disease that largely affects children under 5 years of age. It invades the nervous system and can cause total paralysis in a matter of hours.

• The virus is transmitted by person-to-person spread mainly through the fecal-oral route or, less frequently, by a common vehicle (e.g. contaminated water or food).

• There is no cure for polio; it can only be prevented through immunization.

• Types of Vaccines:

• Oral Polio Vaccine (OPV): Developed by Albert Sabin in 1961. It is administered orally and consists of a mixture of live, attenuated poliovirus strains.

• Inactivated Polio Vaccine (IPV): Developed by Jonas Salk and first used in 1955. It is administered by injection and contains inactivated (killed) virus.

• Global Eradication Status:

• As of 2024-2025, wild poliovirus type 1 (WPV1) remains endemic in only two countries: Pakistan and Afghanistan.

• The world has successfully eradicated WPV Type 2 (certified in 2015) and WPV Type 3 (certified in 2019).

• India's Success Story:

• India was once considered the most difficult place in the world to eradicate polio. However, the country was officially certified Polio-free by the World Health Organization on March 27, 2014.

• The last reported case of wild polio in India was in Howrah, West Bengal, on January 13, 2011.

Important Points

• Pulse Polio Programme: This initiative was started in India in 1995 following the World Health Assembly resolution in 1988. It involves vaccinating every child under the age of five years during National Immunization Days (NIDs).

• Mission Indradhanush: Launched by the Ministry of Health and Family Welfare in December 2014, this program aims to strengthen and re-energize the immunization coverage in the country, ensuring high coverage for children with all available vaccines, including polio.

• Circulating Vaccine-Derived Poliovirus (cVDPV): While wild polio is nearly gone, cVDPVs remain a challenge in areas with low immunization coverage. The 2025 campaign theme specifically targets these gaps to ensure Every Vaccine reaches Every Child to stop these outbreaks.

• Financial Commitment: Major donors like the Bill & Melinda Gates Foundation have committed billions of dollars toward the GPEI goals for 2026, stressing that the cost of failure would be a resurgence of the disease globally.

Q98. Answer: (d) rs

The logic followed here is:

Given:

kids are playing → pu rs bp

people love kids → rs gu xc

So, kids → rs

Hence, the correct answer is Option 4.

Q99. Answer: (c) 2020

The correct answer is 2020.

Key Points

• The first state-level E-Lok Adalat in India was held in the year 2020, specifically on July 11, 2020.

• This landmark initiative was organized by the Chhattisgarh High Court and the Chhattisgarh State Legal Services Authority (SLSA).

• It was inaugurated by Justice P. R. Ramachandra Menon, the then Chief Justice of the Chhattisgarh High Court, through video conferencing.

• The primary objective of organizing the E-Lok Adalat was to ensure that the delivery of justice remained uninterrupted during the COVID-19 pandemic, which had led to the suspension of physical court hearings across the country.

• During this session, more than 3,000 cases were taken up for settlement across nearly 200 benches constituted in various districts of Chhattisgarh, marking a significant step toward Digital Judiciary.

Additional Information

• Concept of Lok Adalat: Lok Adalat (People's Court) is an Alternative Dispute Resolution (ADR) mechanism where disputes or cases pending in the court of law or at the pre-litigation stage are settled or compromised amicably.

• Legal Framework: Lok Adalats have been given statutory status under the Legal Services Authorities Act, 1987. Under this Act, the award (decision) made by the Lok Adalats is deemed to be a decree of a civil court.

• Finality of Decision: The decision of the Lok Adalat is final and binding on all parties to the dispute, and no appeal lies before any court against such an award. This helps in reducing the burden on the traditional judiciary.

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• No Court Fee: One of the major features of this system is that there is no court fee payable when a matter is filed in a Lok Adalat. If a matter pending in a court is referred to the Lok Adalat and is settled subsequently, the court fee originally paid is refunded to the parties.

• Types of Cases: It deals with various matters including matrimonial disputes, labor disputes, land acquisition cases, bank recovery cases, and Motor Accident Claims Tribunal (MACT) cases.

Important Points

• National Legal Services Authority (NALSA): The NALSA was constituted under the Legal Services Authorities Act, 1987 to monitor and evaluate the implementation of legal aid programs. The Chief Justice of India is the Patron-in-Chief.

• Historical Background: The first Lok Adalat in India was held on March 14, 1982, at Junagadh in Gujarat. Although it started as a voluntary and conciliatory agency, it gained statutory teeth later in 1987.

• E-Lok Adalat Evolution: Following the success in Chhattisgarh in 2020, other states like Rajasthan, Karnataka, and Delhi also adopted the E-Lok Adalat model to clear backlogs using video conferencing platforms and WhatsApp video calls.

• Article 39A: The Constitution of India, under Article 39A, provides for free legal aid to the poor and weaker sections of the society and ensures justice for all, which is the foundational principle behind the Lok Adalat system.

Q100. Answer: (b) Pulakesin II

The correct answer is Pulakesin II.

Key Points

• Pulakesin II (reigned 610–642 AD) was the most powerful and illustrious ruler of the Chalukya dynasty of Vatapi (modern-day Badami in Karnataka).

• He is famously known for defeating Harshavardhana, the powerful Emperor of Kannauj, on the banks of the Narmada River.

• The battle took place when Harshavardhana attempted to expand his empire into the Deccan region; however, Pulakesin II successfully guarded the passes of the Narmada and forced Harsha to retreat.

• The primary source for this historical event is the Aihole Inscription of 634 AD, which was composed in Sanskrit by his court poet Ravikirti.

• Following this victory, Pulakesin II assumed the title of Parameswara (Supreme Lord) and established himself as the Dakshinapathapathi (Lord of the South), while Harsha remained the Uttarapathanatha (Lord of the North).

Additional Information

• Kirttivarman I:

• He was the father of Pulakesin II and ruled from 566 to 597 AD.

• He is often described as the "First Maker of Vatapi" for his role in consolidating Chalukya power by defeating the Kadambas of Banavasi and the Mauryas of Konkan.

• Mangalesha:

• He was the brother of Kirttivarman I and acted as a regent/ruler from 597 to 610 AD because Pulakesin II was a minor at the time of his father's death.

• His reign ended when Pulakesin II defeated him in a civil war to claim the throne.

• Vikramaditya I:

• He was the son of Pulakesin II and ruled from 655 to 680 AD.

• He is credited with restoring the Chalukya prestige after the kingdom was temporarily occupied by the Pallavas following the death of his father in 642 AD.

• Harshavardhana:

• He belonged to the Pushyabhuti or Vardhana dynasty and ruled from 606 to 647 AD.

• His reign and life are documented in the Harshacharita, a biography written by his court poet Banabhatta, and the travelogues of the Chinese pilgrim Hiuen Tsang.

Important Points

• Date of the Battle: While historians debate the exact year, it is widely accepted to have occurred between 618 AD and 630 AD.

• Diplomatic Relations: Pulakesin II was so influential that he reportedly exchanged ambassadors with the Persian King Khusrau II in 625 AD.

• Conflict with Pallavas: Despite his victory over Harsha, Pulakesin II engaged in a long-drawn conflict with the Pallava dynasty. He was ultimately defeated and killed by the Pallava king Narasimhavarman I (also known as Mamalla) during the Battle of Vatapi in 642 AD.

• Hiuen Tsang's Observation: The Chinese traveler visited the Chalukya kingdom in 641 AD and praised the military discipline and the efficient administration under Pulakesin II, noting that the king was obeyed with fear and respect.

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