RRB NTPC (Graduate) CBT-I Official Paper (Held On: 25 Mar, 2026 Shift 2) (Previous Year Paper)

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

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Q1. In accordance with Article 239AA of the Constitution of India, after the enforcement of the Constitution (Sixty-ninth Amendment) Act, 1991, the Union Territory of Delhi is designated by which of the following titles?

(a) Union State of Delhi
(b) Administrative Capital of India
(c) National Capital Region of Delhi
(d) National Capital Territory of Delhi

Q2. The length of each side of a rhombus is 17 cm and one of the diagonals is 30 cm. What is the area of the rhombus?

(a) 510 cm^2
(b) 240 cm^2
(c) 272 cm^2
(d) 255 cm^2

Q3. Which of the following number series was prescribed by the Telecom Regulatory Authority of India (TRAI) on 16 December 2025, for IRDAI-regulated entities to use for consumer service and transactional calls, to be implemented by 15 February 2026?

(a) 1500 series
(b) 1900 series
(c) 1400 series
(d) 1600 series

Q4. The sum of 12 numbers is 540. Find their average.

(a) 45
(b) 46
(c) 44
(d) 43

Q5. In a certain code language,

A + B means ‘A is the mother of B’
A – B means ‘A is the brother of B’
A x B means ‘A is the sister of B’
A ÷ B means ‘A is the father of B’
A % B means ‘A is the husband of B’
A # B means ‘A is the wife of B’
Based on the above, how is R related to W if ‘W # A ÷ M – P + I x R ÷ E’?

(a) Sister's Son
(b) Son's Son
(c) Brother's Son
(d) Daughter's Son

Q6. What is the fraction equal to (0.55... + 0.1)) in simplest form?

(a) 51/91
(b) 71/69
(c) 59/90
(d) 78/89

Q7. A trader marks his goods at a certain price and offers a 10% discount on it. In addition, he runs a scheme where for every 104 articles purchased, 16 articles are given free. If he still makes a profit of 17% on the overall transaction, find out by what percentage the marked price of an article is more than its cost price. Assume the customer pays for only 104 articles.

(a) 60%
(b) 50%
(c) 44%
(d) 53%

Q8. 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 conclusions logically follow(s) from the statements.

Statements:

Some cows are goats.

Some goats are dogs.

All dogs are tigers.

Conclusions:

(I) All dogs are cows.

(II) Some tigers are goats.

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

Q9. A gardener waters three rows of plants using automatic sprays. Spray A activates after every 12 minutes, Spray B after every 15 minutes, and Spray C after every 20 minutes. If they first activate together at 9:45 AM, at what time will they activate together for the sixth time (including the one at the beginning)?

(a) 1:45 PM
(b) 2:35 PM
(c) 2:45 PM
(d) 2:55 PM

Q10. Which of the following letter-number clusters will replace the question mark (?) in the given series to make it logically complete?

LJL 62 IGI 54 FDF 46 CAC 38 ?

(a) ZYY 30
(b) ZWY 29
(c) ZHQ 29
(d) ZXZ 30

Q11. Sharad starts from Point A and drives 47 km towards the South. He then takes a right turn, drives 49 km, turns right and drives 51 km. He then takes a right turn and drives 53 km. He takes a final right turn, drives 4 km and stops at Point P. How far (shortest distance) and towards which direction should he drive in order to reach Point A again? (All turns are 90-degree turns only unless specified.)

(a) 3 km to the west
(b) 4 km to the west
(c) 1 km to the west
(d) 2 km to the west

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Q12. In a certain code language, 'OENI' is coded as '79' and 'WASR' is coded as '61'.

What is the code for 'QJTD' in the given code language?

(a) 78
(b) 66
(c) 71
(d) 62

Q13. With which State did the Department of Biotechnology sign the first Centre–State Memorandum of Understanding under the BioE3 Policy in 2025 to promote high-performance biomanufacturing?

(a) Tamil Nadu
(b) Assam
(c) Gujarat
(d) Karnataka

Q14. Ramesh, Seema, and Shanaya invest Rs. 1230, Rs. 1710, and Rs. 1010 respectively to start a business. If the profit at the end of the year is Rs. 1580, then what is the share of Shanaya in the profit?

(a) Rs. 407
(b) Rs. 405
(c) Rs. 403
(d) Rs. 404

Q15. What should come in place of '?' in the given series?

99 124 140 149 153 ?

(a) 154
(b) 166
(c) 152
(d) 164

Q16. Evaluate: 16 + 20 ÷ 5 - 2 × 4

(a) 12
(b) 14
(c) 11
(d) 15

Q17. What is the primary pigment responsible for photosynthesis in plants?

(a) Carotenoid
(b) Xanthophyll
(c) Chlorophyll
(d) Anthocyanin

Q18. During which nationwide event, observed in 2025, did the Union Minister of Science and Technology emphasize inclusive participation in India's biotechnology mission and the goal of achieving a $300 billion bioeconomy by 2030?

(a) National Biotechnology Awareness Week Programme
(b) World Bioproduct Day – The BioE3 Way
(c) Global Biotech Innovation and Sustainability Summit
(d) India Bioeconomy Vision 2030 Outreach Event

Q19. Refer to the following number and symbol series and answer the question. Counting to be done from left to right only. (All numbers are single-digit numbers only.)

(Left) 6 2 @ # & * % ~ 7 = Ω 1 8 ? £ $ 4 3 5 + 9 (Right)

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

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

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(d) None

Q20. The price of fuel decreases by 30%, 20% and 50% in three successive months, but increases by 40% in the fourth month. What is the percentage increase or decrease in the price of fuel in the fourth month as compared to its original price?

(a) Decrease by 57.2%
(b) Decrease by 60.8%
(c) Increase by 63.2%
(d) Increase by 55.4%

Q21. A student double-clicks a file in Windows 11 and a program starts running immediately. The file is not a document or image but directly launches software. Which file type is most likely being opened?

(a) .exe
(b) .jpg
(c) .mp3
(d) .txt

Q22. Each of the digits in the number 7834126 is arranged in 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) Three
(d) None

Q23. Which of the following programmes aims to increase soil fertility and thereby helps in production of healthy food through organic practices without the use of agro-chemicals?

(a) Paramparagat Krishi Vikas Yojana
(b) Pradhan Mantri Kisan MaanDhan Yojana
(c) Rastriya Krishi Vikas Yojana
(d) Pradhan Mantri Fasal Bima Yojana

Q24. Which of the following characteristics represents the ability of a computer to work continuously without fatigue?

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

Q25. In November 2025, India and Israel signed a Memorandum of Understanding (MoU) on Defence Cooperation during which meeting?

(a) 10th India–Israel Defence Dialogue
(b) 14th Strategic Defence Summit
(c) 20th Indo-Israel Defence Forum
(d) 17th India–Israel Joint Working Group (JWG) meeting

Q26. A typist takes 40 minutes to type 2 pages. How long (in minutes) will he take to type 82 pages?

(a) 1650
(b) 1640
(c) 1630
(d) 1645

Q27. In 2025, which state had One-Stop Centres that assisted approximately 2.39 lakh women?

(a) Uttar Pradesh
(b) Gujarat
(c) Maharashtra
(d) Bihar

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Q28. Which amendment to the Indian constitution provided a special status to the Union Territory of Delhi, and redesignated it the National Capital Territory of Delhi?

(a) 68th Constitutional Amendment
(b) 69th Constitutional Amendment
(c) 71st Constitutional Amendment
(d) 70th Constitutional Amendment

Q29. In a circle with center A, a 18 cm long chord is at a distance of 12 cm from the center. Find the length of the diameter.

(a) 38 cm
(b) 32 cm
(c) 30 cm
(d) 28 cm

Q30. 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) GI-JL
(b) AC-DF
(c) RT-VX
(d) UW-XZ

Q31. What is a significant feature of Indian architecture related to caves?

(a) Influence of European architecture
(b) Development of skyscrapers
(c) Excavation of caves for religious purposes
(d) Use of marble in construction

Q32. In December 2025, which country officially transferred the BRICS presidency to India during the concluding session of the 4th BRICS Sherpas Meeting?

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

Q33. 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 – 24 – 44 – 74; 18 – 36 – 56 – 86

(a) 10 – 20 – 40 – 80
(b) 8 – 24 – 44 – 74
(c) 15 – 30 – 50 – 80
(d) 17 – 34 – 44 – 74

Q34. Which irrigation method delivers water directly to roots using emitters for optimal moisture control and efficiency?

(a) Overhead
(b) Flood
(c) Drip
(d) Sprinkler

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Q35. Seven boxes, A, B, C, D, E, F and G, are kept one over the other but not necessarily in the same order. Only G is kept above C. Only E is kept between C and F. Only D is kept below B.

How many boxes are kept below F?

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

Q36. Mansi and Neha started a partnership business, investing some amount in the ratio of 7 : 9. Utsavi joined then after six months with an amount equal to that of Neha. In what ratio should the profit at the end of one year be distributed among Mansi, Neha and Utsavi?

(a) 14 : 18 : 9
(b) 12 : 17 : 8
(c) 18 : 19 : 10
(d) 13 : 14 : 8

Q37. Two people, A and B, start running from the same point on a circular track of length 400 meters, but in opposite directions. A runs at 6 m/s and B at 4 m/s. In how many seconds will they meet for the first time?

(a) 50 seconds
(b) 40 seconds
(c) 20 seconds
(d) 30 seconds

Q38. Which of the following countries is India’s nearest neighbour in the northwest?

(a) Pakistan
(b) Nepal
(c) Bhutan
(d) China

Q39. 72 is related to 22 following a certain logic. Following the same logic,132 is related to 37. To which of the following is 108 related, following the same logic?

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

(a) 42
(b) 28
(c) 31
(d) 38

Q40. Which of the following best explains the Indian National Congress’s stance on communal politics during the Moderate phase?

(a) Accepted political demands based on religious identities
(b) Maintained a secular approach in its programmes and demands
(c) Aligned itself with leaders of specific religious communities
(d) Limited organisational participation to a single religious group

Q41. Article 47 deals with which of the following?

(a) Participation of workers in management
(b) Protection of environment
(c) Organization of agriculture
(d) Raising the level of nutrition and public health

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Q42. 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. Five cousins – Kriti, Leena, Mona, Pooja, and Reema – are of different ages.

Who is the youngest?

(I) Leena is older than Kriti but younger than Mona.

(II) Pooja is older than Kriti but younger than Leena.

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

Q43. Which of the following freedom fighters led the Mahad Satyagraha in 1927?

(a) Jyotirao Phule
(b) E V Ramaswamy Naicker
(c) K Kelappan
(d) B R Ambedkar

Q44. Which technique was primarily used to produce flake tools in India during the Middle Palaeolithic culture?

(a) Percussion method
(b) Blade-tool technology
(c) Levallois technique
(d) Pressure flaking

Q45. Refer to the following letter and symbol series and answer the question that follows. Counting to be done from left to right only.

(Left) S * & € L £ O & £ £ S # T * © M @ Y T $ L £ (Right)

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

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

Q46. Which of the following is NOT a component of the actual population growth?

(a) Birth rate
(b) Death rate
(c) Urbanisation rate
(d) In-migration

Q47. A cylindrical wax block with radius 7 cm and height 10 cm is melted and reshaped into a cone with the same base radius. Find the height of the cone.

(Use $\pi = 22/7$)

(a) 20 cm
(b) 30 cm
(c) 25 cm
(d) 18 cm

Q48. Which of the following plant tissues is NOT a type of simple tissue?

(a) Collenchyma
(b) Sclerenchyma
(c) Xylem
(d) Parenchyma

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Q49. Two taps can fill a cistern in 4 hours and 32 hours respectively. A third tap can empty it in 4 hours. How long (in hours) will it take to fill one-fourth of the empty cistern, if all of them are opened together?

(a) 24
(b) 8
(c) 32
(d) 16

Q50. A frequency distribution has a mean of 55 and a mode of 50. If the empirical relation holds, what should be the median of the data set? (Round off to two decimal places.)

(a) 53.86
(b) 53.33
(c) 54.21
(d) 54.83

Q51. What was the name given to the special officials appointed by Ashoka to spread his policy of Dhamma?

(a) Dhamma Lekhakas
(b) Dhamma Mahamatta
(c) Dhamma Janapada
(d) Dhamma Mukhyas

Q52. Which of the following letter-clusters should replace # and % so that the pattern and relationship followed between the letter-cluster pair on the left side of :: is the same as that on the right side of :: ?

: BYU :: GDZ : %

(a) = JGC, % = YUS
(b) = JGB, % = XUQ
(c) = JIE, % = YVR
(d) = JGC, % = YVR

Q53. Refer to the following letter, number and symbol series and answer the question that follows. Counting to be done from left to right only.

(Left) D 8 € K K 6 * @ F Y 9 5 L 8 € 7 2 X Y € O & (Right)

If all the letters are dropped from the series, which of the following will be fifth from the left?

(a) @
(b) €
(c) 9
(d) 5

Q54. Which of the following letter-number clusters will replace the question mark “?” in the given series to make it logically complete?

JVO 5, HTM 11, FRK 17, DPI 23, ?

(a) BOG 29
(b) BNG 29
(c) AMF 30
(d) BME 27

Q55. If ‘A’ stands for ‘÷’, ‘B’ stands for ‘×’, ‘C’ stands for ‘+’ and ‘D’ stands for ‘−’, then what will come in place of the question mark (?) in the following equation?

60 A 6 C 3 B 5 D 8 = ?

(a) 16
(b) 17
(c) 14
(d) 15

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Q56. Seven people, C, D, E, N, O, P and Q, are sitting in a straight line, facing north. E sits second to the right of N. Only two people sit between E and P. Only two people sit to the left of N. Only three people sit between N and C. O sits at some place to the right of Q but at some place to the left of D. How many people sit to the right of O?

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

Q57. Padma Shri Award winner Rani Karnaa was an exponent of which of the following dance forms?

(a) Odissi
(b) Kathak
(c) Kuchipudi
(d) Kathakali

Q58. The energy stored in human liver and muscle tissues is mainly in the form of which carbohydrate?

(a) Glycogen
(b) Sucrose
(c) Cellulose
(d) Starch

Q59. What should come in place of the question mark (?) in the given series?

35 36 40 49 65 ?

(a) 92
(b) 89
(c) 90
(d) 81

Q60. Which of the following statements best represents system software?

(a) Software used for preparing presentations
(b) Software used to play games
(c) Software used to design custom projects
(d) Software that controls all internal computer functions

Q61. The monthly incomes of two friends Tushar and Salil, are in the ratio 6 : 7 respectively and each of them saves Rs. 66,000 every month. If the ratio of their monthly expenditure is 2 : 4, find the monthly income of Tushar (in Rs.).

(a) 1,10,880
(b) 78200
(c) 80200
(d) 79200

Q62. What is the primary function of the Alt + Tab keyboard shortcut in Windows?

(a) To switch between open windows
(b) To open Task Manager
(c) To minimize all open applications
(d) To close the currently active window

Q63. There are 52 members in group A, 22 members in group B and 36 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. 420, Rs. 437 and Rs. 101, respectively. The overall average amount (in Rs.) spent per member is:

(a) 320
(b) 323
(c) 319
(d) 322

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Q64. 9 is related to 82 following a certain logic. Following the same logic, 17 is related to 290. To which of the following is 33 related, following the same logic?

(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.)

(a) 1080
(b) 1060
(c) 1070
(d) 1090

Q65. For 4 waffles, a recipe needs 680 g of butter. Find the quantity of butter needed if you want to make 17 waffles.

(a) 3120 g
(b) 2650 g
(c) 2890 g
(d) 2930 g

Q66. 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) NQU
(b) JMP
(c) PSW
(d) DGK

Q67. For what values of 'k' will the value of $(12x^2 – kx + 27)$ be always positive?

(a) $–36 < k < 36$
(b) $–36 \leq k \leq 36$
(c) $k < –36$
(d) $k > 36$

Q68. 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 papers are books. All books are erasers. Some erasers are crayons.

Conclusions:

(I) Some papers are crayons.

(II) Some books are crayons.

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

Q69. Simplify: $((2.33)^3 + (1.55)^3 + (1.22)^3 - 3 \times 2.33 \times 1.55 \times 1.22)/((2.33)^2 + (1.55)^2 + (1.22)^2 - 3.6115 - 1.891 - 2.8426)$

(a) 5.1
(b) 5.3
(c) 5
(d) 5.2

Q70. Who was known as the 'Mother of Indian Feminism' for her pioneering work in women's education and rights?

(a) Pandita Ramabai
(b) Savitribai Phule
(c) Rukhmabai
(d) Annie Besant

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Q71. Which of the following thickens sauces and soups due to its ability to absorb water and form a gel?

(a) Starch
(b) Sugar
(c) Oil
(d) Salt

Q72. The Constitution (Ninety-Fifth Amendment) Act of 2009 extended the reservation of seats in the Lok Sabha and State Legislative Assemblies for Scheduled Castes, Scheduled Tribes, and Anglo-Indians for how many years?

(a) Twenty Years
(b) Fifteen Years
(c) Five Years
(d) Ten Years

Q73. A boat goes 20,000 m upstream and 44,000 m downstream in 8 hours while it goes 15,000 m upstream and 22,000 m downstream in 5 hours. The speed of boat in still water is:

(a) 2 1over9 m/s
(b) 2 2over9 m/s
(c) 3 2over9 m/s
(d) 3 4over9 m/s

Q74. A shopkeeper professes to sell his goods at a 35% loss but uses a false balance and gains 55%. The actual weight (rounded off to one decimal place) he uses instead of 1 kg is:

(a) 419.4 gm
(b) 417.9 gm
(c) 417.6 gm
(d) 420.8 gm

Q75. Which centrally sponsored scheme aims to create community infrastructure in Minority Concentration Areas (MCAs) to address development deficits, as stated by Minister of MINORITY AFFAIRS in July 2025?

(a) Padho Pardesh
(b) Pradhan Mantri Virasat Ka Samvardhan (PM VIKAS)
(c) Pradhan Mantri Jan Vikas Karyakram (PMJVK)
(d) Seekho Aur Kamao

Q76. If 5^(3x) ^(+ 4) = (5^4)^(105), then find the integral part of x.

(a) 183
(b) 128
(c) 182
(d) 138

Q77. In a right-angled triangle, if the lengths of the opposite side and the adjacent side to angle θ are 7 cm and 21 cm, respectively, then what is the value of tanθ?

(a) 1/7
(b) 1/3
(c) 1/21
(d) 2/11

Q78. WELD is related to YHPI in a certain way based on the English alphabetical order. In the same way, AKTN is related to CNXS. To which of the following is EQBX related, following the same logic?

(a) GUED
(b) GTFC
(c) FUDB
(d) HSED

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Q79. Which Koppen climate subtype is identified by a short wet season and long, severe dry period?

(a) Af climate subtype
(b) Aw climate subtype
(c) BSh climate subtype
(d) Am climate subtype

Q80. Who made history in November 2025 as the first Muslim and South Asian American elected Lieutenant Governor of Virginia?

(a) Suhas Subramanyam
(b) Pramila Jayapal
(c) Ghazala Hashmi
(d) Zeeshan Siddiqui

Q81. With reference to Harappan architecture, which of the following statements is/are correct?

I. Streets and roads were straight and cutting each other at right angles.

II. Street drains were covered by stone slabs.

(a) Only II
(b) Both I and II
(c) Neither I nor II
(d) Only I

Q82. The primary objective of monetary policy is _____.

(a) To maximize employment
(b) To evade taxes
(c) To fund elections
(d) To maintain price stability

Q83. In a certain code language, ‘TOUR’ is coded as ‘3894’ and ‘AUTO’ is coded as ‘5489’. What is the code for ‘A’ in the given code language?

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

Q84. Each of F, G, H, I, M, N and O has an exam on a different day of a week starting from Monday and ending on Sunday of the same week. Only three people have exams between I and O. O has exam on the last day of the week. Only one person has exam between F and H. N has exam immediately the day before M. G doesn't have exam on Friday. How many people have exam(s) between G and N?

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

Q85. Which 16th-century CE heritage site near Agra was commissioned by Emperor Akbar as a planned capital city?

(a) Agra Fort
(b) Fatehpur Sikri
(c) Taj Mahal
(d) Akbar’s Tomb

Q86. In a certain code language,

A + B means ‘A is the husband of B’

A - B means ‘A is the daughter of B’

A × B means ‘A is the brother of B’

A ÷ B means ‘A is the sister of B’

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Based on the above, how is S related to M if 'S × R - U + N ÷ M'?

(a) Sister's son
(b) Son's son
(c) Brother's son
(d) Daughter's son

Q87. At what rate per annum will a sum of money become five times itself in 11 years under simple interest?

(a) 36 4/11 %
(b) 34 4/11 %
(c) 38 8/11 %
(d) 72 8/11 %

Q88. There is a wooden cube with an edge length of 14 cm. A hemisphere with a radius of 7 cm is carved out from each face of the cube. Find the surface area (in cm^2) of the remaining structure. (Useπ = 22/7)

(a) 1950
(b) 2150
(c) 1800
(d) 2100

Q89. As per Census of India 2011, which union territory of India recorded the highest population growth rate?

(a) Andaman and Nicobar Islands
(b) Daman and Diu
(c) Puducherry
(d) Dadra and Nagar Haveli

Q90. The Preamble declares India to be which of the following?

(a) Sovereign, Federal, Secular, Democratic, Republic
(b) Sovereign, Socialist, Federal, Democratic, Republic
(c) Sovereign, Socialist, Secular, Democratic, Republic
(d) Sovereign, Socialist, Secular, Democratic, Union

Q91. India's National Clean Air Programme (NCAP) originally aimed to reduce particulate pollution by what percentage by 2024–25 compared to the 2017–18 baseline?

(a) 60–70%
(b) 20–30%
(c) 10–15%
(d) 40–50%

Q92. Which of the following letter-clusters should replace # and % so that the pattern and relationship followed between the letter-cluster pair on the left side of :: is the same as that on the right side of :: ?

: NXF :: JTB : %

(a) = CMU % = UEN
(b) = DMU % = UEM
(c) = CMU % = UEM
(d) = CNU % = UEM

Q93. The cost price of 48 books is equal to the selling price of 36 books. Find the profit percentage. (Round off your answer to two decimal places.)

(a) 33.33%
(b) 36.23%
(c) 22.18%
(d) 39.84%

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Q94. What method does the Hill Areas Development Programme (HADP) use to increase productivity of the land?

(a) Importing high-yielding crops from plain regions
(b) Application of advanced mechanized technologies
(c) Vegetative methods and changing cropping pattern
(d) Use of chemical fertilizers and pesticide inputs

Q95. Which of the following Articles of the Constitution empowers the administrator to promulgate ordinances during recess of the Legislature in Union Territories?

(a) 239B
(b) 241
(c) 239
(d) 239AA

Q96. Veer has Rs. 1404 with him. He divides this amount between his two sons, Nitin and Pravin, and asks them to invest their respective shares at a compound interest rate of 8% per annum, compounded annually. It is observed that Nitin's investment amounts to the same value after 19 years as Pravin's investment does after 20 years. How much (in Rs.) did Veer give to Pravin?

(a) 729
(b) 829
(c) 675
(d) 525

Q97. Seven people F, G, H, I, V, W, and X are sitting around a circular table facing the centre of the table. V sits fourth to the left of H. H sits to the immediate right of W. Only three people sit between W and X. G sits to the immediate right of I. How many people sit between F and I when counted from the left of I?

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

Q98. Solve the following system of equations:

$x + 2y + 4z = 14$

$x + 2y + z = 7$

$2x + y + 2z = 2$

(a) $x = -10/3, y = 3, z = 7/3$
(b) $x = -10/3, y = 4, z = 8/3$
(c) $x = -10/3, y = 4, z = 7/3$
(d) $x = -11/3, y = 3, z = 7/3$

Q99. What is the value of $(9x + 7y)$, if mean of the following distribution is 50?

Class	0-20	20-40	40-60	60-80	80-100	Total
Frequency	8	18	x	2	y	52

(a) 193
(b) 184
(c) 166
(d) 191

Q100. A, B, C, D, 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. B lives on the topmost floor. Only three people live between B and D. F lives immediately above A, but immediately below E. How many people live between F and C?

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

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(d) Two

ANSWER KEY

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

SOLUTIONS

Q1. Answer: (d) National Capital Territory of Delhi

The correct answer is 'National Capital Territory of Delhi'

Key Points

• National Capital Territory of Delhi:

• Article 239AA of the Constitution of India was inserted by the Constitution (Sixty-ninth Amendment) Act, 1991.

• As per this article, the Union Territory of Delhi is formally designated as the National Capital Territory (NCT) of Delhi.

• The amendment provided for a Legislative Assembly and a Council of Ministers for the NCT of Delhi.

• The Administrator of the National Capital Territory of Delhi, appointed under Article 239, is designated as the Lieutenant Governor.

• The Legislative Assembly has the power to make laws for the whole or any part of the NCT with respect to matters in the State List or Concurrent List, except for Public Order, Police, and Land.

Additional Information

• National Capital Region of Delhi:

• The National Capital Region (NCR) is a unique multi-state regional planning area that encompasses the entire NCT of Delhi and several districts from neighboring states like Haryana, Uttar Pradesh, and Rajasthan.

• While the NCT of Delhi is a constitutional administrative unit, the NCR is a broader planning region aimed at balanced development around the capital.

• Administrative Capital of India:

• While New Delhi serves as the seat of the Government of India and is effectively the administrative capital, this is a functional description rather than the formal constitutional title established by Article 239AA.

• Union State of Delhi:

• The term "Union State" is not a recognized constitutional category in India. India is a "Union of States," and Delhi is classified specifically as a Union Territory with special provisions, not a "Union State."

Important Points

• The 69th Amendment Act came into force on February 1, 1992.

• The Legislative Assembly of Delhi consists of 70 members chosen by direct election from territorial constituencies.

• The Council of Ministers consists of not more than ten percent of the total number of members in the Legislative Assembly (i.e., a maximum of 7 ministers including the Chief Minister).

• The Chief Minister is appointed by the President (not the Lieutenant Governor), and other ministers are appointed by the President on the advice of the Chief Minister.

Q2. Answer: (b) 240 cm²

Shortcut Trick

Side = 17 cm, Half-diagonal (d1/2) = 30 ÷ 2 = 15 cm.

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Using Pythagorean triplet (8, 15, 17), the other half-diagonal = 8 cm.

Full second diagonal (d2) = 8 × 2 = 16 cm.

Area of rhombus = (1/2) × d1 × d2 = (1/2) × 30 × 16.

Area = 15 × 16 = 240 cm².

Therefore Answer = 240 cm²

Alternate Method

Given:

Side (s) = 17 cm, One diagonal (d1) = 30 cm

Formula used:

In a rhombus, $s^2 = (d1/2)^2 + (d2/2)^2$

Area = (1/2) × d1 × d2

Side = 17 15 15 8 8 Area = 1/2 × 30 × 16 = 240 cm²

Calculations:

Length of half of the given diagonal = 30 ÷ 2 = 15 cm

=> Let the other half-diagonal be x.

=> $17^2 = 15^2 + x^2$

=> $289 = 225 + x^2$

=> $x^2 = 289 - 225 = 64$

=> $x = \sqrt{64} = 8$ cm

=> Full second diagonal (d2) = 8 × 2 = 16 cm

=> Area = (1/2) × 30 × 16

=> Area = 15 × 16 = 240 cm²

Therefore The correct answer is 240 cm². (Option 2)

Additional Information

Perimeter of a Rhombus

Since all sides of a rhombus are equal, the perimeter is calculated as 4 × side.

Area via Base and Height

If the altitude (height) is known, the area can also be expressed as Base × Height.

Diagonal Property

The diagonals of a rhombus are perpendicular bisectors of each other and bisect the vertex angles.

Relation between Side and Diagonals

$4 \times s^2 = d1^2 + d2^2$, where s is the side and d1, d2 are the diagonals.

Q3. Answer: (d) 1600 series

The correct answer is '1600 series'

Key Points

• 1600 series (160 Series):

• The Telecom Regulatory Authority of India (TRAI) introduced the 160 series (specifically a 10-digit number starting with the 160 prefix) to help consumers identify legitimate service and transactional calls.

• This series is specifically allocated for entities regulated by the Reserve Bank of India (RBI), Securities and Exchange Board of India (SEBI), Insurance Regulatory and Development Authority of India (IRDAI), and the Pension Fund Regulatory and Development Authority (PFRDA).

• The primary objective of this move is to combat the menace of spam calls and financial fraud by providing a distinct identity to calls originating from these regulated financial institutions.

• Under this regulation, transactional and service-related calls (such as bank alerts, insurance renewals, or OTPs) must migrate to this series to ensure they are not confused with promotional or fraudulent calls.

• The directive issued in December sets a timeline for implementation (often early 2025/2026) to ensure that all financial communication becomes transparent and trustworthy for the end-user.

Additional Information

• 1400 series (140 Series):

• The 140 series is the designated number range for telemarketing and promotional calls in India.

• Unlike the 160 series, which is for essential services and transactions, the 140 series is strictly for commercial advertising. Users can easily identify and block these calls if they have registered for "Do Not Disturb" (DND) services.

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• 1900 series:

• The 1900 series is utilized by mobile subscribers in India to initiate the Mobile Number Portability (MNP) process.

• A user sends an SMS to 1900 to receive a Unique Porting Code (UPC), allowing them to switch their service provider while retaining their original mobile number. It is not used for institutional service calls.

• 1500 series:

• Numbers in the 15xx or 1500 range are typically short codes reserved for government-sanctioned utility services, helplines, or customer care services provided by various departments.

• They are used for general public utility queries rather than the specific transactional communication required by financial regulators like IRDAI or SEBI.

Important Points

• The 160 prefix is formatted in a way that helps identify the telecom circle and the originating operator, ensuring accountability in the communication chain.

• This initiative is part of TRAI's broader Telecom Commercial Communications Customer Preference Regulations (TCCCPR) to protect consumers from "Unsolicited Commercial Communication" (UCC).

• By segregating 140 (Promotional) and 160 (Service/Transactional), TRAI aims to make it easier for users to decide which calls to answer, thereby reducing the success rate of "vishing" (voice phishing) attacks.

Q4. Answer: (a) 45

Shortcut Trick

Average is the equal distribution of the total sum.

Average = Total Sum ÷ Number of Items

Average = 540 ÷ 12

Average = 45

Therefore Answer = 45

Alternate Method

Given:

Sum of 12 numbers = 540

Total count of numbers (n) = 12

Formula used:

Average = (Sum of all observations) ÷ (Total number of observations)

Total Sum = 540 Divided into 12 equal parts 45 Each Part (Average) = 45

Calculations:

Average = 540 ÷ 12

=> Average = (12 × 40 + 60) ÷ 12

=> Average = 40 + 5

=> Average = 45

Therefore The correct answer is 45.

Additional Information

Average of Natural Numbers

The average of the first n natural numbers is given by the formula (n + 1) ÷ 2.

Weighted Average

When two groups with averages A1 and A2 and sizes n1 and n2 are combined, the new average is (n1×A1 + n2×A2) ÷ (n1 + n2).

Change in Average

If every number in a set is increased, decreased, multiplied, or divided by a constant k, the average also changes by the same constant k.

Average of Arithmetic Progression

For any series in A.P., the average is always (First term + Last term) ÷ 2.

Q5. Answer: (d) Daughter's Son

Family Chart:

Decoding the Symbols:

Symbol	•	–	x	÷	%	#
Meaning	Mother	Brother	Sister	Father	Husband	Wife

Given: W # A ÷ M – P + I x R ÷ E

It means: W is wife of A, A is father of M, M is brother of P, P is mother of I, I is sister of R, R is father of E.

Thus, R is daughter's son of W.

Hence, the correct answer is Option 4.

Q6. Answer: (c) 59/90

The logic followed here is:

Logic: Convert repeating decimal into fraction and then add the fractions.

Given: 0.5 + 0.1

First convert into fractions:

0.5 = 0.555... = 5/9

0.1 = 1/10

Now, 5/9 + 1/10

LCM of 9 and 10 is 90

5/9 = 50/90

1/10 = 9/90

Now, 50/90 + 9/90 = 59/90

Now written in option form: 5990

Hence, the correct answer is Option 3.

Q7. Answer: (b) 50%

Shortcut Trick

Profit multiplier = 1 + 17% = 1.17

Cash discount multiplier = 1 − 10% = 0.9

Free scheme multiplier = Articles Paid ÷ Total Articles = 104 ÷ (104 + 16) = 104/120 = 13/15

Markup Ratio (MP/CP) = Profit ÷ (Discount 1 × Discount 2)

Markup Ratio = 1.17 ÷ (0.9 × 13/15) = 1.17 ÷ (11.7/15) = 1.5

Therefore Answer = 50%

Alternate Method

Given:

Cash Discount = 10%, Free articles = 16 on 104 purchased, Overall Profit = 17%

Formula used:

Markup % = [(MP − CP) ÷ CP] × 100

Total Revenue = Total Cost × (1 + Profit/100)

CP (100) SP (117) MP (150) Markup +50% 10% Disc. + 16 Free Profit 17%

Calculations:

Let the Cost Price (CP) of 1 article be 100.

=> Total articles given by trader = 104 + 16 = 120.

=> Total Cost = 120 × 100 = 12,000.

=> Total Selling Price (SP) for 17% profit = 12,000 × 1.17 = 14,040.

=> This revenue is generated from 104 articles only. SP per article = 14,040 ÷ 104 = 135.

=> Since a 10% discount was offered on MP, 0.9 × MP = 135 => MP = 135 ÷ 0.9 = 150.

=> Markup % = (MP − CP) ÷ CP = (150 − 100) ÷ 100 = 50%.

Therefore The correct answer is 50%.

Additional Information

Markup and Cost Price Relation

The ratio of Marked Price (MP) to Cost Price (CP) is given by: MP/CP = (100 + Profit%) / (100 − Discount%).

Effective Discount on Free Items

When Y items are free on purchase of X items, the effective discount % = [Y / (X + Y)] × 100.

Successive Discount Formula

If two discounts d1 and d2 are given successively, the net discount = d1 + d2 − (d1 × d2 / 100).

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Q8. Answer: (a) Only conclusion (II) follows

Given Statements:

Some cows are goats.

Some goats are dogs.

All dogs are tigers.

The least possible Venn diagram for the given statement is:

Conclusions:

I. All dogs are cows - False (Because only some goats are dogs and some cows are goats, there is no definite relation between all dogs and cows).

II. Some tigers are goats - True (Because some goats are dogs and all dogs are tigers, so those goats which are dogs are also tigers).

So, only conclusion II follows.

Hence, the correct answer is "Option 1".

Q9. Answer: (c) 2:45 PM

Shortcut Trick

LCM of intervals (12, 15, 20) = 60 minutes = 1 hour.

Intervals required for 6th activation = 6 − 1 = 5 intervals.

Total time gap = 5 × 1 hour = 5 hours.

Time = 9:45 AM + 5 hours = 2:45 PM.

Therefore Answer = 2:45 PM

Alternate Method

Given:

Spray A = 12 min, Spray B = 15 min, Spray C = 20 min. First activation = 9:45 AM.

Formula used:

n^(th) Activation Time = Start Time + (n − 1) × LCM(intervals)

9:45 AM (1st) 2:45 PM (6th) +1 hr +1 hr Total Gap = 5 intervals of 1 hour each

Calculations:

Step 1: Finding LCM of 12, 15, and 20.

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

=> 15 = 3 × 5

=> 20 = $2^2 \times 5$

=> LCM = $2^2 \times 3 \times 5$ = 60 minutes = 1 hour.

=> Total duration for 6 activations = (6 − 1) × 1 hour = 5 hours.

=> Time = 9:45 AM + 5 hours = 2:45 PM.

Therefore The correct answer is 2:45 PM.

Additional Information

LCM for Synchronization

Least Common Multiple (LCM) is the smallest positive integer divisible by all numbers in a set. It is used to find when multiple periodic events will next coincide.

The n-th Occurrence Rule

To find the time of the n-th occurrence when the first is at t0, use: T = t0 + (n − 1) × LCM.

HCF and LCM Relation

For any two numbers a and b: a × b = HCF(a, b) × LCM(a, b).

LCM of Fractions

LCM of Fractions = LCM of Numerators ÷ HCF of Denominators.

Q10. Answer: (d) ZXZ 30

The logic followed here is:

So, 'ZXZ 30' will replace the question mark in the given series.

Hence, the correct answer is "Option 4".

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Q11. Answer: (b) 4 km to the west

Given:

Sharad starts from A and drives 47 km South.

He turns right → 49 km West.

He turns right → 51 km North.

He turns right → 53 km East.

He turns right → 4 km South and reaches P.

To reach A from P → move 4 km West.

Hence, the correct answer is Option 2.

Q12. Answer: (c) 71

The logic followed here is:

'OENI' is coded as '79'

And,

'WASR' is coded as '61'

Similarly,

'QJTD' is coded as

Hence, the correct answer is Option 3.

Q13. Answer: (b) Assam

The correct answer is Assam.

Key Points

• In 2025, the Department of Biotechnology (DBT), Ministry of Science & Technology, signed its first Centre–State Memorandum of Understanding (MoU) under the BioE3 (Biotechnology for Economy, Environment and Employment) Policy with the Government of Assam.

• The MoU aims to promote high-performance biomanufacturing by fostering collaboration between the Centre and the State.

• It focuses on developing biotechnology-based industries, strengthening research and innovation, creating skilled employment, and supporting sustainable economic growth.

• The BioE3 Policy seeks to establish India as a global leader in bio-based manufacturing through innovation-driven and environmentally sustainable technologies.

• Hence, the correct answer is Option 2 – Assam.

Additional Information

• BioE3 Policy:

• Stands for Biotechnology for Economy, Environment and Employment.

• Aims to accelerate India's bioeconomy through advanced biomanufacturing and biotechnology innovation.

• Promotes sustainable production, entrepreneurship, and public-private partnerships.

• Department of Biotechnology (DBT):

• Functions under the Ministry of Science & Technology.

• Supports biotechnology research, innovation, and commercialization in India.

Q14. Answer: (d) Rs. 404

Shortcut Trick

Profit Ratio = Investment Ratio (since time period is same for all).

Ramesh : Seema : Shanaya = 1230 : 1710 : 1010 = 123 : 171 : 101.

Sum of ratio parts = 123 + 171 + 101 = 395 units.

395 units = 1580 => 1 unit = 1580 ÷ 395 = 4.

Shanaya's share = 101 units × 4 = 404.

Therefore Answer = 404

Alternate Method

Given:

Investment of Ramesh = Rs. 1230, Seema = Rs. 1710, Shanaya = Rs. 1010. Total Profit = Rs. 1580. Time = 1 year.

Formula used:

Profit Share of a partner = (Capital × Time)_(partner) ÷ ∑(Capital × Time)_(all) × Total Profit

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Ramesh 1230 Seema 1710 Shanaya 1010 Total Profit = 1580

Calculations:

Ratio of profits = 1230 × 1 : 1710 × 1 : 1010 × 1

=> Ramesh : Seema : Shanaya = 123 : 171 : 101

=> Sum of ratios = 123 + 171 + 101 = 395

=> Shanaya's share = (101 ÷ 395) × 1580

=> Shanaya's share = 101 × 4 = 404

Therefore The correct answer is 404 (Option 4).

Additional Information

Basic Partnership

When partners invest for the same duration, profit is shared in the ratio of their capitals: P1 : P2 = C1 : C2.

Compound Partnership

When investment durations differ, profit ratio depends on the product of capital and time: P1 : P2 = (C1 × T1) : (C2 × T2).

Working vs Sleeping Partner

A working partner manages the business and may receive a salary or extra commission before the remaining profit is distributed among all partners.

Q15. Answer: (a) 154

The logic followed here is:

thus, "154" will replace the question mark in the given series.

Hence, the correct option is "Option 1".

Q16. Answer: (a) 12

Shortcut Trick

Apply BODMAS rule order: Division → Multiplication → Addition → Subtraction.

Divide: 20 ÷ 5 = 4

Multiply: 2 × 4 = 8

Calculate: 16 + 4 − 8 = 12

Therefore Answer = 12

Alternate Method

Given:

Expression = 16 + 20 ÷ 5 − 2 × 4

Formula used:

BODMAS Rule: B (Brackets), O (Of), D (Division), M (Multiplication), A (Addition), S (Subtraction).

20 ÷ 5 = 4 2 × 4 = 8 16 + 4 − 8 12

Calculations:

The expression is 16 + 20 ÷ 5 − 2 × 4

=> 16 + 4 − 2 × 4 (After Division: 20 ÷ 5 = 4)

=> 16 + 4 − 8 (After Multiplication: 2 × 4 = 8)

=> 20 − 8 (After Addition: 16 + 4 = 20)

=> 12 (After Subtraction: 20 − 8 = 12)

Therefore The correct answer is (1).

Additional Information

VBODMAS Rule

It stands for Viniculum (bar), Brackets (), Of (×), Division (÷), Multiplication (×), Addition (+), and Subtraction (−).

Division and Multiplication Priority

Division and Multiplication have equal priority and are solved from left to right if they appear consecutively in an expression.

Addition and Subtraction Priority

Similarly, Addition and Subtraction have equal priority and are generally solved from left to right once higher-order operations are completed.

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Q17. Answer: (c) Chlorophyll

The correct answer is 'Chlorophyll'

Key Points

• Chlorophyll:

• Chlorophyll is the primary pigment used by plants, algae, and cyanobacteria to absorb light energy for photosynthesis.

• It is located within the thylakoid membranes of the chloroplasts, which are specialized organelles in plant cells.

• There are several types of chlorophyll, with Chlorophyll-a and Chlorophyll-b being the most common in terrestrial plants. Chlorophyll-a is specifically responsible for the light-dependent reactions.

• Chlorophyll absorbs light most efficiently in the blue-violet and red parts of the electromagnetic spectrum, while it reflects green light, which is why plants appear green to the human eye.

• The molecule has a porphyrin ring structure with a magnesium atom at its center, which is crucial for the absorption of light energy and the subsequent excitation of electrons.

Additional Information

• Carotenoid:

• Carotenoids are accessory pigments that are typically yellow, orange, or red. They assist in photosynthesis by absorbing wavelengths of light that chlorophyll cannot.

• They play a vital role in photoprotection, where they dissipate excess light energy that could otherwise damage the chlorophyll molecule or the plant tissue.

• Xanthophyll:

• Xanthophylls are a specific class of carotenoids that contain oxygen in their molecular structure.

• They primarily produce yellow hues and function alongside other pigments to harvest light energy and protect the plant from high light intensity via the xanthophyll cycle.

• Anthocyanin:

• Anthocyanins are water-soluble vacuolar pigments that can appear red, purple, or blue depending on the pH level.

• Unlike chlorophyll or carotenoids, anthocyanins are not involved in the process of photosynthesis. Instead, they serve to attract pollinators, protect plants against cold stress, and act as antioxidants.

Important Points

• The process of photosynthesis converts solar energy into chemical energy (glucose), providing the foundation for most food chains on Earth.

• The primary site of photosynthesis in most plants is the mesophyll layer of the leaves.

• In autumn, as chlorophyll breaks down due to shorter days and cooler temperatures, the underlying accessory pigments like carotenoids and xanthophylls become visible, leading to the changing colors of leaves.

• The absorption spectrum of chlorophyll is a key factor in determining the Photosynthetically Active Radiation (PAR), which is the range of light (400 to 700 nanometers) that organisms use for photosynthesis.

Q18. Answer: (b) World Bioproduct Day – The BioE3 Way

The correct answer is 'World Bioproduct Day – The BioE3 Way'

Key Points

• World Bioproduct Day – The BioE3 Way:

• The Union Minister of Science and Technology, Dr. Jitendra Singh, addressed the nationwide observance of World Bioproduct Day on March 5, 2025.

• The event centered on the BioE3 Policy (Biotechnology for Economy, Environment, and Employment), which aims to foster high-performance biomanufacturing in India.

• During this event, the Minister emphasized the ambitious target of scaling India’s bioeconomy from its current state to $300 billion by the year 2030.

• A major highlight of the address was the call for "Jan Bhagidari" (inclusive participation), urging students, startups, and citizens to engage with the biotechnology mission to drive sustainable growth.

• The "BioE3 Way" focuses on transitioning from chemical-based manufacturing to regenerative, bio-based models to address climate change and resource depletion.

Additional Information

• National Biotechnology Awareness Week Programme:

• This is typically a generalized awareness initiative aimed at educating the public about the benefits of biotechnology in daily life.

• While it supports the bioeconomy, it was not the specific 2025 platform used to launch the detailed BioE3 implementation roadmap and the $300 billion specific emphasis mentioned in the question.

• Global Biotech Innovation and Sustainability Summit:

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• These summits are usually international forums focused on global partnerships and cross-border technology transfers.

• The $300 billion target is a domestic mission goal central to India's BioE3 policy, which was the primary focus of the "World Bioproduct Day" celebration rather than a general global summit.

• India Bioeconomy Vision 2030 Outreach Event:

• While the name sounds relevant to the goal, this is not the formal title of the nationwide event observed in March 2025.

• The official branding for the 2025 push for inclusive participation was tied directly to the observance of World Bioproduct Day to highlight the tangible outputs of the biotech sector.

Important Points

• The BioE3 Policy was approved by the Union Cabinet in 2024, focusing on six thematic areas: bio-based chemicals, functional foods, precision medicine, climate-resilient agriculture, carbon capture, and futuristic marine resources.

• India is currently among the top 12 biotechnology destinations in the world and ranks 3rd in the Asia-Pacific region.

• The government aims to establish Biomanufacturing & Bio-AI hubs across the country to accelerate the transition to a circular bioeconomy.

• The $300 billion goal reflects a significant leap, as India's bioeconomy was valued at approximately $10 billion in 2014 and has crossed the $150 billion mark recently.

Q19. Answer: (b) One

Given: (Left) 6 2 @ # & * % ~ 7 = Ω 1 8 ? £ $ 4 3 5 + 9 (Right)

Now,

Symbols, which are immediately preceded by a number and also immediately followed by a number.

So, Needed pattern is: Number - Symbol - Number.

(Left) 6 2 @ # & * % ~ 7 = Ω 1 8 ? £ $ 4 3 5 + 9 (Right)

So, One number satisfies the condition.

Hence, the correct answer is Option 2.

Q20. Answer: (b) Decrease by 60.8%

Shortcut Trick

Let original price = 100 units

Successive Multiplier = 0.70 × 0.80 × 0.50 × 1.40 = 0.392

Price in 4th Month = 100 × 0.392 = 39.2 units

Percentage Change = (100 − 39.2) = 60.8% decrease

Therefore Answer = Decrease by 60.8%

Alternate Method

Given:

Month 1: 30% decrease, Month 2: 20% decrease, Month 3: 50% decrease, Month 4: 40% increase.

Formula used:

Final Value = Initial Value × (1 ± r1/100) × (1 ± r2/100) × (1 ± r3/100) × (1 ± r4/100)

100 (Init) −30% 70 −20% 56 −50% 28 +40% 39.2 Start M1 M2 M3 M4 (Final)

Calculations:

Let the initial price be 100.

=> Price after 1st month = 100 − (30% of 100) = 70

=> Price after 2nd month = 70 − (20% of 70) = 70 − 14 = 56

=> Price after 3rd month = 56 − (50% of 56) = 56 − 28 = 28

=> Price after 4th month = 28 + (40% of 28) = 28 + 11.2 = 39.2

=> Net change = 100 − 39.2 = 60.8 units

=> Percentage decrease = (60.8 ÷ 100) × 100 = 60.8%

Therefore The correct answer is Option (2).

Additional Information

Net Successive Percentage Formula

For two successive changes of x% and y%, the net change is given by: x + y + (xy ÷ 100)%.

Multiplication Factor Method

A p% increase is equivalent to multiplying by (1 + p/100) and a p% decrease is equivalent to multiplying by (1 − p/100).

Effective Percentage Decrease

Net percentage decrease = (Initial Value − Final Value) ÷ Initial Value × 100.

Q21. Answer: (a) .exe

The correct answer is '.exe'

Key Points

• .exe (Executable File):

• The .exe file extension stands for "executable." It is the primary file format used by Windows operating systems, including Windows 11, to launch programs and install software.

• Unlike data files (like documents or images) that require a specific application to be opened, an .exe file contains a program—a set of instructions that the computer can carry out directly.

• When a user double-clicks an .exe file, the Windows OS initiates a process that loads the program's code into the system memory (RAM) and begins execution through the CPU.

• In Windows 11, these files are often associated with the core components of applications, such as the main launch icon for a web browser, a game, or a utility tool.

Additional Information

• .jpg:

• The .jpg (or .jpeg) extension stands for Joint Photographic Experts Group. It is a widely used compressed image format.

• Opening a .jpg file does not "run" a program; instead, it triggers a viewer application (like the Windows 11 Photos app) to decode and display the visual data stored within the file.

• .mp3:

• The .mp3 extension stands for MPEG-1 Audio Layer III. It is a common format for digital audio and music.

• When double-clicked, the operating system opens a media player (like Windows Media Player or Groove Music) to play the audio stream. It is a data file, not an executable program.

• .txt:

• The .txt extension denotes a plain text file. It contains only unformatted text characters and does not support images, fonts, or styling.

• Double-clicking a .txt file typically opens the "Notepad" application or another text editor. It is used for storing notes, README files, or simple configuration data.

Important Points

• Security Caution: Because .exe files can run code directly on a system, they are common carriers for malware and viruses. Windows 11 includes security features like Microsoft Defender and User Account Control (UAC) to warn users before running unknown executables.

• Hidden Extensions: By default, Windows often hides the file extensions of known file types. To see the .exe extension, a user may need to enable "File name extensions" in the File Explorer view settings.

• Other Executables: While .exe is the most common, other file types can also act as executables or scripts in Windows, such as .msi (installer packages), .bat (batch files), and .cmd files.

• Architecture Dependency: Executable files are usually compiled for specific hardware architectures (e.g., x64 or ARM64). An .exe designed for one might not run on the other without an emulation layer.

Q22. Answer: (a) Two

Given number: 7834126

Logic: Arrange digits in ascending order from left to right

Original number: 7 8 3 4 1 2 6

Now, arranging in ascending order: 1 2 3 4 6 7 8

Now, compare positions:

Digit	Original Position	New Position	Same?
7	1st	6th	No
8	2nd	7th	No
3	3rd	3rd	Yes
4	4th	4th	Yes
1	5th	1st	No
2	6th	2nd	No

6	7th	5th	No

Now, digits whose positions remain unchanged = 3 and 4 → total 2 digits

Hence, the correct answer is Option 1.

Q23. Answer: (a) Paramparagat Krishi Vikas Yojana

The correct answer is 'Paramparagat Krishi Vikas Yojana'

Key Points

• Paramparagat Krishi Vikas Yojana (PKVY):

• PKVY is a sub-component of the Soil Health Management (SHM) scheme under the National Mission of Sustainable Agriculture (NMSA), launched in 2015.

• The primary objective of this programme is to support and promote organic farming, which results in the improvement of soil health and fertility.

• It encourages the production of agricultural products free from chemicals and pesticide residues by adopting eco-friendly, low-cost technologies.

• The scheme is implemented via a cluster approach, where groups of farmers are encouraged to take up organic farming through the Participatory Guarantee System (PGS) for certification.

• It aims to provide institutional support and handholding for farmers to transition from conventional farming to organic farming, ensuring a better market for their produce.

Additional Information

• Pradhan Mantri Kisan MaanDhan Yojana (PMKMY):

• This is a government-backed pension scheme specifically designed for small and marginal farmers (SMFs) in India.

• It provides a monthly pension of Rs. 3,000 to eligible farmers after they reach the age of 60, acting as a social security net.

• It is a voluntary and contributory scheme where the farmer and the Central Government contribute an equal amount to the pension fund.

• Rashtriya Krishi Vikas Yojana (RKVY):

• Launched in 2007, this umbrella scheme aims at the holistic development of agriculture and allied sectors.

• It provides states with the flexibility and autonomy to plan and execute agricultural development programmes based on their local needs and agro-climatic conditions.

• The scheme focuses on increasing public investment in agriculture and achieving a higher growth rate in the sector through infrastructure development and innovation.

• Pradhan Mantri Fasal Bima Yojana (PMFBY):

• PMFBY is a crop insurance scheme launched in 2016 to provide financial support to farmers suffering from crop loss or damage arising out of unforeseen events.

• It covers all food and oilseed crops and annual commercial/horticultural crops against natural calamities, pests, and diseases.

• The scheme aims to stabilize the income of farmers to ensure their continuance in farming and encourage them to adopt innovative agricultural practices.

Important Points

• The financial assistance under PKVY is provided for a 3-year period to clusters of farmers for various activities like mobilization, organic seeds, harvesting, and branding.

• Under the cluster approach, a minimum of 50 or more farmers form a cluster having 50 acres of land to take up organic farming.

• The Participatory Guarantee System (PGS) is a key element of PKVY, which is a process of certifying organic products that ensures they adhere to quality standards without the high cost of third-party certification.

• Promotion of organic farming under this scheme also helps in carbon sequestration and mitigating the ill effects of climate change on Indian agriculture.

Q24. Answer: (c) Diligence

The correct answer is 'Diligence'

Key Points

• Diligence:

• Diligence refers to the capacity of a computer to perform repetitive tasks for long periods without getting tired, bored, or losing concentration.

• Unlike human beings, who may experience physical fatigue or mental exhaustion after working for several hours, a computer can work for days without any break and still maintain the same level of performance.

• Even if millions of calculations are performed, a computer will complete the last calculation with the same accuracy and speed as

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the first one.

• This characteristic makes computers ideal for industrial automation, data processing, and complex scientific simulations that require continuous operation.

Additional Information

• Versatility:

• Versatility is the ability of a computer to perform completely different types of work at the same time or in quick succession.

• For example, a computer can be used to prepare a payroll slip, while simultaneously playing music in the background and downloading a file from the internet.

• This flexibility allows computers to be used in various fields, such as education, medicine, business, and entertainment.

• Accuracy:

• Accuracy refers to the degree of correctness with which a computer performs its operations.

• Computers are highly accurate and perform every calculation with the same precision. Errors in computing are usually not caused by the machine but by incorrect data input or faulty programming, a concept known as GIGO (Garbage In, Garbage Out).

• Speed:

• Speed is the capability of a computer to process data and execute instructions at an incredibly fast rate.

• Modern computers can perform millions or even billions of instructions per second (MIPS or BIPS). Tasks that would take a human years to complete can be finished by a computer in a few seconds.

Important Points

• While computers possess many advantages over humans, they lack IQ (Intelligence Quotient). A computer cannot take its own decisions and follows only the instructions provided by the user.

• Another limitation is No Feeling; computers do not have emotions, taste, or intuition, which prevents them from making value-based judgments.

• Storage (Memory): A computer has an in-built memory where it can store a vast amount of data. This data can be retrieved instantaneously whenever required.

• The physical components of a computer are referred to as Hardware, while the set of instructions that tell the hardware what to do is called Software.

Q25. Answer: (d) 17th India–Israel Joint Working Group (JWG) meeting

The correct answer is '17th India–Israel Joint Working Group (JWG) meeting'

Key Points

• 17th India–Israel Joint Working Group (JWG) meeting:

• The Joint Working Group (JWG) is the apex body between the Ministry of Defence of India and the Ministry of Defence of Israel to comprehensively review and guide all aspects of bilateral defence cooperation.

• During the 17th meeting, both nations signed a Memorandum of Understanding (MoU) to enhance cooperation in the field of defence technology, research, and development.

• The meeting focused on the formation of a comprehensive Ten-Year Roadmap to identify new areas of cooperation and to intensify the existing collaboration in the defence sector.

• A major highlight of this meeting was the agreement to promote the co-development and co-production of niche technologies, aligning with India's 'Make in India' and 'Atmanirbhar Bharat' initiatives.

Additional Information

• India–Israel Defence Dialogue:

• The Defence Dialogue is usually a high-level ministerial or secretary-level meeting that discusses broad strategic interests and geopolitical security. While MoUs are discussed here, the technical and operational MoUs regarding specific technology transfers are typically finalized in Working Groups.

• The 10th edition of such dialogues occurred in earlier years, focusing on maritime security and regional stability in the Indo-Pacific.

• Strategic Defence Summit:

• Strategic Summits are often broader platforms involving industry leaders, policymakers, and military officials to discuss future warfare and long-term security architecture.

• They serve as brainstorming platforms rather than the formal inter-governmental administrative bodies like the JWG where MoUs on specific defence cooperation are officially signed.

• Indo-Israel Defence Forum:

• Defence Forums are frequently organized as business-to-business (B2B) or government-to-business (G2B) interactions aimed at promoting trade and investment in the defence industry.

• While these forums facilitate networking between Indian and Israeli defence firms, the formal state-level policy agreements are

the prerogative of the Joint Working Group.

Important Points

• The 17th JWG meeting was co-chaired by the Defence Secretary of India and the Director General of the Israel Ministry of Defence.

• India is one of the largest buyers of Israeli military equipment, including Phalcon AWACS, Heron drones, and Barak-8 missile systems.

• The partnership has evolved from a buyer-seller relationship to a strategic partnership involving technology transfer and joint ventures.

• Both countries have also agreed to form a Sub-Working Group (SWG) on Defence Industry Cooperation to enable better synergy between their respective private and public sectors.

Q26. Answer: (b) 1640

Shortcut Trick

Ratio of Pages = 2 : 82 = 1 : 41

Since time taken is directly proportional to work, Time Ratio = 1 : 41

Given 1 part of time = 40 minutes

Required time (41 parts) = 40 × 41 = 1640 minutes

Therefore Answer = 1640

Alternate Method

Given:

Time for 2 pages = 40 minutes, Target pages = 82

Formula used:

Time2 = (Time1 ÷ Pages1) × Pages2

2 pages 40 min 82 pages ? min Direct Proportion: 82/2 = 41 times

Calculations:

Time taken to type 1 page = 40 ÷ 2

=> Time per page = 20 minutes => Time for 82 pages = 82 × 20 => Total time = 1640 minutes

Therefore The correct answer is 1640 (Option 2).

Additional Information

Direct Proportion

When two quantities are such that an increase in one leads to a proportional increase in the other, they are in direct proportion: x1/y1 = x2/y2.

Unitary Method

This involves finding the value of a single unit (1 page in this case) and then multiplying by the required number of units.

Work-Time Relationship

Work Done = Rate × Time. If the rate of typing remains constant, the time taken is directly proportional to the amount of work (pages).

Q27. Answer: (a) Uttar Pradesh

The correct answer is 'Uttar Pradesh'

Key Points

• Uttar Pradesh and One-Stop Centres:

• Uttar Pradesh has emerged as the leading state in providing assistance to women through the One-Stop Centre (OSC) scheme, reaching a milestone of assisting approximately 2.39 lakh women by recent assessment periods leading into 2025.

• The state has effectively implemented these centres across various districts to provide integrated support to women affected by violence, both in private and public spaces.

• The high number of beneficiaries in Uttar Pradesh is attributed to the extensive outreach programs, the dense population, and the proactive administrative measures taken to ensure that the services of the 'Sakhi' centres reach the grassroots level.

• These centres in the state provide a range of services under one roof, including medical aid, police facilitation, legal counseling, and temporary shelter.

Additional Information

• Gujarat:

• Gujarat has a well-established network of One-Stop Centres and has integrated them with its existing women's helpline services (181 Abhayam).

• While the state has been successful in resolving thousands of cases, the total volume of women assisted at these specific centres does not match the 2.39 lakh figure associated with Uttar Pradesh.

• Maharashtra:

• Maharashtra operates numerous One-Stop Centres and has its own state-specific schemes like 'Manodhairya' to support victims of violence.

• Although the state provides comprehensive support, its recorded numbers for assisted women in the OSC framework are significant but lower than the specific statistics reported for Uttar Pradesh.

• Bihar:

• Bihar has been progressively establishing OSCs in all its districts to address gender-based violence and provide social and legal support.

• While Bihar has shown improvement in the utilization of these centres, the scale of outreach and the documented number of beneficiaries have not yet reached the 2.39 lakh mark as of the current reporting cycle.

Important Points

• The One-Stop Centre (OSC) Scheme, popularly known as 'Sakhi', was launched by the Ministry of Women and Child Development (MWCD) on April 1, 2015.

• It is a centrally sponsored scheme funded through the Nirbhaya Fund, aimed at supporting women affected by violence in any form (domestic, sexual harassment, etc.).

• The primary objective is to provide 24x7 emergency response and support services, including specialized medical and psychological assistance.

• Nationwide, over 700 One-Stop Centres have been approved, with Uttar Pradesh hosting a significant portion of these to cater to its large population.

Q28. Answer: (b) 69th Constitutional Amendment

The correct answer is '69th Constitutional Amendment'

Key Points

• 69th Constitutional Amendment Act, 1991:

• The 69th Amendment Act of 1991 provided a special status to the Union Territory of Delhi and redesignated it as the National Capital Territory (NCT) of Delhi.

• This amendment inserted Articles 239AA and 239AB into the Indian Constitution.

• It created a Legislative Assembly for Delhi and a Council of Ministers headed by a Chief Minister.

• The Legislative Assembly was given the power to make laws on subjects in the State List (except police, public order, and land) and the Concurrent List.

• The administrator of the NCT of Delhi was designated as the Lieutenant Governor (L-G).

Additional Information

• 68th Constitutional Amendment:

• Passed in 1991, this amendment was specifically concerned with the state of Punjab.

• It amended Article 356 to allow the extension of President's Rule in Punjab for a total period of five years due to the internal disturbance in the state at that time.

• 70th Constitutional Amendment:

• Passed in 1992, this amendment focused on the Presidential elections.

• It provided for the inclusion of the members of the Legislative Assemblies of the National Capital Territory of Delhi and the Union Territory of Pondicherry (now Puducherry) in the Electoral College for the election of the President of India.

• 71st Constitutional Amendment:

• Passed in 1992, this amendment dealt with the languages of India.

• It amended the Eighth Schedule of the Constitution to include three more languages: Konkani, Manipuri, and Nepali. This increased the total number of languages in the Eighth Schedule to 18 at that time.

Important Points

• The 69th Amendment was based on the recommendations of the S. Balakrishnan Committee, which examined the issues relating to the administration of Delhi.

• While Delhi has a Legislative Assembly, it remains a Union Territory, which often leads to complex jurisdictional dynamics between the elected government and the Central Government (via the Lieutenant Governor).

• The amendment came into force on February 1, 1992.

• The strength of the Council of Ministers for Delhi was fixed at ten percent of the total number of members in the Legislative Assembly (i.e., 7 ministers for a 70-member assembly).

Q29. Answer: (c) 30 cm

Shortcut Trick

The radius, half-chord, and distance from the center form a right-angled triangle.

Half of the chord = 18 ÷ 2 = 9 cm.

Using Pythagorean triplet (3, 4, 5) scaled by 3: (3×3, 4×3, 5×3) → (9, 12, 15).

The radius is 15 cm.

Diameter = 2 × Radius = 2 × 15 = 30 cm.

Therefore Answer = 30 cm

Alternate Method

Given:

Center = A, Chord length = 18 cm, Distance from center = 12 cm.

Formula used:

Radius² = (Chord ÷ 2)² + (Distance from center)²

Diameter = 2 × Radius

A (Center) B C D 12 cm 9 cm Radius (r) Radius² = 9² + 12²

Calculations:

Let the chord be BC = 18 cm and D be the midpoint of BC. AD is the distance from center A.

=> BD = BC ÷ 2 = 18 ÷ 2 = 9 cm

=> In right-angled triangle ABD, $AB^2 = AD^2 + BD^2$

=> $AB^2 = 12^2 + 9^2 = 144 + 81 = 225$

=> AB = √225 = 15 cm (Radius)

=> Diameter = 2 × AB = 2 × 15 = 30 cm

Therefore The correct answer is 30 cm (Option 3).

Additional Information

Perpendicular Bisector Property

The perpendicular drawn from the center of a circle to a chord always bisects the chord into two equal segments.

Chord Distance Relation

Chords of equal length in a circle are equidistant from the center. Longer chords are closer to the center than shorter ones.

Pythagorean Triplets

Common triplets like (3, 4, 5), (5, 12, 13), and (8, 15, 17) help solve circle geometry problems involving chords and radii quickly.

Q30. Answer: (c) RT-VX

The logic followed here is:

Option 1) GI–JL

Option 2) AC–DF

Option 3) RT–VX

Option 4) UW–XZ

Here, three pairs follow a +3 shift pattern, while Option 3 follows a +4 shift pattern.

Hence, the correct answer is "Option 3".

Q31. Answer: (c) Excavation of caves for religious purposes

The correct answer is 'Excavation of caves for religious purposes'

Key Points

• Excavation of caves for religious purposes:

• Cave architecture, also known as rock-cut architecture, is one of the most spectacular features of ancient Indian heritage, where structures were created by carving out solid natural rock.

• In India, these caves were primarily excavated to serve as religious retreats, prayer halls (Chaityas), and monasteries (Viharas) for monks and devotees.

• The practice began around the 3rd century BCE, initially associated with Buddhism and Jainism, and later with Hinduism.

• Architects and sculptors displayed immense skill by carving intricate pillars, statues of deities, and decorative facades directly into mountainsides, ensuring the structures would last for centuries.

Additional Information

• Influence of European architecture:

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• European architectural influence in India (such as Gothic, Neo-Classical, and Baroque styles) emerged much later, during the colonial period starting in the 16th century.

• Common examples include the Victoria Memorial and various churches in Goa, which are distinct from the ancient tradition of rock-cut cave architecture.

• Development of skyscrapers:

• The development of skyscrapers is a modern architectural phenomenon driven by 20th and 21st-century engineering, steel frames, and urban density.

• Ancient Indian cave architecture focused on subterranean or mountain-embedded structures rather than vertical, multi-story buildings constructed from the ground up.

• Use of marble in construction:

• While marble became a defining material in Indian architecture, it is most famously associated with the Indo-Islamic and Mughal periods (e.g., the Taj Mahal).

• Ancient cave excavations were predominantly carved out of hard volcanic basalt (as in the Deccan) or granite, rather than being built using marble slabs.

Important Points

• The earliest examples of rock-cut architecture in India are the Barabar Caves in Bihar, dating back to the Mauryan Empire (3rd century BCE).

• The Ajanta Caves (Maharashtra) are world-renowned for their Buddhist paintings and sculptures, while the Ellora Caves are famous for the monolithic Kailasa Temple.

• These caves demonstrate a transition from wood-based structures to permanent stone excavations, often mimicking the wooden carpentry of that era in stone details.

• Most of these sites were located along ancient trade routes, allowing them to serve as resting places for travelling merchants and monks alike.

Q32. Answer: (a) Brazil

The correct answer is 'Brazil'

Key Points

• Transfer of BRICS Presidency:

• In December 2025, Brazil officially transferred the BRICS presidency to India during the concluding session of the 4th BRICS Sherpas Meeting.

• The presidency of BRICS rotates annually among the member nations according to the acronym B-R-I-C-S (Brazil, Russia, India, China, and South Africa).

• Brazil held the chairmanship throughout 2025, focusing on themes such as sustainable development, global governance reform, and strengthening the voices of the Global South.

• The handover signifies India taking the lead for the year 2026, where it will be responsible for hosting the annual summit and coordinating various ministerial and working group meetings.

Additional Information

• Russia:

• Russia held the BRICS presidency in 2024, prior to Brazil.

• During its tenure, Russia hosted the 16th BRICS Summit in Kazan, which was notable for being the first summit after the group's significant expansion.

• China:

• China last held the BRICS presidency in 2022.

• The Chinese presidency was instrumental in initiating the discussions for the expansion of the group, leading to the "BRICS Plus" format.

• South Africa:

• South Africa held the presidency in 2023 and hosted the 15th BRICS Summit in Johannesburg.

• This summit was historic as it resulted in the formal invitation of several new countries (Egypt, Ethiopia, Iran, and the UAE) to join the bloc.

Important Points

• BRICS Expansion: On January 1, 2024, the group expanded to include Egypt, Ethiopia, Iran, and the United Arab Emirates, significantly increasing its global demographic and economic weight.

• Role of Sherpas: Sherpas are high-level representatives of the heads of state or government who carry out the preparatory work for summits, including negotiating the contents of the final declarations.

• The New Development Bank (NDB): Formerly known as the BRICS Development Bank, it is a key institution of the group

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headquartered in Shanghai, China, aimed at mobilizing resources for infrastructure and sustainable development projects.

• Rotation Order: While the rotation usually follows the acronym, adjustments are occasionally made to accommodate other international hosting duties (such as Brazil hosting the G20 in 2024, which led to Russia taking the 2024 BRICS chair instead).

Q33. Answer: (c) 15 – 30 – 50 – 80

The logic followed here is:

Logic: The difference between consecutive terms increases in a fixed pattern (+n, +20, +30)

Given, 12 – 24 – 44 – 74

=> 12 → 24 = +12

=> 24 → 44 = +20

=> 44 → 74 = +30

And, 18 – 36 – 56 – 86

=> 18 → 36 = +18

=> 36 → 56 = +20

=> 56 → 86 = +30

Now, checking the options:

Option 1) 10 – 20 – 40 – 80

=> 10 → 20 = +10

=> 20 → 40 = +20

=> 40 → 80 = +40

Option 2) 8 – 24 – 44 – 74

=> 8 → 24 = +16

Option 3) 15 – 30 – 50 – 80

=> 15 → 30 = +15

=> 30 → 50 = +20

=> 50 → 80 = +30

Option 4) 17 – 34 – 44 – 74

=> 17 → 34 = +17

=> 34 → 44 = +10

Hence, the correct answer is "Option 3".

Q34. Answer: (c) Drip

The correct answer is 'Drip'

Key Points

• Drip Irrigation:

• Drip irrigation, also known as trickle irrigation, is a micro-irrigation system that saves water and nutrients by allowing water to drip slowly to the roots of plants.

• The goal is to place water directly into the root zone and minimize evaporation through a network of valves, pipes, tubing, and emitters.

• It is considered the most water-efficient method of irrigation, often reaching efficiency levels of over 90% because it reduces runoff and deep percolation.

• This method is highly effective for row crops, orchards, and greenhouses where precise moisture control is required to enhance crop yield and quality.

Additional Information

• Overhead Irrigation:

• This method involves distributing water through high-pressure sprinklers or guns from a central location in the field or from moving platforms.

• While effective for large areas, it is less efficient than drip irrigation due to high evaporation rates and the potential for water to be diverted by wind.

• Flood Irrigation:

• Flood irrigation is an ancient method where water is pumped or brought to the fields and allowed to flow over the ground among the crops.

• It is generally the least efficient method as a large amount of water is lost to evaporation, runoff, and infiltration below the root zone.

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• It can also lead to soil erosion and waterlogging if not managed properly.

• Sprinkler Irrigation:

• In this method, water is sprayed into the air through sprinklers so that it falls on the ground surface somewhat like rainfall.

• The spray is developed by the flow of water under pressure through small orifices or nozzles.

• While more controlled than flood irrigation, it still suffers from water loss due to evaporation and can promote the growth of fungi on wet leaves.

Important Points

• Modern drip irrigation was popularized by Simcha Blass and his son Yeshayahu in Israel during the 1960s.

• One of the major advantages of drip irrigation is fertigation, which is the application of water-soluble fertilizers directly through the irrigation system to the plant roots.

• This system significantly reduces weed growth because water is only applied where the crop is growing, leaving the gaps between rows dry.

• Drip irrigation is particularly vital in arid and semi-arid regions where water scarcity is a major constraint on agricultural productivity.

Q35. Answer: (d) 3

Given: Seven boxes, A, B, C, D, E, F and G, are kept one over the other but not necessarily in the same order.

Only G is kept above C.

Only E is kept between C and F.

Only D is kept below B.

Now arrange:

Top → Bottom

G

C

E

F

A

B

D

Now below F → A, B, D = 3 boxes

Hence, the correct answer is Option 4.

Q36. Answer: (a) 14 : 18 : 9

Shortcut Trick

Profit Distribution Ratio = (Investment × Time Period)

Mansi : Neha : Utsavi = (7 × 12 months) : (9 × 12 months) : (9 × 6 months)

Divide the entire ratio by 6:

Mansi : Neha : Utsavi = (7 × 2) : (9 × 2) : (9 × 1) = 14 : 18 : 9

Therefore Answer = 14 : 18 : 9

Alternate Method

Given:

Investment ratio of Mansi and Neha = 7 : 9

Utsavi investment = Neha investment = 9 units

Time period for Mansi and Neha = 1 year = 12 months

Time period for Utsavi (joined after 6 months) = 12 − 6 = 6 months

Formula used:

Profit Ratio = (Capital1 × Time1) : (Capital2 × Time2) : (Capital3 × Time3)

Mansi 7 × 12 Neha 9 × 12 Utsavi 9 × 6 Profit Ratio = Capital × Time

Calculations:

Ratio of profit = (Mansi Investment × Time) : (Neha Investment × Time) : (Utsavi Investment × Time)

=> Profit Ratio = (7 × 12) : (9 × 12) : (9 × 6)

=> Profit Ratio = 84 : 108 : 54

=> Divide all parts by the Highest Common Factor (6):

=> Profit Ratio = (84 ÷ 6) : (108 ÷ 6) : (54 ÷ 6) = 14 : 18 : 9

Therefore The correct answer is (1) 14 : 18 : 9.

Additional Information

Compound Partnership

When partners invest their capital for different time periods, the profit is distributed in the ratio of the product of their capital and time period (Capital1 × Time1 : Capital2 × Time2).

Simple Partnership

If all partners invest their capital for the same time duration, the profit is distributed simply in the ratio of their investments (C1 : C2).

Working and Sleeping Partner

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

Calculating Time Period

Time for a partner = Total business duration − Number of months after which the partner joined.

Q37. Answer: (b) 40 seconds

Shortcut Trick

For meeting in opposite directions, use Relative Speed = Sum of individual speeds.

Relative Speed = 6 + 4 = 10 m/s.

Time to meet for the first time = Track Length ÷ Relative Speed.

Time = 400 ÷ 10 = 40 seconds.

Therefore Answer = 40 seconds

Alternate Method

Given:

Length of circular track = 400 meters

Speed of A = 6 m/s, Speed of B = 4 m/s

Direction of running = Opposite

Formula used:

Relative Speed (Opposite Direction) = Speed_A + Speed_B

Time = Distance ÷ Relative Speed

Start Point A (6 m/s) B (4 m/s) Track = 400 m Relative Speed = 6 + 4 = 10 m/s

Calculations:

Since both move in opposite directions, the distance between them reduces by the sum of their speeds every second.

=> Relative Speed = 6 + 4 = 10 m/s

=> Time taken to meet for the first time = Distance ÷ Relative Speed

=> Time = 400 ÷ 10 = 40 seconds

Therefore The correct answer is 40 seconds.

Additional Information

Same Direction Meeting Time

If two people run in the same direction, the time to meet for the first time is Track Length ÷ (Speed1 − Speed2).

Meeting at Starting Point

The time they will meet at the starting point for the first time is the LCM of the times taken by each to complete one full lap: LCM(L/S1, L/S2).

Number of Distinct Meeting Points

If speeds are in simplified ratio a:b, they meet at (a + b) distinct points when moving in opposite directions, and |a − b| distinct points when moving in the same direction.

Q38. Answer: (a) Pakistan

The correct answer is 'Pakistan'

Key Points

• Pakistan:

• Pakistan is India's immediate neighbor located to the northwest of the Indian mainland.

• The boundary between India and Pakistan was demarcated in 1947 and is known as the Radcliffe Line.

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• India shares a land border of approximately 3,323 km with Pakistan, which is one of the most significant and sensitive borders in the world.

• The Indian states and Union Territories that share a border with Pakistan are Gujarat, Rajasthan, Punjab, Jammu & Kashmir, and Ladakh.

• Geographically, the northwestern region transitions from the fertile plains of Punjab to the Thar Desert in Rajasthan and the marshy Rann of Kutch in Gujarat.

Additional Information

• Nepal:

• Nepal is located to the north of India, nestled in the central Himalayas.

• It is a landlocked country that shares borders with five Indian states: Uttarakhand, Uttar Pradesh, Bihar, West Bengal, and Sikkim.

• India and Nepal share an "open border," allowing citizens of both countries to move freely across it without passports or visas for various purposes.

• Bhutan:

• Bhutan is a landlocked country situated in the Eastern Himalayas, to the north/northeast of India.

• It shares borders with the Indian states of Sikkim, West Bengal, Assam, and Arunachal Pradesh.

• India and Bhutan maintain a very close relationship, particularly in areas of hydropower, trade, and defense.

• China:

• China is India's largest neighbor to the north.

• The border between India and China is often divided into three sectors: the Western sector (Ladakh), the Middle sector (Himachal Pradesh and Uttarakhand), and the Eastern sector (Sikkim and Arunachal Pradesh).

• The border in the eastern sector is known as the McMahon Line, while the de facto border in other regions is referred to as the Line of Actual Control (LAC).

Important Points

• India has a total land frontier of about 15,106.7 km and a coastline of 7,516.6 km including island territories.

• Apart from Pakistan, Afghanistan is also considered a neighbor in the northwest, sharing a small border (approx. 106 km) with the Union Territory of Ladakh (currently in the POK region).

• India shares its longest land border with Bangladesh (4,096.7 km) and its shortest with Afghanistan.

• To the south, India's nearest island neighbors are Sri Lanka and Maldives.

Q39. Answer: (c) 31

The logic followed here is:

Logic: (First Number ÷ 4) + 4 = Second Number

Given, 72 → 22

=> (72 ÷ 4) + 4

=> 18 + 4 = 22

And, 132 → 37

=> (132 ÷ 4) + 4

=> 33 + 4 = 37

Now, applying the same logic for 108:

=> (108 ÷ 4) + 4

=> 27 + 4 = 31

Hence, the correct answer is "Option 3".

Q40. Answer: (b) Maintained a secular approach in its programmes and demands

The correct answer is 'Maintained a secular approach in its programmes and demands'

Key Points

• Secular Approach of the Moderates:

• During the Moderate phase (1885–1905), the Indian National Congress (INC) was deeply committed to the idea of a secular nation. They believed that the political and economic interests of Indians were common, regardless of their religious affiliations.

• The Moderates made conscious efforts to avoid any demands or actions that could be seen as favoring one religious community over another, aiming to build a broad-based national unity against British colonial rule.

• They functioned on the principle that religion is a private matter and should not interfere with the political struggle for constitutional reforms and civil liberties.

• To ensure the participation of all communities, the Congress passed a rule in 1888 stating that no resolution would be passed if an overwhelming majority of Hindu or Muslim delegates objected to it.

Additional Information

• Demands Based on Religious Identities:

• The INC, in its early years, strictly rejected political demands based on religious identities. They viewed communal demands as a threat to the emerging Indian nationalism.

• The British later encouraged communal demands (like the demand for separate electorates) to implement their 'Divide and Rule' policy, but the Moderates resisted this by focusing on universal economic and political grievances.

• Alignment with Specific Religious Leaders:

• While the INC included leaders from various religions (such as Dadabhai Naoroji, Badruddin Tyabji, and Pherozeshah Mehta), they did not align with leaders who promoted communalism or exclusive religious interests.

• The goal was to present a united front of Indian citizens rather than a federation of religious groups.

• Organisational Participation:

• The INC was never limited to a single religious group. From its very first session in 1885, it invited delegates from all parts of India and all walks of life.

• The election of Badruddin Tyabji as the first Muslim President of the INC in 1887 was a clear message that the organization was inclusive and represented all Indians.

Important Points

• The Moderate Phase of the Indian National Congress lasted from 1885 to 1905.

• Prominent leaders of this phase included W.C. Bonnerjee, Dadabhai Naoroji, Gopal Krishna Gokhale, and Surendranath Banerjee.

• Their primary methods were Prayers, Petitions, and Protests (3Ps) within the framework of the law, aiming for gradual constitutional reforms.

• The Moderates were successful in creating a sense of Indian "nationhood" and exposing the exploitative nature of British economic policies through the "Drain of Wealth" theory.

• Despite their secular stance, the British attempted to alienate the Muslim community from the Congress, eventually leading to the formation of the All India Muslim League in 1906.

Q41. Answer: (d) Raising the level of nutrition and public health

The correct answer is 'Raising the level of nutrition and public health'

Key Points

• Article 47:

• Article 47 of the Indian Constitution falls under the Directive Principles of State Policy (DPSP).

• It states that the State shall regard the raising of the level of nutrition and the standard of living of its people and the improvement of public health as among its primary duties.

• The article also mandates that the State shall endeavor to bring about prohibition of the consumption except for medicinal purposes of intoxicating drinks and of drugs which are injurious to health.

• This article is classified under the Socialist principles as it aims to provide social justice and improve the welfare of the people.

Additional Information

• Participation of workers in management:

• This is covered under Article 43A of the Indian Constitution.

• It was added by the 42nd Amendment Act of 1976.

• It directs the State to take steps, by suitable legislation or in any other way, to secure the participation of workers in the management of undertakings, establishments, or other organizations engaged in any industry.

• Protection of environment:

• This is covered under Article 48A of the Indian Constitution.

• Added by the 42nd Amendment Act of 1976, it states that the State shall endeavor to protect and improve the environment and to safeguard the forests and wildlife of the country.

• Organization of agriculture:

• This is covered under Article 48 of the Indian Constitution.

• It directs the State to organize agriculture and animal husbandry on modern and scientific lines and, in particular, take steps for preserving and improving the breeds, and prohibiting the slaughter of cows and calves and other milch and draught cattle.

Important Points

• The Directive Principles of State Policy (DPSP) are enumerated in Part IV of the Constitution from Articles 36 to 51.

• The framers of the Constitution borrowed this idea from the Irish Constitution of 1937, which had copied it from the Spanish

Constitution.

• The DPSPs are non-justiciable in nature, meaning they are not legally enforceable by the courts for their violation.

• However, Article 37 itself says that these principles are fundamental in the governance of the country and it shall be the duty of the State to apply these principles in making laws.

• The Directive Principles can be classified into three broad categories: Socialistic, Gandhian, and Liberal-intellectual.

Q42. Answer: (b) Both statements I and II together are NOT sufficient to answer the question

Given Statement:

Five cousins – Kriti, Leena, Mona, Pooja, and Reema – are of different ages.

Now analyzing the Statements:

(I) Leena is older than Kriti but younger than Mona.

– Gives partial order: Mona > Leena > Kriti (Reema and Pooja unknown), so youngest cannot be identified.

(II) Pooja is older than Kriti but younger than Leena.

– Gives partial order: Leena > Pooja > Kriti (Mona and Reema unknown), so youngest cannot be identified.

So, Statement I alone is not sufficient and Statement II alone is also not sufficient.

Even combining both statements, Reema's position is still unknown, so the youngest cannot be determined uniquely.

Hence, both statements I and II together are NOT sufficient to answer the question.

Hence, the correct answer is "Option 2".

Q43. Answer: (d) B R Ambedkar

The correct answer is 'B R Ambedkar'

Key Points

• B R Ambedkar and the Mahad Satyagraha:

• The Mahad Satyagraha was led by Dr. B.R. Ambedkar on March 20, 1927, in Mahad, Maharashtra.

• The primary objective of this movement was to assert the right of the Dalits (then referred to as untouchables) to use water from the public Chavdar Tank, which they were previously forbidden from accessing.

• This event is considered a foundational moment in the Dalit movement in India, as it challenged the centuries-old caste-based discrimination and the practice of untouchability.

• Ambedkar argued that the Satyagraha was not just about water, but about establishing the fundamental human equality of all people.

Additional Information

• Jyotirao Phule:

• Jyotirao Phule was a prominent 19th-century social reformer from Maharashtra who founded the Satyashodhak Samaj (Truth Seekers' Society).

• He worked extensively for the education of women and the lower castes; however, he passed away in 1890, decades before the Mahad Satyagraha occurred.

• E V Ramaswamy Naicker (Periyar):

• E.V. Ramaswamy, commonly known as Periyar, was the father of the Self-Respect Movement in South India.

• While he was a staunch advocate against caste discrimination and participated in the Vaikom Satyagraha in Kerala, he was not the leader of the Mahad Satyagraha in Maharashtra.

• K Kelappan:

• K. Kelappan, often called the "Kerala Gandhi," was a celebrated freedom fighter and social reformer from Kerala.

• He was instrumental in the Vaikom Satyagraha and the Guruvayur Satyagraha, which focused on temple entry rights in the Malabar region, rather than the Mahad water rights movement.

Important Points

• During the second phase of the Mahad Satyagraha in December 1927, Dr. Ambedkar and his followers publicly burned the Manusmriti to protest against the religious basis of caste-based inequality.

• In India, March 20 is often observed as Social Empowerment Day (Samajik Sadbhavna Diwas) to commemorate the Mahad Satyagraha.

• The Satyagraha was a response to the Mahad Municipality's failure to implement a 1923 resolution (the Bole Resolution) that allowed untouchables to use public places and water bodies.

• The legal battle for the Chavdar Tank continued for years, eventually resulting in a victory in the Bombay High Court in 1937, affirming the right of Dalits to use the tank.

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Q44. Answer: (c) Levallois technique

The correct answer is 'Levallois technique'

Key Points

• Levallois Technique:

• The Levallois technique is a distinctive type of stone-knapping developed by precursors to modern humans during the Palaeolithic period. It is the defining technological hallmark of the Middle Palaeolithic culture in India.

• This technique involves the preparation of a stone core by striking pieces off the edges until it acquires a specific shape (often compared to a tortoise shell).

• Once the core is prepared, a final "predetermined" flake is struck off. This allowed the tool-maker to have much greater control over the size and shape of the resulting flake tool.

• In the Indian context, the Middle Palaeolithic is often referred to as the "Nevasan" culture (named after the site of Nevasa), where flake tools produced using this method became dominant over the heavy handaxes of the preceding era.

• The flakes produced were then further retouched to create a variety of specialized tools such as scrapers, points, and borers.

Additional Information

• Percussion Method:

• The percussion method is the oldest and most basic form of tool-making, where a stone (hammer-stone) is struck against another stone (core) to remove chips.

• While it was used throughout the Stone Age, it is most closely associated with the Lower Palaeolithic (Acheulean and Soanian cultures) for making large, heavy tools like handaxes and cleavers.

• It lacks the sophisticated "prepared core" planning inherent in the Levallois technique.

• Blade-tool Technology:

• Blade technology represents a major advancement where "blades" (flakes that are at least twice as long as they are wide) are produced from a cylindrical core.

• This technology is the characteristic feature of the Upper Palaeolithic culture, following the Middle Palaeolithic.

• It allowed for more economical use of raw material and the creation of standardized, slender tools like knives and harpoons.

• Pressure Flaking:

• Pressure flaking involves using a pointed tool (made of bone, antler, or wood) to apply specialized pressure to the edge of a stone tool to remove small, thin flakes.

• This technique is used for fine-tuning and sharpening the edges of tools rather than the initial production of the flake itself.

• It became highly prominent in the late Upper Palaeolithic and the Mesolithic/Neolithic periods to create microliths and highly refined arrowheads.

Important Points

• The Middle Palaeolithic culture in India was first identified by H.D. Sankalia at the site of Nevasa on the banks of the river Pravara (Maharashtra).

• During this period, there was a shift in raw materials; while Lower Palaeolithic tools were often made of quartzite, Middle Palaeolithic tools frequently utilized fine-grained siliceous rocks like chert, jasper, and chalcedony.

• The geographical spread of this culture is extensive in India, with significant sites found in the Luni Valley (Rajasthan), the Narmada Valley, and the Tungabhadra River basin.

• The primary tool types of this era include various types of scrapers (side, end, and round), points, and borers, all predominantly made on flakes.

Q45. Answer: (c) 6

Given: (Left) S * & € L £ O & £ £ S # T * © M @ Y T $ L £ (Right)

Now,

Letters, which are immediately preceded by a symbol and also immediately followed by a symbol.

So, Needed pattern is: Symbol - Letter - Symbol.

(Left) S * & € L £ O & £ £ S # T * © M @ Y T $ L £ (Right)

So, Only six letters satisfy the condition.

Hence, the correct answer is Option 3.

Q46. Answer: (c) Urbanisation rate

The correct answer is 'Urbanisation rate'

Key Points

• Actual Population Growth:

• Actual population growth is the change in the number of inhabitants of a territory during a specific period of time, accounting for

both natural changes and movement of people.

• It is calculated using four primary components: Births, Deaths, In-migration (Immigration), and Out-migration (Emigration).

• The formula for actual growth is: (Births - Deaths) + (In-migration - Out-migration).

• Unlike natural growth, which only considers births and deaths, actual growth provides a comprehensive view of how a population size changes due to all demographic factors.

• Urbanisation Rate:

• The urbanisation rate refers to the percentage of the total population living in urban areas or the rate at which the proportion of the urban population is increasing.

• While urbanisation is a significant demographic process, it describes the distribution and concentration of people rather than a direct component used to calculate the numerical increase or decrease of the total population.

• Therefore, it is a measure of settlement patterns, not a component of the actual growth calculation.

Additional Information

• Birth Rate:

• The Crude Birth Rate (CBR) is expressed as the number of live births in a year per thousand of the population.

• It is a fundamental "positive" component of population growth as it adds individuals to the total count.

• Death Rate:

• The Crude Death Rate (CDR) is the number of deaths in a particular year per thousand of the population in a particular area.

• It plays a vital role in population change; population growth occurs not just by increasing the birth rate but also by decreasing the death rate.

• In-migration:

• In-migration or Immigration refers to the movement of people into a new area or country to settle there permanently or semi-permanently.

• This is a crucial component of actual population growth because it increases the population of the destination area, independent of the local birth and death rates.

Important Points

• Natural Growth: This is the difference between births and deaths in a specific region between two points in time. Formula: Births - Deaths.

• Migration: This is the movement of people across territories. It can be internal (within a country) or international.

• While internal migration (rural to urban) drives the urbanisation rate, it does not change the total actual population of the country; it only redistributes it.

• The net effect of migration (In-migration minus Out-migration) is what determines the "Migration" component of actual growth.

Q47. Answer: (b) 30 cm

Shortcut Trick

When a cylinder is melted into a cone with the same base radius:

Volume of Cylinder = Volume of Cone

$\pi \times r^2 \times h_{(cylinder)} = (1/3) \times \pi \times r^2 \times h_{(cone)}$

$h_{(cone)} = 3 \times h_{(cylinder)}$

$h_{(cone)} = 3 \times 10 = 30$ cm

Therefore Answer = 30 cm

Alternate Method

Given:

Radius of cylinder (r) = 7 cm

Height of cylinder (h1) = 10 cm

Radius of cone (r) = 7 cm

Formula used:

Volume of Cylinder = $\pi r^2 h1$

Volume of Cone = $(1/3)\pi r^2 h2$

r = 7 h = 10 Reshaped h = ? r = 7 Cylinder Cone

Calculations:

Since the wax block is melted and reshaped, Volume remains constant.

=> Volume of Cylinder = Volume of Cone

=> $\pi \times 7^2 \times 10 = (1/3) \times \pi \times 7^2 \times h2$

=> 10 = (1/3) × h2

=> h2 = 10 × 3 = 30 cm

Therefore The correct answer is 30 cm.

Additional Information

Conservation of Volume

When a solid object is melted and recast into another shape, the total volume remains the same (provided there is no wastage during the process).

Slant Height of Cone

The relationship between slant height (l), vertical height (h), and radius (r) of a cone is $l = \sqrt{(h^2 + r^2)}$.

Surface Area of Cylinder

The Total Surface Area (TSA) of a cylinder is given by $2\pi rh + 2\pi r^2 = 2\pi r(h + r)$.

Volume of Sphere

If a cylinder is reshaped into a sphere, the volume of the sphere is $(4/3)\pi r^3$.

Q48. Answer: (c) Xylem

The correct answer is 'Xylem'

Key Points

• Xylem:

• Xylem is classified as a complex permanent tissue rather than a simple tissue because it consists of more than one type of cell that works together as a unit.

• It is responsible for the conduction of water and dissolved minerals from the roots to the rest of the plant.

• Xylem is composed of four distinct types of elements: tracheids, vessels, xylem parenchyma, and xylem fibres.

• Except for xylem parenchyma, all other xylem elements are dead cells at maturity and have thick lignified walls, which also provide mechanical strength to the plant body.

Additional Information

• Parenchyma:

• Parenchyma is a simple permanent tissue made of relatively unspecialized cells with thin cell walls.

• The cells are usually living and have large intercellular spaces; they are primarily involved in food storage and photosynthesis (chlorenchyma).

• Collenchyma:

• Collenchyma is a simple permanent tissue that provides flexibility and mechanical support to young plant parts like stems and petioles.

• The cells are living, elongated, and irregularly thickened at the corners with cellulose, hemicellulose, and pectin.

• It allows easy bending in various parts of a plant without breaking.

• Sclerenchyma:

• Sclerenchyma is a simple permanent tissue that makes the plant hard and stiff (e.g., the husk of a coconut).

• The cells of this tissue are dead, long, and narrow with walls greatly thickened due to lignin deposition.

• These walls are often so thick that there is no internal space inside the cell.

Important Points

• Plant tissues are broadly divided into two main groups: Meristematic tissue (cells capable of division) and Permanent tissue (cells that have lost the ability to divide).

• Permanent tissues are further categorized into:

• Simple Permanent Tissue: Composed of cells that are structurally and functionally similar (Parenchyma, Collenchyma, Sclerenchyma).

• Complex Permanent Tissue: Composed of more than one type of cell working together to perform a common function (Xylem and Phloem).

• Phloem is the other complex tissue which transports food materials, usually from leaves to other parts of the plant, and consists of sieve tubes, companion cells, phloem parenchyma, and phloem fibres.

Q49. Answer: (b) 8

Shortcut Trick

Net efficiency = Efficiency of Tap 1 + Efficiency of Tap 2 − Efficiency of Tap 3

Since Tap 1 (4h) and Tap 3 (4h) have the same rate, they cancel each other out.

Net filling rate = Efficiency of Tap 2 = 1/32 of cistern per hour.

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Time to fill full cistern = 32 hours.

Time to fill 1/4th cistern = 32 ÷ 4 = 8 hours.

Therefore Answer = 8

Alternate Method

Given:

Tap 1 filling time = 4 hours, Tap 2 filling time = 32 hours, Tap 3 emptying time = 4 hours.

Formula used:

Total Work = LCM of all given days

Efficiency = Total Work ÷ Number of Days

Person	Number of Hours	Total Work (LCM)	Efficiency
Tap 1 (+)	4	32	+8
Tap 2 (+)	32	+1	
Tap 3 (−)	4	−8	

Combined Efficiency = 8 + 1 − 8 = 1 unit/hour

Work to be completed = 1/4 of Total Work = 32 ÷ 4 = 8 units

Calculations:

Total units to be filled = 32 ÷ 4 = 8 units

=> Time taken = Work ÷ Combined Efficiency

=> Time = 8 ÷ 1 = 8 hours

Therefore The correct answer is 8.

Additional Information

Negative Efficiency

In Pipes and Cisterns, an inlet pipe has positive efficiency while an outlet or leak has negative efficiency.

Work-Time Relation

Time taken to complete a part of the work is directly proportional to the fraction of work, where Time = (Fraction of Work × Total Work) ÷ Net Efficiency.

Combined Rate Formula

If two pipes fill in x and y hours and one empties in z hours, the net rate per hour is (1/x + 1/y − 1/z).

Q50. Answer: (b) 53.33

Shortcut Trick

Use the empirical relationship: 3 × Median = Mode + 2 × Mean.

3 × Median = 50 + 2 × 55

3 × Median = 50 + 110 = 160

Median = 160 ÷ 3 = 53.333...

Therefore Answer = 53.33

Alternate Method

Given:

Mean = 55, Mode = 50

Formula used:

Mode = 3 × Median − 2 × Mean (Empirical Relation)

Frequency Distribution (Positive Skew) Mode = 50 Median = 53.33 Mean = 55

Calculations:

Substitute the given values into the empirical formula:

=> 50 = 3 × Median − 2 × 55

=> 50 = 3 × Median − 110

=> 50 + 110 = 3 × Median

=> 160 = 3 × Median

=> Median = 160 ÷ 3

=> Median ≈ 53.333...

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Therefore The correct answer is 53.33 (Option 2).

Additional Information

Karl Pearson's Empirical Relation

For moderately skewed distributions, the distance between the mean and the median is approximately one-third of the distance between the mean and the mode: (Mean − Mode) = 3 × (Mean − Median).

Symmetrical Distribution

In a perfectly symmetrical bell-shaped distribution (like the normal distribution), the three measures of central tendency coincide: Mean = Median = Mode.

Skewness and Values

In a positively skewed distribution, Mean > Median > Mode. In a negatively skewed distribution, Mode > Median > Mean.

Standard Error of Median

The median is generally more stable than the mode but less stable than the mean when dealing with various samples from the same population.

Q51. Answer: (b) Dhamma Mahamatta

The correct answer is 'Dhamma Mahamatta'

Key Points

• Dhamma Mahamatta:

• Dhamma Mahamattas were a special class of officers established by the Mauryan Emperor Ashoka to spread and enforce his policy of Dhamma (Dharma).

• According to Ashoka's inscriptions, specifically Major Rock Edict V, these officials were appointed in the 13th year of his reign.

• Their primary responsibility was to look after the spiritual and moral well-being of the subjects and to propagate the principles of Dhamma across the vast Mauryan Empire.

• They were tasked with promoting harmony among different religious sects, including Brahmanas, Ajivikas, and Buddhists, and were also involved in charitable activities and the welfare of prisoners.

Additional Information

• Dhamma Lekhakas:

• The term 'Lekhaka' generally refers to a scribe or a writer in ancient Indian administration.

• While Ashoka employed many scribes to engrave his edicts on rocks and pillars, there was no specific official designation called "Dhamma Lekhakas" used for the moral propagation of his policy.

• Dhamma Janapada:

• The word 'Janapada' refers to the land, territory, or a realm of a tribe or people in ancient India.

• While Ashoka focused on the welfare of the people in various Janapadas, this term does not refer to an official post or person responsible for spreading Dhamma.

• Dhamma Mukhyas:

• 'Mukhya' translates to a chief or a head of a village or organization.

• Although administrative heads existed at various levels of the Mauryan bureaucracy, "Dhamma Mukhyas" was not the formal title used in the Ashokan edicts for the officials designated to spread the Dhamma.

Important Points

• Ashoka was the first king in Indian history who left his records engraved on stones and pillars.

• The policy of Dhamma was not a new religion but a code of social and ethical conduct intended to maintain peace and order in a diverse society.

• Other officials like the Rajukas (judicial/land measurement officers) and Yuktas (secretaries/accountants) were also commanded by Ashoka to propagate the principles of Dhamma during their official tours.

• Ashoka even sent his son, Mahendra, and daughter, Sanghamitra, to Sri Lanka to spread the message of Buddhism and Dhamma.

• The Major Rock Edicts and Pillar Edicts serve as the primary source of information regarding the appointment and duties of the Dhamma Mahamattas.

Q52. Answer: (d) = JGC, % = YVR

Given: # : BYU :: GDZ : %

Option 1) # = JGC, % = YUS

For # (JGC) to BYU

For GDZ to % (YUS)

Since, the patterns do not match, Option 1 is incorrect.

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Option 2) # = JGB, % = XUQ
For # (JGB) to BYU
For GDZ to % (XUQ)
Since, the patterns do not match, Option 2 is incorrect.
Option 3) # = JIE, % = YVR
For # (JIE) to BYU
For GDZ to % (YVR)
Since, the patterns do not match, Option 3 is incorrect.
Option 4) # = JGC, % = YVR
For # (JGC) to BYU
For GDZ to % (YVR)
Since, both transformations follow a consistent shift pattern of moving each letter backward by 8 positions, Option 4 is correct.
Hence, the correct answer is "Option 4".

Q53. Answer: (a) @

Given: (Left) D 8 € K K 6 * @ F Y 9 5 L 8 € 7 2 X Y € O & (Right)
Now, remove all the letters from the series.
Remaining series: 8 € 6 * @ 9 5 8 € 7 2 € &
Now, count from left to right: (Left) 8 € 6 * @ 9 5 8 € 7 2 € & (Right)
Thus, The fifth element from the left is @.
Hence, the correct answer is Option 1.

Q54. Answer: (b) BNG 29

The logic followed here is:
So, 'BNG 29' will replace the question mark in the given series.
Hence, the correct answer is "Option 2".

Q55. Answer: (b) 17

BODMAS Table:
Given equation: 60 A 6 C 3 B 5 D 8 = ?
Now, replacing the symbols with their meanings ‘A = ÷’, ‘C = +’, ‘B = ×’, ‘D = −’, then:
=> 60 ÷ 6 + 3 × 5 − 8
=> 10 + 3 × 5 − 8
=> 10 + 15 − 8
=> 25 − 8
=> 17
Hence, the correct answer is "Option 2".

Q56. Answer: (c) Three

Given: Seven people C, D, E, N, O, P and Q are sitting in a straight line, facing north.
E sits second to the right of N. Only two people sit between E and P.
Only two people sit to the left of N.
Only three people sit between N and C.
O sits at some place to the right of Q but at some place to the left of D.
There are three people sitting to the right of O.
Hence, the correct answer is "Option 3".

Q57. Answer: (b) Kathak

The correct answer is 'Kathak'
Key Points
• Rani Karnaa:
• Rani Karnaa (1939–2018) was a renowned Indian classical dancer, widely recognized as one of the greatest exponents of Kathak.
• She was proficient in both the Lucknow and Jaipur gharanas of Kathak, having trained under legendary gurus like Pandit

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Shambhu Maharaj and Pandit Birju Maharaj.

• She is credited with integrating the grace of the Lucknow style with the rhythmic precision of the Jaipur style, creating a unique aesthetic in her performances.

• In recognition of her immense contribution to the field of classical dance, the Government of India honored her with the Padma Shri in 2014.

• She founded the dance academy 'Sanskriti Sagar' in Kolkata, where she dedicated her life to teaching and preserving the purity of the Kathak tradition.

Additional Information

• Odissi:

• Odissi is a major ancient classical dance form that originated in the Hindu temples of Odisha.

• It is characterized by the Tribhanga (three-part break) posture and the Chauka (square) stance.

• While Rani Karnaa also trained in Odissi under Guru Kelucharan Mohapatra, her primary identity and major awards are associated with Kathak.

• Kuchipudi:

• Kuchipudi is a classical dance form that originated in the village of Kuchipudi in Andhra Pradesh.

• It is unique for its blend of dance, acting, and singing, often involving the 'Tarangam' where the dancer performs on the rim of a brass plate.

• It was traditionally performed by men (Brahmins), but later evolved to include female performers.

• Kathakali:

• Kathakali is a highly stylized classical dance-drama that originated in Kerala.

• It is famous for its elaborate, colorful make-up, heavy costumes, and extraordinary expressions (Mudras and Bhavas) used to depict stories from Indian epics.

• Traditionally, it is a male-dominated dance form where male actors play both male and female roles.

Important Points

• Rani Karnaa was born in Hyderabad (Sindh) in 1939 and later moved to Delhi and eventually settled in Kolkata.

• Apart from the Padma Shri, she was also a recipient of the Sangeet Natak Akademi Award (1996) for her contribution to Kathak.

• She was known for her research-oriented approach to dance, often exploring the historical links between different classical traditions.

• Kathak, the dance form she championed, derives its name from the Sanskrit word 'Katha' (story), as the dancers were originally storytellers in temples.

Q58. Answer: (a) Glycogen

The correct answer is 'Glycogen'

Carbohydrates are the primary source of energy for the human body. When we consume more glucose than the body needs for immediate energy, the excess is converted into a storage form to be used later during periods of fasting or intense physical activity.

Key Points

• Glycogen:

• Glycogen is a large, branched polysaccharide that serves as the main storage form of glucose in humans and animals.

• It is primarily synthesized and stored in the liver and the skeletal muscles.

• The process of converting glucose into glycogen is known as glycogenesis, which occurs when blood sugar levels are high (usually after eating).

• Muscle glycogen provides a readily available source of energy for the muscle cells themselves during exercise, while liver glycogen is broken down into glucose and released into the bloodstream to maintain blood sugar levels for the entire body, especially the brain.

Additional Information

• Starch:

• Starch is the primary storage carbohydrate in plants. It consists of two types of molecules: amylose and amylopectin.

• While it is a major part of the human diet (found in potatoes, rice, and wheat), humans do not store energy as starch; they digest it into glucose and then store it as glycogen.

• Cellulose:

• Cellulose is a structural polysaccharide found in the cell walls of plants.

• It provides rigidity and strength to plants. Humans lack the enzymes (cellulase) necessary to digest cellulose, so it passes through the digestive tract as dietary fiber.

• Sucrose:

• Sucrose is a disaccharide commonly known as table sugar, composed of one glucose molecule and one fructose molecule.

• It is naturally found in many plants, such as sugar cane and sugar beets, but it is not a storage form of energy within human tissues.

Important Points

• The regulation of glycogen is controlled by hormones: Insulin promotes the storage of glucose as glycogen, while Glucagon (and Adrenaline) triggers the breakdown of glycogen into glucose when energy is needed.

• The total amount of glycogen stored in the body is limited; once glycogen stores are full, excess glucose is typically converted into fat (triglycerides) and stored in adipose tissue.

• Liver glycogen typically accounts for about 5-10% of the liver's weight, whereas muscle glycogen accounts for about 1-2% of muscle weight. However, because humans have more muscle mass than liver mass, the total amount of glycogen in muscles is generally greater.

Q59. Answer: (c) 90

Shortcut Trick

Identify the difference between consecutive terms:

+1, +4, +9, +16, ...

Pattern: Differences are squares of consecutive natural numbers (1^2, 2^2, 3^2, 4^2).

Next difference = $5^2 = 25$

Missing term = 65 + 25 = 90

Therefore Answer = 90

Alternate Method

Given:

Number series: 35, 36, 40, 49, 65, ?

Formula used:

T_n = T_(n−1) + (n − 1)² where T_n is the n^(th) term.

35 36 40 49 65 90 $+1^2$ $+2^2$ $+3^2$ $+4^2$ $+5^2$

Calculations:

$35 + 1^2 = 35 + 1 = 36$

$\Rightarrow 36 + 2^2 = 36 + 4 = 40$

$\Rightarrow 40 + 3^2 = 40 + 9 = 49$

$\Rightarrow 49 + 4^2 = 49 + 16 = 65$

$\Rightarrow 65 + 5^2 = 65 + 25 = 90$

Therefore The correct answer is 90 (Option 3).

Additional Information

Perfect Square Series

A series where the terms or their differences follow the sequence of squares like 1, 4, 9, 16, 25, 36...

Perfect Cube Series

Similar to squares, differences can follow cubes: 1, 8, 27, 64, 125...

Prime Number Differences

A common pattern where the difference between terms is a sequence of prime numbers: 2, 3, 5, 7, 11...

Double Difference Series

If the first level of differences doesn't show a pattern, calculate the difference of those differences to find a constant or AP.

Q60. Answer: (d) Software that controls all internal computer functions

The correct answer is 'Software that controls all internal computer functions'

Key Points

• System Software:

• System software is a type of computer program that is designed to run a computer's hardware and application programs. If we think of the computer system as a layered model, the system software is the interface between the hardware and user applications.

• The main purpose of system software is to manage the resources of the computer, such as the central processing unit (CPU), memory, and peripheral devices like printers and scanners.

• The most prominent example of system software is the Operating System (OS), which manages all other programs in a computer. Examples include Microsoft Windows, macOS, Linux, and Android.

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• System software runs in the background and is responsible for essential tasks such as booting the computer, managing files, and ensuring that the hardware components communicate effectively with each other.

Additional Information

• Application Software:

• Unlike system software, application software (or "apps") is designed to perform specific tasks for the user. These programs run on top of the system software.

• Software used for preparing presentations: This refers to productivity software like Microsoft PowerPoint or Google Slides. These are application softwares used for specific creative or professional communication tasks.

• Software used to play games: Video games are a category of application software designed for entertainment. They utilize the resources managed by the system software to render graphics and process user input.

• Software used to design custom projects: Programs like Adobe Photoshop, AutoCAD, or specialized project management tools are application softwares tailored for specific professional outputs and user-driven projects.

• Utility Software:

• Often considered a sub-type of system software, utility software helps analyze, configure, optimize, or maintain a computer. Examples include antivirus programs, disk defragmenters, and file compression tools.

Important Points

• System software is generally written in low-level programming languages (like C or Assembly) to interact directly with the hardware with maximum efficiency.

• Without system software, a computer would be a collection of useless hardware parts; it provides the platform necessary for any application software to function.

• Device drivers are also a crucial part of system software, acting as translators between the operating system and specific hardware devices like printers or graphic cards.

Q61. Answer: (d) 79200

Shortcut Trick

Income Ratio: 6 : 7 | Expenditure Ratio: 2 : 4 | Savings = Rs. 66,000

Using Cross-Multiplication: (6 × 4) − (7 × 2) units = 66,000 × (4 − 2)

24 − 14 units = 66,000 × 2

10 units = 132,000 => 1 unit = 13,200

Tushar monthly income (6 units) = 6 × 13,200 = 79,200

Therefore Answer = 79200

Alternate Method

Given:

Ratio of incomes of Tushar and Salil = 6 : 7

Ratio of expenditures of Tushar and Salil = 2 : 4

Monthly savings of each = Rs. 66,000

Formula used:

Income − Savings = Expenditure

Income Breakdown (Ratio 6 : 7) Tushar (6x): Exp (2u) Savings (66k) Salil (7x): Exp (4u) Savings (66k) Total Tushar Income = 79,200

Calculations:

Let the monthly incomes be 6x and 7x respectively.

=> (6x − 66,000) / (7x − 66,000) = 2 / 4

=> (6x − 66,000) / (7x − 66,000) = 1 / 2

=> 2 × (6x − 66,000) = 1 × (7x − 66,000)

=> 12x − 132,000 = 7x − 66,000

=> 12x − 7x = 132,000 − 66,000

=> 5x = 66,000

=> x = 13,200

=> Tushar monthly income = 6x = 6 × 13,200 = 79,200

Therefore The correct answer is 79200.

Additional Information

Income, Expenditure, and Savings Relationship

Income is always the sum of Expenditure and Savings: Income = Expenditure + Savings.

Cross-Multiplication Method in Ratios

When a fixed amount is added or subtracted from two terms of a ratio to get a new ratio, the difference in cross-products of the ratios equals the fixed amount multiplied by the difference in the terms of the second ratio.

Ratio Simplification

Ratios can be simplified by dividing both parts by their Greatest Common Divisor (GCD). Example: 2 : 4 simplifies to 1 : 2.

Q62. Answer: (a) To switch between open windows

The correct answer is 'To switch between open windows'

Key Points

• Alt + Tab (Task Switcher):

• The Alt + Tab shortcut is one of the most fundamental multitasking features in the Microsoft Windows operating system.

• It allows users to quickly toggle between active software applications and open windows without using a mouse.

• When the Alt key is held and the Tab key is pressed, a graphical overlay appears on the screen showing thumbnails or icons of all running programs.

• Continuing to tap the Tab key while holding Alt moves the selection box forward through the open windows, and releasing the Alt key brings the selected window to the foreground.

• This functionality is essential for professional workflows, enabling a seamless transition between different tasks, such as referencing a web browser while typing in a document.

Additional Information

• To open Task Manager:

• The direct keyboard shortcut to open the Task Manager in Windows is Ctrl + Shift + Esc.

• Alternatively, Ctrl + Alt + Delete can be used to access a security screen that includes a link to the Task Manager. It is primarily used to monitor system resources or terminate unresponsive processes.

• To minimize all open applications:

• The primary shortcut to clear the screen and show the desktop is Windows Key + D.

• Another common shortcut is Windows Key + M, which specifically sends all windows to the taskbar.

• To close the currently active window:

• The standard keyboard shortcut to exit an active application or close a window is Alt + F4.

• If used while on the desktop with no programs active, it typically brings up the Windows Shutdown dialog box.

Important Points

• Alt + Shift + Tab: Holding the Shift key while using the Alt + Tab sequence allows the user to cycle through the open windows in reverse order.

• Windows + Tab: This shortcut opens the Task View, which provides a full-screen overview of all open windows and allows for the management of virtual desktops.

• Ctrl + Alt + Tab: This variation opens the task switcher and keeps it on the screen even after the keys are released, allowing the user to use arrow keys to select a window.

• Alt + Tab has been a staple feature of Windows since Windows 3.0, though its visual interface has evolved significantly with each version of the OS.

Q63. Answer: (c) 319

Shortcut Trick

Ratio of members A : B : C = 52 : 22 : 36 = 26 : 11 : 18

Total ratio units = 26 + 11 + 18 = 55

Total expenditure = (26 × 420) + (11 × 437) + (18 × 101)

Total expenditure = 10920 + 4807 + 1818 = 17545

Average amount = 17545 ÷ 55 = 319

Therefore Answer = 319

Alternate Method

Given:

Group A: 52 members, Average = Rs. 420

Group B: 22 members, Average = Rs. 437

Group C: 36 members, Average = Rs. 101

Formula used:

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

A (52) B (22) C (36) Rs. 420 Rs. 437 Rs. 101 Total Avg = Rs. 319

Calculations:

Simplify member counts by dividing by 2:

=> n1 : n2 : n3 = 26 : 11 : 18

=> Total Sum = (26 × 420) + (11 × 437) + (18 × 101)

=> Total Sum = 10920 + 4807 + 1818 = 17545

=> Total Units = 26 + 11 + 18 = 55

=> Combined Average = 17545 ÷ 55 = 319

Therefore The correct answer is 319 (Option 3).

Additional Information

Weighted Average

When different groups have different sizes, the combined average is calculated by dividing the total sum of all values by the total number of members across all groups.

Simplified Ratio Trick

In weighted average problems, you can simplify the number of members into a ratio to reduce the calculation burden without affecting the final average result.

Deviation Method (Assumed Mean)

Assume an average (A), calculate the net deviation from this value, and adjust the assumed mean: New Average = A + (Net Deviation ÷ Total members).

Q64. Answer: (d) 1090

The logic followed here is:

Logic: (First Number)^2 + 1 = Second Number

Given, 9 → 82

=> 9^2 + 1

=> 81 + 1 = 82

And, 17 → 290

=> 17^2 + 1

=> 289 + 1 = 290

Now, applying the same logic for 33:

=> 33^2 + 1

=> 1089 + 1 = 1090

Hence, the correct answer is "Option 4".

Q65. Answer: (c) 2890 g

Shortcut Trick

Butter required for 4 units = 680 g

Butter required for 1 unit = 680 ÷ 4 = 170 g

Butter required for 17 units = 17 × 170 = 2890 g

Therefore Answer = 2890 g

Alternate Method

Given:

Butter for 4 waffles = 680 g

Target number of waffles = 17

Formula used:

Quantity for n units = (Initial Quantity ÷ Initial Units) × n

4 Waffles 680 g 1 Waffle 170 g 17 Waffles (Target) 2890 g

Calculations:

Butter needed for 4 waffles = 680 g

=> Butter needed for 1 waffle = 680 ÷ 4

=> Butter needed for 1 waffle = 170 g

=> Butter needed for 17 waffles = 17 × 170

=> Butter needed for 17 waffles = 2890 g

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Therefore The correct answer is 2890 g.

Additional Information

Unitary Method

A technique where we first find the value of a single unit and then multiply by the required number of units to find the total value.

Direct Proportion

Two quantities are in direct proportion if an increase in one leads to a proportional increase in the other. Formula: x1/y1 = x2/y2.

Ratio Scaling

Ratios can be scaled up or down by multiplying or dividing both parts by the same non-zero number (e.g., 4:680 is equivalent to 1:170 and 17:2890).

Q66. Answer: (b) JMP

The logic followed here is:

Option 1) NQU

Option 2) JMP

Option 3) PSW

Option 4) DGK

Here, three options (1, 3, and 4) follow a mixed pattern of +3 and +4, while Option 2 follows a constant +3 pattern.

Hence, the correct answer is "Option 2".

Q67. Answer: (a) −36 < k < 36

Shortcut Trick

Condition for $ax^2 + bx + c > 0$ for all x is $a > 0$ and $b^2 - 4ac < 0$.

Here, $a = 12 (> 0)$, so we only need $b^2 - 4ac < 0$.

$(-k)^2 - 4 \times 12 \times 27 < 0$

$k^2 - 1296 < 0 \Rightarrow k^2 < 1296$

$|k| < 36 \Rightarrow -36 < k < 36$

Therefore Answer = $-36 < k < 36$

Alternate Method

Given:

Quadratic expression: $12x^2 - kx + 27$

Expression value: Always positive (> 0)

Formula used:

For a quadratic expression $f(x) = ax^2 + bx + c$ to be always positive ($f(x) > 0$ for all real x):

1. Coefficient of x^2 (a) must be positive: $a > 0$

2. Discriminant (D) must be negative: $D = b^2 - 4ac < 0$

x y $f(x) = 12x^2 - kx + 27$ Condition: $D < 0$ (No x-intercepts) Always $f(x) > 0$

Calculations:

Comparing $12x^2 - kx + 27$ with $ax^2 + bx + c$:

$a = 12, b = -k, c = 27$

As $a = 12$ is already greater than 0, we check for $D < 0$:

$\Rightarrow (-k)^2 - 4 \times 12 \times 27 < 0$

$\Rightarrow k^2 - 4 \times 324 < 0$

$\Rightarrow k^2 - 1296 < 0$

$\Rightarrow k^2 < 1296$

$\Rightarrow -\sqrt{1296} < k < \sqrt{1296}$

$\Rightarrow -36 < k < 36$

Therefore The correct answer is $-36 < k < 36$ (Option 1).

Additional Information

Nature of Roots

If $D > 0$, roots are real and distinct. If $D = 0$, roots are real and equal. If $D < 0$, roots are imaginary (complex conjugates).

Condition for Always Negative

For a quadratic $ax^2 + bx + c$ to be always negative ($f(x) < 0$ for all x), the conditions are $a < 0$ and $D < 0$.

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Vertex of a Parabola

The minimum or maximum value of a quadratic function occurs at its vertex, given by the coordinates (−b/2a, −D/4a).

Quadratic Formula

The roots of the equation $ax^2 + bx + c = 0$ are calculated as $x = (-b \pm \sqrt{D}) \div 2a$, where $D = b^2 - 4ac$.

Q68. Answer: (b) Neither conclusion I nor II follows.

Given Statements:

All papers are books.

All books are erasers.

Some erasers are crayons.

The least possible Venn diagram for the given statement is:

Conclusions:

I. Some papers are crayons - False (Because papers are inside erasers, but only some erasers are crayons, so papers may or may not be crayons).

II. Some books are crayons - False (Because books are inside erasers, but only some erasers are crayons, so books may or may not be crayons).

So, neither conclusion I nor II follows.

Hence, the correct answer is "Option 2".

Q69. Answer: (a) 5.1

Shortcut Trick

The given expression is in the standard identity form: $(a^3 + b^3 + c^3 - 3abc) \div (a^2 + b^2 + c^2 - ab - bc - ca)$.

This algebraic identity always simplifies to $(a + b + c)$.

Here, $a = 2.33$, $b = 1.55$, and $c = 1.22$.

Required Value = 2.33 + 1.55 + 1.22 = 5.1.

Therefore Answer = 5.1

Alternate Method

Given:

Expression = $[(2.33)^3 + (1.55)^3 + (1.22)^3 - 3 \times 2.33 \times 1.55 \times 1.22] \div [(2.33)^2 + (1.55)^2 + (1.22)^2 - 3.6115 - 1.891 - 2.8426]$

Formula used:

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

$a = 2.33$ $b = 1.55$ $c = 1.22$ Result = $a + b + c = 5.1$ Identity: $(a^3+b^3+c^3-3abc) \div (a^2+b^2+c^2-ab-bc-ca)$

Calculations:

Let $a = 2.33$, $b = 1.55$, $c = 1.22$.

=> $ab = 2.33 \times 1.55 = 3.6115$

=> $bc = 1.55 \times 1.22 = 1.891$

=> $ca = 1.22 \times 2.33 = 2.8426$

=> Expression = $[a^3 + b^3 + c^3 - 3abc] \div [a^2 + b^2 + c^2 - ab - bc - ca]$

=> Expression = $[(a + b + c)(a^2 + b^2 + c^2 - ab - bc - ca)] \div [a^2 + b^2 + c^2 - ab - bc - ca]$

=> Expression = $a + b + c = 2.33 + 1.55 + 1.22 = 5.1$

Therefore The correct answer is 5.1, which is option (1).

Additional Information

Special Case of $a^3 + b^3 + c^3 - 3abc$

If $a + b + c = 0$, then the identity implies $a^3 + b^3 + c^3 = 3abc$.

Alternative Form of $(a^2 + b^2 + c^2 - ab - bc - ca)$

This term can also be written as $1/2\ [(a - b)^2 + (b - c)^2 + (c - a)^2]$, often used for finding values when differences are given.

Square of a Trinomial

The identity $(a + b + c)^2 = a^2 + b^2 + c^2 + 2(ab + bc + ca)$ is frequently used in conjunction with the cubic identity.

Q70. Answer: (b) Savitribai Phule

The correct answer is Savitribai Phule.

Key Points

• Savitribai Phule is widely regarded as a pioneer of Indian feminism and women’s empowerment.

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• She was the first female teacher in India and played a crucial role in promoting women's education.

• Along with Jyotiba Phule, she established the first school for girls in Pune in 1848.

• She actively worked against caste discrimination, child marriage, and the oppression of women.

• Her efforts laid the foundation for the women's rights movement in India, earning her recognition as the "Mother of Indian Feminism".

Additional Information

• Pandita Ramabai:

• A prominent social reformer who worked for women's rights and education.

• Founded Arya Mahila Samaj and wrote 'The High-Caste Hindu Woman'.

• Rukhmabai:

• One of the first female doctors in India.

• Known for her stand against child marriage through a landmark legal case.

• Annie Besant:

• A British social reformer and supporter of Indian self-rule.

• Served as the first woman president of the Indian National Congress in 1917.

Important Points

• Savitribai Phule is remembered as a trailblazer in women's education in India.

• She also worked for the welfare of widows and established care centers for pregnant rape victims.

• Her legacy continues to inspire movements for gender equality and social justice.

Q71. Answer: (a) Starch

The correct answer is 'Starch'

Key Points

• Starch:

• Starch is a complex carbohydrate found in plants like corn, potatoes, wheat, and rice. It is the most common thickening agent used in culinary arts for making sauces, soups, and gravies.

• The process by which starch thickens a liquid is known as gelatinization. When starch granules are heated in a liquid, they absorb water and swell significantly.

• As the temperature increases, the starch granules eventually burst, releasing starch molecules (amylose and amylopectin) into the liquid. These molecules form a network that traps water, resulting in a thickened, viscous consistency or a gel.

• Starches are preferred for thickening because they are relatively flavorless, effective in small quantities, and provide a smooth, glossy texture to the final dish.

Additional Information

• Sugar:

• While sugar can increase the viscosity of a liquid when used in very high concentrations (creating a syrup), it does not "absorb" water to form a gel structure like starch does.

• Sugar is primarily used as a sweetener and a preservative. In baking, it helps with browning (caramelization) and moisture retention, but it is not a standard thickening agent for savory soups or sauces.

• Oil:

• Oil is a fat and is hydrophobic, meaning it does not mix with or absorb water.

• While oil can be part of a thickening process (such as in a roux, where it is cooked with flour), oil alone will float on top of a liquid rather than thickening it into a gel. In emulsions like mayonnaise, oil is suspended in water, but it does not function through water absorption.

• Salt:

• Salt is a mineral primarily used for seasoning, enhancing flavor, and preservation.

• Salt does not have the molecular structure required to form a gel or thicken liquids. In fact, salt can sometimes inhibit the thickening power of certain starches if added in excessive amounts during the early stages of cooking.

Important Points

• The temperature at which gelatinization occurs varies depending on the type of starch; for example, cornstarch typically thickens between 144°F and 162°F (62°C to 72°C).

• Slurry: A common method to add starch to a hot soup is by creating a slurry (mixing starch with a cold liquid first) to prevent lumps from forming.

• Retrogradation: This occurs when a starch-thickened sauce cools down and the starch molecules rearrange into a more crystalline structure, sometimes causing the liquid to "weep" or separate (syneresis).

• Common culinary thickeners derived from starch include all-purpose flour, arrowroot, tapioca, and potato starch.

Q72. Answer: (d) Ten Years

The correct answer is 'Ten Years'

Key Points

• The Constitution (Ninety-Fifth Amendment) Act, 2009:

• The 95th Amendment Act specifically amended Article 334 of the Indian Constitution.

• It extended the period of reservation of seats for Scheduled Castes (SCs) and Scheduled Tribes (STs) in the Lok Sabha and the State Legislative Assemblies.

• It also extended the period for the special representation of the Anglo-Indian community by nomination for another ten years.

• Before this amendment, the reservation was set to expire on January 25, 2010 (60 years from the commencement of the Constitution). This act extended it to January 25, 2020 (70 years).

• The primary objective was to ensure that the underprivileged sections of society continued to have a voice in the legislative process until their socio-economic conditions improved further.

Additional Information

• Twenty Years:

• While the total duration of reservation has been extended multiple times, the 95th Amendment specifically added a 10-year increment to the existing 60-year limit.

• Historically, the 8th Amendment (1960) was the first to extend the original 10-year limit to 20 years, but it is not the duration associated with the 2009 Act.

• Fifteen Years:

• There is no constitutional amendment regarding Article 334 that extended the political reservation for a specific block of fifteen years. Extensions have traditionally been granted in 10-year intervals.

• Five Years:

• A five-year term usually refers to the tenure of the Lok Sabha or State Assemblies, but it has not been the standard duration for extending constitutional reservations for SC/STs under Article 334.

Important Points

• Article 334: This article originally provided that the reservation of seats and special representation would cease 10 years after the commencement of the Constitution (i.e., in 1960).

• Subsequent Extensions: Through various amendments (8th, 23rd, 45th, 62nd, 79th, and 95th), this period was consistently extended every 10 years.

• 104th Amendment Act (2019): This is the most recent amendment related to this topic. It extended the reservation for SCs and STs for another ten years (until January 25, 2030).

• Anglo-Indian Representation: Importantly, the 104th Amendment Act did not extend the reservation for the Anglo-Indian community, effectively ending their nomination process in the Lok Sabha and State Assemblies as of January 2020.

Q73. Answer: (b) 2 2over9 m/s

Shortcut Trick

Convert m to km: 20 km Up, 44 km Down in 8h; 15 km Up, 22 km Down in 5h.

Let Upstream speed = U and Downstream speed = D.

Eq 1: 20/U + 44/D = 8; Eq 2: 15/U + 22/D = 5.

Eliminate D by doubling Eq 2: 30/U + 44/D = 10.

Subtracting Eq 1 from doubled Eq 2: 10/U = 2 → U = 5 km/h.

Put U=5 in Eq 2: 3 + 22/D = 5 → D = 11 km/h. Speed = (11+5)÷2 = 8 km/h

in m/sec = 8 × (5/18) = 2(2/9)

Therefore Answer = 2(2/9) m/sec

Alternate Method

Given:

Case 1: Upstream = 20 km, Downstream = 44 km, Time = 8 h

Case 2: Upstream = 15 km, Downstream = 22 km, Time = 5 h

Formula used:

Time = Distance ÷ Speed

Speed of boat (u) = (Downstream speed + Upstream speed) ÷ 2

Boat Speed (u) Stream (v) Downstream: u + v Upstream: u − v Boat and Stream Dynamics

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Calculations:
Let upstream speed be s and downstream speed be d.
=> 20/s + 44/d = 8 --- (i)
=> 15/s + 22/d = 5 --- (ii)
=> Multiplying (ii) by 2: 30/s + 44/d = 10 --- (iii)
=> Subtracting (i) from (iii): (30/s − 20/s) = 10 − 8
=> 10/s = 2 => s = 5 km/h
=> Substitute s=5 in (ii): 15/5 + 22/d = 5 => 3 + 22/d = 5 => 22/d = 2 => d = 11 km/h
=> Speed of boat in still water = (11 + 5) ÷ 2 = 8 km/h
in m/sec = 8 × (5/18) = 2(2/9)
Therefore The correct answer is 2(2/9) m/sec.
Additional Information
Downstream and Upstream Speeds
Downstream speed (d) = u + v and Upstream speed (s) = u − v, where u is boat speed and v is stream speed.
Speed of Boat in Still Water
The speed of the boat in still water is the average of the downstream and upstream speeds: u = (d + s) ÷ 2.
Speed of the Current
The speed of the stream or current is half the difference between downstream and upstream speeds: v = (d − s) ÷ 2.
Average Speed for Round Trip
Average speed for going and returning between two points is: (d × s) ÷ u, where u is still water speed.

Q74. Answer: (a) 419.4 gm

Shortcut Trick
Net Profit Ratio = 155 ÷ 100 (for 55% gain)
Price Multiplier = 65 ÷ 100 (for 35% loss)
False Weight = True Weight × (Price Multiplier ÷ Net Profit Ratio)
Actual Weight = 1000 × (65 ÷ 155) = 65000 ÷ 155
Actual Weight ≈ 419.35 gm
Therefore Answer = 419.4 gm
Alternate Method
Given:
Professed Loss = 35%, Overall Gain = 55%, True Weight = 1000 gm
Formula used:
(100 + Gain%) ÷ (100 − Professed Loss%) = True Weight ÷ False Weight
True Weight (1000 gm) False Weight (x gm) Weight Gap (Error) Loss Professed: 35% Actual Gain: 55% Result: x = 419.4 gm
Calculations:
Let the weight used be x grams.
=> (100 + 55) ÷ (100 − 35) = 1000 ÷ x
=> 155 ÷ 65 = 1000 ÷ x
=> x = (1000 × 65) ÷ 155
=> x = 65000 ÷ 155
=> x = 419.3548... ≈ 419.4 gm
Therefore The correct answer is 419.4 gm.
Additional Information
Basic Dishonest Dealer Profit
When a dealer sells at cost price but uses a false weight, Profit% = [Error ÷ (True Value − Error)] × 100.
Combined Dishonest Dealer Formula
If a dealer professes k% profit and uses false weight, then Overall Profit% = [(100 + k) × (True Weight ÷ False Weight) − 100].
False Balance Multiplication
If the weight is faulty by x% while buying and y% while selling, Total Gain% = [((100+x)(100+y) ÷ 100) − 100].

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Q75. Answer: (c) Pradhan Mantri Jan Vikas Karyakram (PMJVK)

The correct answer is 'Pradhan Mantri Jan Vikas Karyakram (PMJVK)'

Key Points

• Pradhan Mantri Jan Vikas Karyakram (PMJVK):

• PMJVK is a Centrally Sponsored Scheme (CSS) implemented by the Ministry of Minority Affairs to address development deficits in identified Minority Concentration Areas (MCAs).

• The primary objective of the scheme is to improve the socio-economic conditions of the minorities and provide basic amenities to them for improving their quality of life and reducing imbalances in the identified MCAs.

• The scheme focuses on creating community infrastructure in priority sectors such as Education, Health, Skill Development, and Women Empowerment.

• Infrastructure projects include the construction of school buildings, hostels, smart classrooms, ITIs, polytechnics, health centers, and Sadbhav Mandaps (community centers).

• The MCAs are identified based on the concentration of minority populations and their relative backwardness in terms of socio-economic and basic amenity parameters.

Additional Information

• Pradhan Mantri Virasat Ka Samvardhan (PM VIKAS):

• PM VIKAS is an integrated scheme that umbrellas five erstwhile schemes of the Ministry: Seekho aur Kamao, USTTAD, Hamari Dharohar, Nai Roshni, and Nai Manzil.

• It focuses on the skilling, entrepreneurship, and leadership training requirements of the minority communities, particularly the artisan communities.

• The aim is to improve the livelihoods of minorities through capability building and market linkages.

• Padho Pardesh:

• This was a scheme that provided interest subsidies on educational loans for overseas studies to students belonging to economically weaker sections of notified minority communities.

• The focus was specifically on financial aid for higher education abroad, rather than physical community infrastructure.

• Seekho Aur Kamao:

• This is a placement-linked skill development scheme for minorities.

• It aims to upgrade the skills of minority youth in various modern/traditional skills depending upon their educational qualification, present economic trends, and market potential.

• The goal is to ensure they obtain suitable employment or become self-employed.

Important Points

• PMJVK was evolved from the erstwhile Multi-sectoral Development Programme (MsDP), which was launched in 2008-09.

• The scheme has been restructured to increase its reach and effectiveness, covering all districts of the country where Minority Concentration Areas are identified.

• The funding pattern for PMJVK is generally 60:40 between the Centre and States, and 90:10 for North Eastern and Himalayan States.

• Central assistance is provided to the State Governments/UT Administrations for the implementation of the projects approved by the Ministry.

Q76. Answer: (d) 138

Shortcut Trick

Compare the exponents on both sides of base 5.

Exponent on RHS = 4 × 105 = 420.

Equate with LHS exponent: 3x + 4 = 420.

3x = 416 → x = 138.66...

The integral part is the value before the decimal.

Therefore Answer = 138

Alternate Method

Given:

Equation: 5^(3x + 4) = (5^4)^(105)

Formula used:

(a^m)^n = a^(m × n)

If a^p = a^q, then p = q (where a > 0, a ≠ 1)

LHS 5^(3x + 4) = RHS (5^4)^(105) 3x + 4 = 4 × 105

Calculations:

5^(3x + 4) = 5^(4 × 105)

=> 5^(3x + 4) = 5^(420)

=> 3x + 4 = 420

=> 3x = 420 − 4

=> 3x = 416

=> x = 416 ÷ 3

=> x = 138.666...

The integral part of a number is the greatest integer less than or equal to that number.

=> Integral part of x = 138

Therefore The correct answer is 138.

Additional Information

Product and Quotient Laws of Indices

When bases are the same, multiply by adding powers: $a^m \times a^n = a^{(m+n)}$. Divide by subtracting powers: $a^m \div a^n = a^{(m-n)}$.

Integral Part (Greatest Integer Function)

The integral part of a real number x, often denoted as [x], is the largest integer that is not greater than x. For example, [138.66] = 138.

Power of a Power Rule

When a base with an exponent is raised to another power, multiply the exponents together: $(a^m)^n = a^{(m \times n)}$.

Negative and Zero Indices

Any non-zero base raised to the power of 0 equals 1 ($a^0 = 1$). A negative power indicates a reciprocal: $a^{(-n)} = 1/a^n$.

Q77. Answer: (b) 1/3

Shortcut Trick

The tangent ratio tanθ in a right-angled triangle is always defined as the ratio of the side opposite to the angle to the side adjacent to it.

tanθ = Opposite Side ÷ Adjacent Side

tanθ = 7 ÷ 21 = 1/3

Therefore Answer = 1/3

Alternate Method

Given:

Length of the opposite side = 7 cm

Length of the adjacent side = 21 cm

Formula used:

tanθ = Perpendicular / Base = Opposite Side / Adjacent Side

Opposite (7) Adjacent (21) θ Right-Angled Triangle

Calculations:

We know the trigonometric ratio for tangent is:

=> tanθ = Opposite Side / Adjacent Side

=> tanθ = 7 / 21

=> tanθ = 1 / 3

Therefore The correct answer is 1/3.

Additional Information

Trigonometric Ratios

In any right triangle: sinθ = Opposite/Hypotenuse, cosθ = Adjacent/Hypotenuse, and tanθ = Opposite/Adjacent.

Pythagoras Theorem

The hypotenuse H can be found using $H^2 = \text{Opposite}^2 + \text{Adjacent}^2$. Here, $H = \sqrt{(7^2 + 21^2)}$.

Reciprocal Identities

The reciprocal of tangent is cotangent: cotθ = 1/tanθ = Adjacent/Opposite. For this problem, cotθ = 21/7 = 3.

Q78. Answer: (b) GTFC

The logic followed here is:

For, WELD → YHPI

Now, for AKTN → CNXS

Now, applying the same logic for EQBX

So, EQBX → GTFC

Hence, the correct answer is "Option 2".

Q79. Answer: (b) Aw climate subtype

The correct answer is 'Aw climate subtype'

Key Points

• Aw Climate Subtype (Tropical Savanna):

• The Aw climate is characterized by a distinct dry season and a wet season, where the dry season is typically longer and more severe compared to other tropical climates.

• It is often referred to as the Tropical Wet and Dry climate or Tropical Savanna.

• The "w" in the classification stands for a dry winter period. During this time, the region is under the influence of the subtropical high-pressure belt, leading to very little precipitation.

• The wet season is relatively short and occurs when the Intertropical Convergence Zone (ITCZ) moves over the region, bringing heavy convective rainfall.

• Vegetation in these areas typically consists of tall grasses and scattered, drought-resistant trees (savanna), as the long dry period prevents the growth of dense forests.

• Temperature remains high throughout the year, but the seasonal variation in rainfall is the defining characteristic of this subtype.

Additional Information

• Af Climate Subtype (Tropical Rainforest):

• This is the Tropical Wet climate where there is no distinct dry season.

• Every month of the year receives an average precipitation of at least 60 mm.

• It is characterized by high humidity, consistent high temperatures, and dense evergreen vegetation known as tropical rainforests.

• Am Climate Subtype (Tropical Monsoon):

• The Am climate is a transitional climate between the Af (rainforest) and Aw (savanna).

• It features a short dry season, but the total annual rainfall is so heavy that the soil remains moist enough to support dense forest growth.

• The heavy rainfall usually occurs during the high-sun season (summer) due to monsoonal wind shifts.

• BSh Climate Subtype (Hot Semi-Arid):

• The BSh climate belongs to the Dry (B) climate group rather than the Tropical (A) group.

• It represents a steppe or semi-arid environment where evaporation often exceeds precipitation.

• While it has dry periods, it is distinguished from the "A" climates by its overall lower annual rainfall and its location in transitional zones between deserts and humid climates.

Important Points

• The Koppen Climate Classification System was developed by Wladimir Köppen in 1884, with several later modifications.

• The system uses capital letters (A, B, C, D, E, H) to designate major climate groups based on temperature and precipitation patterns.

• Group A (Tropical Moist Climates) is defined by all months having an average temperature above 18°C (64°F).

• The secondary letters in Group A (f, m, w) describe the seasonal distribution of rainfall:

• f: feucht (German for moist/wet), no dry season.

• m: monsoon, short dry season.

• w: winter dry season.

• The Aw climate is found primarily in parts of Africa, South and Central America, and Northern Australia.

Q80. Answer: (c) Ghazala Hashmi

The correct answer is 'Ghazala Hashmi'

Key Points

• Ghazala Hashmi:

• In November 2025, Ghazala Hashmi made history by becoming the first Muslim and the first South Asian American to be elected as the Lieutenant Governor of Virginia.

• She previously served as a member of the Virginia Senate, representing the 15th district, where she was also the first Muslim woman elected to that body in 2019.

• Her victory marks a significant milestone in American politics, reflecting the increasing diversity and representation of South

Asian and Muslim communities in high-ranking executive state offices.

• As Lieutenant Governor, she presides over the Virginia Senate and is first in the line of succession to the governorship.

Additional Information

• Suhas Subramanyam:

• Suhas Subramanyam is a prominent Indian-American politician from Virginia. In the 2024 elections, he was elected to the U.S. House of Representatives, representing Virginia's 10th congressional district.

• While he is a historical figure as the first Indian American from Virginia elected to Congress, he did not run for the position of Lieutenant Governor in 2025.

• Pramila Jayapal:

• Pramila Jayapal is a U.S. Representative serving Washington's 7th congressional district since 2017.

• She was the first Indian-American woman to serve in the U.S. House of Representatives and is a leader of the Congressional Progressive Caucus, but her political career is based in Washington state, not Virginia.

• Zeeshan Siddiqui:

• Zeeshan Siddiqui is a politician from India, specifically associated with the state of Maharashtra.

• He is not involved in United States politics or the Virginia state government.

Important Points

• The role of the Lieutenant Governor of Virginia is a four-year term, and the holder is elected separately from the Governor.

• Ghazala Hashmi immigrated to the United States from India as a child, and her career prior to politics was in higher education as a professor and administrator.

• Her election is part of a broader trend often referred to as the "Samosa Caucus" expansion, a term used to describe the growing number of Indian Americans serving in the U.S. legislature and executive branches.

• Virginia's 2025 election was closely watched nationally as a bellwether for political trends leading into the next federal election cycle.

Q81. Answer: (b) Both I and II

The correct answer is 'Both I and II'

Key Points

• Harappan Urban Planning:

• The most remarkable feature of the Harappan civilization was its advanced urbanization and systematic town planning.

• Grid System: The streets and roads were laid out according to a grid pattern, meaning they were straight and intersected each other at right angles, dividing the city into rectangular blocks.

• Drainage System: The Harappans had a very sophisticated drainage system. Every house had its own soak pit which was connected to the main street drains.

• Drain Coverage: Street drains were typically lined with bricks and were covered with stone slabs or large burnt bricks. These covers could be removed for cleaning purposes, showcasing their high standards of hygiene and maintenance.

Additional Information

• Only I:

• While it is true that streets were straight and cut at right angles, this statement alone is incomplete as an answer because the drainage system description in Statement II is also a factual characteristic of Harappan architecture.

• Only II:

• Similarly, while the description of covered drains is accurate, ignoring the grid layout of the roads makes this an incomplete selection regarding the civilization's architectural features.

• Neither I nor II:

• This is incorrect because both statements accurately describe the archaeological findings at major Harappan sites like Mohenjo-daro and Harappa. Excavations have consistently shown both grid-patterned streets and elaborate covered drainage systems.

Important Points

• The Harappan civilization (Indus Valley Civilization) flourished around 2500 BCE in the western part of South Asia.

• The cities were generally divided into two parts: the Citadel (Upper Town) for the ruling class and the Lower Town for the common people.

• They used burnt bricks of a standard ratio (4:2:1) for construction, which was unique compared to the contemporary Egyptian civilization that primarily used sun-dried bricks.

• The Great Bath at Mohenjo-daro is one of the most famous structures, illustrating their engineering skills in waterproofing and water management.

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Q82. Answer: (d) To maintain price stability

The correct answer is 'To maintain price stability'

Key Points

• Monetary Policy:

• Monetary policy refers to the actions undertaken by a nation's central bank (such as the Reserve Bank of India or the Federal Reserve) to control the money supply and achieve sustainable economic growth.

• The primary objective of monetary policy in most modern economies is to maintain price stability while keeping in mind the objective of growth.

• Price stability is crucial because it helps maintain the purchasing power of the currency and provides a predictable environment for businesses and consumers to make long-term financial decisions.

• By controlling inflation, the central bank ensures that the economy does not overheat, which prevents the boom-and-bust cycles that can lead to severe recessions.

Additional Information

• To maximize employment:

• While many central banks (like the US Federal Reserve) have a "dual mandate" that includes promoting maximum employment, it is often considered secondary to or a result of maintaining price stability.

• In many inflation-targeting frameworks, the focus remains primarily on price levels, under the belief that a stable price environment is the best foundation for long-term job creation.

• To evade taxes:

• Tax evasion is an illegal activity where individuals or entities deliberately avoid paying their tax liabilities.

• This is a matter of criminal law and fiscal enforcement; it has no relation to the objectives of a country's monetary policy.

• To fund elections:

• Funding elections is a political and administrative process involving government budgets (fiscal policy) and private donations.

• Monetary policy is designed to be independent of political cycles to ensure economic stability and is never used as a tool to fund specific political events or elections.

Important Points

• In India, the Monetary Policy Committee (MPC) of the RBI is tasked with setting the benchmark interest rate (Repo Rate) to contain inflation within a specified target range.

• The instruments of monetary policy include Repo Rate, Reverse Repo Rate, Cash Reserve Ratio (CRR), and Statutory Liquidity Ratio (SLR).

• Monetary policy is classified as either Expansionary (increasing money supply to fight unemployment/recession) or Contractionary (decreasing money supply to reduce inflation).

• The concept of "Price Stability" usually targets a low and stable inflation rate (for example, 4% with a band of +/- 2% in India).

Q83. Answer: (b) 5

The logic followed here is:

Logic: Each letter is assigned a fixed unique number, and the same letter has the same code in all words.

Given:

TOUR → 3894

AUTO → 5489

Therefore, the code for 'A' is 5.

Hence, the correct answer is Option 2.

Q84. Answer: (c) Three

Given: Each of F, G, H, I, M, N and O has an exam on a different day of a week starting from Monday and ending on Sunday of the same week.

Only three people have exams between I and O.

O has exam on the last day of the week.

Only one person has exam between F and H.

N has exam immediately the day before M.

G doesn't have exam on Friday.

Day	Person
Monday	G

Tuesday	F/H
Wednesday	I
Thursday	H/F
Friday	N
Saturday	M
Sunday	O

Now, there are three people (F, I and H) between G and N.

Hence, the correct answer is Option (3).

Q85. Answer: (b) Fatehpur Sikri

The correct answer is 'Fatehpur Sikri'

Fatehpur Sikri is a 16th-century city located in the Agra District of Uttar Pradesh, India. It stands as a testament to the Mughal Empire's architectural prowess and served as the capital of the empire for a short but significant period under the reign of Emperor Akbar.

Key Points

• Fatehpur Sikri:

• Fatehpur Sikri was commissioned by the Mughal Emperor Akbar in 1571 and served as the capital of the Mughal Empire from 1571 to 1585.

• The city was built to honor the Sufi saint Sheikh Salim Chishti, who had predicted the birth of Akbar's heir, Prince Salim (later Emperor Jahangir).

• It is renowned for being one of the first planned cities of the Mughal era, featuring a sophisticated drainage and water supply system alongside its grand monuments.

• The architectural style of the city is a unique blend of Persian, Hindu, and Islamic influences, reflecting Akbar's inclusive religious and cultural policies (Din-i-Ilahi).

• Key structures within the complex include the Buland Darwaza (the highest gateway in the world), the Jama Masjid, the Tomb of Salim Chishti, and the Panch Mahal.

Additional Information

• Agra Fort:

• While Agra Fort was also extensively renovated and expanded by Emperor Akbar starting in 1565, it was primarily a military structure and a royal residence rather than a "planned capital city" established on a new site like Fatehpur Sikri.

• It is made largely of red sandstone and served as the main residence of the emperors of the Mughal Dynasty until 1638.

• Taj Mahal:

• The Taj Mahal is a white marble mausoleum built by Emperor Shah Jahan (Akbar's grandson) in the 17th century (1631–1648).

• It was built in memory of his favorite wife, Mumtaz Mahal, and is considered one of the New Seven Wonders of the World, representing a later stage of Mughal architecture.

• Akbar’s Tomb:

• Located in Sikandra, a suburb of Agra, this is the final resting place of Emperor Akbar.

• The construction was started by Akbar himself around 1600 but was completed by his son, Jahangir, in 1613. It is a significant funerary monument but not a capital city.

Important Points

• Fatehpur Sikri was designated a UNESCO World Heritage Site in 1986 for its exceptional architectural value.

• The city was abandoned by Akbar in 1585, primarily due to a failure in the water supply system and the need for the Emperor to attend to campaigns in the northwest of India.

• The Buland Darwaza was added to the complex later to commemorate Akbar's successful campaign in Gujarat.

• The Ibadat Khana (House of Worship) at Fatehpur Sikri was the place where Akbar held discussions with scholars of various religions, leading to the foundation of his syncretic philosophy.

Q86. Answer: (a) Sister's son

Family Chart:

Decoding the Symbols:

Symbol	•	•	×	÷

Meaning	Husband	Daughter	Brother	Sister

Given: S × R - U + N ÷ M

It means: S is brother of R, R is daughter of U, U is husband of N, N is sister of M.

Thus, S is sister's son of M.

Hence, the correct answer is Option 1.

Q87. Answer: (a) 36 4/11 %

Shortcut Trick

For a sum to become n times itself, Simple Interest (SI) = (n − 1) × Principal.

Direct formula: Rate (R) = [(n − 1) × 100] ÷ Time (T)

Here, n = 5 and T = 11 years.

R = (5 − 1) × 100 ÷ 11 = 400 ÷ 11

R = 36 ^4/11 %

Therefore Answer = 36 ^4/11 %

Alternate Method

Given:

Amount (A) = 5 × Principal (P)

Time (T) = 11 years

Formula used:

Simple Interest (SI) = Amount − Principal

Rate (R) = (SI × 100) ÷ (P × T)

Year 0 Principal (P) Year 11 Amount (5P) Interest Earned = 4P

Calculations:

Let the Principal (P) be 100.

=> Amount (A) = 5 × 100 = 500

=> Simple Interest (SI) = 500 − 100 = 400

=> Rate (R) = (400 × 100) ÷ (100 × 11)

=> R = 400 ÷ 11 = 36 ^4/11 %

Therefore The correct answer is (1).

Additional Information

Simple Interest Rule for n Times

To find the time (T) or rate (R) when a sum becomes n times itself: R × T = (n − 1) × 100.

Compound Interest Rule for n Times

Under CI, if a sum becomes n times in T years, the relation is A = P(1 + R/100)^T => n = (1 + R/100)^T.

Effective Rate of Interest

The actual interest rate earned or paid on an investment or loan for a year after compounding: $E = (1 + r/n)^n - 1$.

Q88. Answer: (d) 2100

Shortcut Trick

Each hemispherical carving removes a circle (πr^2) but adds a curved surface ($2\pi r^2$).

Net surface area gain per face = $2\pi r^2 - \pi r^2 = +\pi r^2$.

Total surface area = 6 × (Side² + πr²).

Total surface area = 6 × (14² + (22/7) × 7²).

Total surface area = 6 × (196 + 154) = 6 × 350 = 2100 cm².

Therefore Answer = 2100

Alternate Method

Given:

Edge length of wooden cube (a) = 14 cm

Radius of hemisphere (r) = 7 cm

Number of faces = 6

Formula used:

Total Surface Area = TSA of Cube − 6 × (Area of Circle) + 6 × (CSA of Hemisphere)

Surface Area = $6a^2 + 6\pi r^2$

Edge (a) = 14 cm r = 7 cm Hemisphere carved from each face

Calculations:

Total Surface Area of the cube = 6×14^2

=> $6 \times 196 = 1176$ cm²

=> Surface area removed from 6 faces = $6 \times \pi r^2 = 6 \times (22/7) \times 7 \times 7 = 924$ cm²

=> Surface area added by 6 hemispherical cavities = $6 \times 2\pi r^2 = 6 \times 2 \times (22/7) \times 7 \times 7 = 1848$ cm²

=> Net Surface Area = 1176 − 924 + 1848

=> Net Surface Area = 1176 + 924 = 2100 cm²

Therefore The correct answer is 2100.

Additional Information

Total Surface Area of Cube

The total surface area of a cube with edge 'a' is $6a^2$. The lateral surface area is $4a^2$.

Hemisphere Formulas

For a hemisphere of radius 'r', Curved Surface Area = $2\pi r^2$ and Volume = $(2/3)\pi r^3$.

Surface Area Change during Carving

When a hemisphere is carved out from a solid, the total surface area increases by the difference between the curved surface added and the base area removed (πr^2).

Volume of Remaining Structure

The volume of the remaining structure is the original volume of the cube (a^3) minus the volume of all carved shapes ($6 \times 2/3\pi r^3$).

Q89. Answer: (d) Dadra and Nagar Haveli

The correct answer is 'Dadra and Nagar Haveli'

Key Points

• Dadra and Nagar Haveli:

• According to the 2011 Census of India, Dadra and Nagar Haveli recorded the highest decadal population growth rate among all Union Territories and States in India.

• The growth rate for this Union Territory was a staggering 55.9% (specifically 55.88%) during the period of 2001-2011.

• This rapid increase in population is largely attributed to industrialization and the consequent influx of migrant labor from other parts of the country seeking employment in the region's expanding industrial sectors.

• In terms of absolute numbers, its population increased from 220,490 in 2001 to 343,709 in 2011.

Additional Information

• Daman and Diu:

• Daman and Diu recorded the second-highest population growth rate among Union Territories at 53.8%.

• Similar to Dadra and Nagar Haveli, its growth was fueled by industrial development and migration. (Note: These two UTs were later merged into one in 2020).

• Puducherry:

• Puducherry recorded a decadal growth rate of 28.1%.

• While higher than the national average, it was significantly lower than the growth rates observed in Dadra and Nagar Haveli and Daman and Diu.

• Andaman and Nicobar Islands:

• The Andaman and Nicobar Islands recorded the lowest population growth rate among the Union Territories at approximately 6.9%.

• This slow growth is attributed to its remote geographical location and controlled migration policies to protect indigenous tribes and the environment.

Important Points

• The Census of India 2011 was the 15th National Census of the country since 1872 and the 7th after Independence.

• The national decadal growth rate of India between 2001 and 2011 was 17.7%.

• Among the States, Meghalaya recorded the highest growth rate (27.9%), while Nagaland was the only state to record a negative growth rate (-0.6%).

• The Census 2011 was conducted under the guidance of C. Chandramouli, who served as the Registrar General and Census Commissioner of India.

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• The motto of Census 2011 was 'Our Census, Our Future'.

Q90. Answer: (c) Sovereign, Socialist, Secular, Democratic, Republic

The correct answer is 'Sovereign, Socialist, Secular, Democratic, Republic'

Key Points

• Nature of the Indian State:

• The Preamble of the Indian Constitution serves as a brief introductory statement that sets out the guiding purpose, principles, and philosophy of the Constitution.

• It declares India to be a Sovereign, Socialist, Secular, Democratic, Republic. This sequence is vital as it defines the fundamental character of the Indian nation.

• Sovereign: This means India is an independent entity, not a dominion of any external power. It has the absolute right to legislate on any subject and manage its internal and external affairs.

• Socialist: Added by the 42nd Amendment in 1976, it implies "Democratic Socialism" where both public and private sectors co-exist, aiming to end poverty, ignorance, disease, and inequality of opportunity.

• Secular: Also added by the 42nd Amendment, it means that the state has no official religion and treats all religions with equal respect and protection.

• Democratic: It indicates that the Constitution has established a form of government that derives its authority from the will of the people expressed in elections.

• Republic: It means that the head of the state (the President) is elected and not a hereditary monarch.

Additional Information

• Federal:

• While India has a federal system with a distribution of powers between the Union and the States, the word "Federal" is not mentioned anywhere in the Preamble.

• In fact, the word "Federal" is not even used in Article 1 of the Constitution, which describes India as a "Union of States." Therefore, any combination including "Federal" is incorrect regarding the Preamble.

• Union:

• The word "Union" is used in Article 1 of the Indian Constitution ("India, that is Bharat, shall be a Union of States").

• However, the specific declaration of the nature of the state within the Preamble ends with "Republic," not "Union."

• Objectives of the Preamble:

• Apart from defining the nature of the state, the Preamble lists four main objectives: Justice (Social, Economic, and Political), Liberty (of thought, expression, belief, faith, and worship), Equality (of status and opportunity), and Fraternity (assuring the dignity of the individual and the unity and integrity of the nation).

Important Points

• The Preamble is based on the 'Objectives Resolution', drafted and moved by Pandit Jawaharlal Nehru, and adopted by the Constituent Assembly on January 22, 1947.

• It has been amended only once so far, by the 42nd Constitutional Amendment Act (1976), which added three new words: Socialist, Secular, and Integrity.

• In the Kesavananda Bharati case (1973), the Supreme Court held that the Preamble is a part of the Constitution and can be amended, provided that the "basic structure" is not destroyed.

• The date of adoption mentioned in the Preamble is November 26, 1949.

Q91. Answer: (b) 20–30%

The correct answer is '20–30%'

Key Points

• National Clean Air Programme (NCAP) Targets:

• The National Clean Air Programme (NCAP) was launched by the Ministry of Environment, Forest and Climate Change (MoEFCC) in January 2019 as a long-term, time-bound, national-level strategy.

• The original objective of the NCAP was to achieve a 20% to 30% reduction in Particulate Matter (PM10 and PM2.5) concentrations by 2024.

• The program set 2017 as the base year for the comparison of concentration of these pollutants.

• The primary goal of this initiative is to improve air quality in 122 "non-attainment" cities across India that did not meet the National Ambient Air Quality Standards (NAAQS) between 2011 and 2015.

• It emphasizes a collaborative approach between the central government, state governments, and local bodies to tackle air pollution at the source.

Additional Information

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• 60–70%:

• This range is significantly higher than any national air quality target set by the Indian government for the short-to-medium term. While some global climate models suggest such drastic reductions are necessary for long-term health, they were not part of the NCAP's original 2024 roadmap.

• 10–15%:

• This percentage is considered too low for a mission-mode national program like NCAP. The government aimed for a more substantial impact to address the severe public health crisis caused by air pollution in urban centers.

• 40–50%:

• While not the original target for 2024, it is important to note that in September 2022, the Central Government updated the target. The new goal is to achieve a 40% reduction in particulate matter concentration, but the deadline has been shifted to 2026.

• The original 2024 target specifically remained within the 20-30% bracket.

Important Points

• The NCAP is executed under the Ministry of Environment, Forest and Climate Change.

• The program utilizes a portal called PRANA (Portal for Regulation of Air-pollution in Non-Attainment cities) to monitor the implementation of the project.

• Strategies under NCAP include increasing the number of monitoring stations, creating city-specific action plans, and strengthening the ecosystem for air quality management.

• "Non-attainment cities" are those that consistently fail to meet the National Ambient Air Quality Standards (NAAQS) for PM10 (Particulate Matter 10 microns or less) or NO2 (Nitrogen Dioxide) over a period of five years.

Q92. Answer: (c) = CMU % = UEM

The logic followed here is:

For, # : NXF

So, # = CMU

Now, for JTB : %

So, % = UEM

Now, applying the same logic:

So, # = CMU and % = UEM

Hence, the correct answer is "Option 3".

Q93. Answer: (a) 33.33%

Shortcut Trick

CP × 48 = SP × 36

SP ÷ CP = 48 ÷ 36 = 4 ÷ 3

Profit = 4 − 3 = 1 unit

Profit % = (1 ÷ 3) × 100 = 33.33%

Therefore Answer = 33.33%

Alternate Method

Given:

Cost Price (CP) of 48 books = Selling Price (SP) of 36 books.

Formula used:

Profit % = [(SP − CP) ÷ CP] × 100

CP (3 units) SP (4 units) Profit = 1 unit Ratio CP : SP = 36 : 48 = 3 : 4

Calculations:

Let the cost price of 1 book be CP and the selling price of 1 book be SP.

=> 48 × CP = 36 × SP

=> SP ÷ CP = 48 ÷ 36

=> SP ÷ CP = 4 ÷ 3

=> Let CP = 3 and SP = 4

=> Profit = 4 − 3 = 1

=> Profit % = (1 ÷ 3) × 100 = 33.33%

Therefore The correct answer is 33.33% (Option 1).

Additional Information

General Formula for Object-based Profit/Loss

If CP of x articles = SP of y articles, then Profit or Loss % = [(x − y) ÷ y] × 100. If positive, it is profit; if negative, it is loss.

Loss Percentage

Loss occurs when CP > SP. Loss % = [(CP − SP) ÷ CP] × 100.

Relation between CP, SP and Discount

SP = Marked Price − Discount. Also, SP = CP × (100 + Profit%) ÷ 100.

Q94. Answer: (c) Vegetative methods and changing cropping pattern

The correct answer is 'Vegetative methods and changing cropping pattern'

Key Points

• Hill Areas Development Programme (HADP):

• The Hill Areas Development Programme was initiated to address the specific ecological and socio-economic challenges faced by hilly regions, focusing on sustainable land use.

• To increase the productivity of the land without causing environmental degradation, the programme emphasizes vegetative methods such as afforestation, pasture development, and the creation of social forestry.

• Changing cropping patterns is a core strategy, where farmers are encouraged to move away from soil-depleting practices or shifting cultivation toward horticulture and plantation crops that are better suited to the slope and climate.

• These methods aim to reduce soil erosion, improve water retention, and ensure long-term soil fertility, which are critical for the fragile ecosystems of hill stations.

Additional Information

• Importing high-yielding crops from plain regions:

• Crops developed for the plains often require specific climatic conditions and flat terrain that hilly regions cannot provide.

• Introduction of non-native high-yielding varieties can sometimes disrupt local biodiversity and may not be resistant to the unique pests or temperature fluctuations of high altitudes.

• Application of advanced mechanized technologies:

• While mechanization increases efficiency in the plains, the steep and rugged terrain of hill areas makes the use of heavy machinery (like large tractors or harvesters) difficult and often dangerous.

• Heavy mechanization can also lead to significant soil disturbance, increasing the risk of landslides and accelerated soil erosion.

• Use of chemical fertilizers and pesticide inputs:

• Excessive use of chemicals in hilly terrains is discouraged because the runoff from slopes quickly carries these toxins into mountain streams and valleys, causing widespread water pollution.

• The HADP instead promotes organic farming and integrated pest management to preserve the delicate ecological balance of the mountains.

Important Points

• The Hill Areas Development Programme was launched during the Fifth Five Year Plan (1974–78) covering 15 districts comprising all the hilly districts of Uttar Pradesh (now Uttarakhand), Mikir Hill and North Cachar hills of Assam, Khasi Hills of Meghalaya, etc.

• The National Committee on the Development of Backward Areas recommended that hill areas having a height of above 600 metres and not covered under tribal plans be treated as backward hill areas.

• The primary objective of the programme is ecological restoration along with the socio-economic development of the local communities.

• The strategy focuses on harnessing indigenous resources through animal husbandry, forestry, and small-scale industries while involving the local population in the planning process.

Q95. Answer: (a) 239B

The correct answer is '239B'

Key Points

• Article 239B:

• Article 239B of the Indian Constitution empowers the administrator of certain Union Territories (specifically those with a Legislative Assembly, like Puducherry) to promulgate ordinances during the recess of the Legislature.

• This power was inserted into the Constitution by the Constitution (Twenty-seventh Amendment) Act, 1971.

• An ordinance can be issued only when the Legislature is not in session and the administrator is satisfied that circumstances exist which render it necessary to take immediate action.

• However, the administrator cannot promulgate any such ordinance without prior instructions from the President in certain cases.

• Every such ordinance has the same force and effect as an Act of the Legislature of the Union Territory but must be laid before

the Legislature when it reassembles. It ceases to operate at the expiration of six weeks from the reassembly of the Legislature unless disapproved earlier.

Additional Information

• Article 239:

• This article deals with the general Administration of Union Territories.

• It states that every Union Territory shall be administered by the President acting, to such extent as he thinks fit, through an administrator appointed by him with such designation as he may specify.

• The President may also appoint the Governor of a neighboring State as the administrator of a Union Territory.

• Article 239AA:

• This article contains Special provisions with respect to Delhi.

• It was inserted by the 69th Amendment Act, 1991, which designated the Union Territory of Delhi as the National Capital Territory (NCT) of Delhi.

• It provided for a Legislative Assembly and a Council of Ministers for the NCT of Delhi.

• Article 241:

• This article relates to High Courts for Union Territories.

• It empowers the Parliament by law to constitute a High Court for a Union Territory or declare any court in any such territory to be a High Court for all or any of the purposes of the Constitution.

• For instance, the NCT of Delhi has its own High Court, while other UTs fall under the jurisdiction of High Courts of neighboring states.

Important Points

• The ordinance-making power of the administrator under Article 239B is analogous to the power of the President under Article 123 and the Governor under Article 213.

• Unlike the President or Governor, the administrator of a UT (under Article 239B) can only exercise this power when the Legislature is created by a law made by Parliament under Article 239A.

• If the Legislature is dissolved or suspended, the administrator cannot promulgate an ordinance.

Q96. Answer: (c) 675

Shortcut Trick

Ratio of shares (Lower Time : Higher Time) = (1 + r/100)^(Difference in years) : 1

Difference = 20 − 19 = 1 year | Ratio (Nitin : Pravin) = $(1 + 8/100)^1$: 1

Ratio = 1.08 : 1 = 108 : 100 = 27 : 25

Total parts = 27 + 25 = 52 units → Rs. 1404

1 unit = 1404 ÷ 52 = 27 | Pravin's share = 25 × 27

Therefore Answer = 675

Alternate Method

Given:

Total Amount = Rs. 1404, Rate (r) = 8% p.a., Nitin's time = 19 years, Pravin's time = 20 years

Formula used:

Amount (A) = P(1 + r/100)^t

Total: Rs. 1404 Nitin Pravin 19 Years 20 Years Same Final Amount

Calculations:

Let Nitin's share be N and Pravin's share be P.

=> N(1 + 8/100)^(19) = P(1 + 8/100)^(20)

=> N / P = (1 + 8/100)^(20) ÷ (1 + 8/100)^(19)

=> N / P = $(1 + 8/100)^1$ = 108/100 = 27/25

=> Total ratio parts = 27 + 25 = 52

=> 52 units = 1404

=> 1 unit = 1404 ÷ 52 = 27

=> Pravin's share (P) = 25 × 27 = 675

Therefore The correct answer is 675 (Option 3).

Additional Information

Compound Interest Formula

The amount after t years is A = P(1 + r/100)^t. Compound interest is A − P.

Difference between SI and CI

For 2 years, the difference between CI and SI is $D = P(r/100)^2$.

Effective Interest Rate

The effective annual rate for two years with rate r% is $R_{(eff)} = r + r + (r \times r)/100$.

Half-Yearly Compounding

If interest is compounded semi-annually, the rate becomes r/2 and the time period becomes 2t.

Q97. Answer: (c) Two

Given: Seven people F, G, H, I, V, W, and X are sitting around a circular table facing the centre of the table.

V sits fourth to the left of H.

H sits to the immediate right of W.

Only three people sit between W and X.

G sits to the immediate right of I.

Now, Between I and F = V, X => 2 people

Hence, the correct answer is Option 3.

Q98. Answer: (c) x = -10/3, y = 4, z = 7/3

Shortcut Trick

Subtract Eq(2) from Eq(1) to eliminate x and y: $(x + 2y + 4z) - (x + 2y + z) = 14 - 7 \Rightarrow 3z = 7 \Rightarrow z = 7/3$.

Identify options with z = 7/3: Options (1), (3), and (4).

Plug z = 7/3 into Eq(2) and Eq(3): $x + 2y = 14/3$ and $2x + y = -8/3$.

Multiply the second by 2 and subtract: $(4x + 2y) - (x + 2y) = -16/3 - 14/3 \Rightarrow 3x = -30/3 \Rightarrow x = -10/3$.

Substitute x in $2x + y = -8/3$: $2(-10/3) + y = -8/3 \Rightarrow y = -8/3 + 20/3 = 12/3 = 4$.

Therefore Answer = $x = -10/3$, $y = 4$, $z = 7/3$

Alternate Method

Given:

Eq(1): $x + 2y + 4z = 14$

Eq(2): $x + 2y + z = 7$

Eq(3): $2x + y + 2z = 2$

Formula used:

Method of Elimination for Linear Equations.

Eq 1: $x + 2y + 4z = 14$ Eq 2: $x + 2y + z = 7$ Eq 3: $2x + y + 2z = 2$ $z = 7/3$ $x = -10/3$, $y = 4$ (Eq 1 − Eq 2)

Calculations:

Subtract Eq(2) from Eq(1):

$\Rightarrow (x + 2y + 4z) - (x + 2y + z) = 14 - 7$

$\Rightarrow 3z = 7 \Rightarrow z = 7/3$

Substitute z = 7/3 in Eq(2):

$\Rightarrow x + 2y + 7/3 = 7 \Rightarrow x + 2y = 7 - 7/3 = 14/3 \rightarrow$ [Eq 4]

Substitute z = 7/3 in Eq(3):

$\Rightarrow 2x + y + 2(7/3) = 2 \Rightarrow 2x + y = 2 - 14/3 = -8/3 \rightarrow$ [Eq 5]

Multiply [Eq 5] by 2: $4x + 2y = -16/3$

Subtract [Eq 4] from this: $(4x + 2y) - (x + 2y) = -16/3 - 14/3$

$\Rightarrow 3x = -30/3 = -10 \Rightarrow x = -10/3$

Substitute $x = -10/3$ into [Eq 5]:

$\Rightarrow 2(-10/3) + y = -8/3 \Rightarrow y = -8/3 + 20/3 = 12/3 = 4$

Therefore The correct answer is $x = -10/3$, $y = 4$, $z = 7/3$ (Option 3).

Additional Information

Cramer's Rule

A system of linear equations AX = B can be solved using determinants where $x = D_x/D$, $y = D_y/D$, and $z = D_z/D$, provided $D \neq 0$.

Consistency of System

A system is consistent (has at least one solution) if the rank of the coefficient matrix A equals the rank of the augmented matrix [A|B].

Matrix Inversion Method

The variables can be found by X = A^(−1)B, where A^(−1) is the inverse of the coefficient matrix.

Infinite Solutions

If D = D_x = D_y = D_z = 0, the system may have infinitely many solutions or no solution (dependent on ranks).

Q99. Answer: (b) 184

Shortcut Trick

Total frequency sum: x + y = 52 − (8 + 18 + 2) = 24.

Using deviations from mean 50: Σf_id_i = 0.

8(−40) + 18(−20) + x(0) + 2(20) + y(40) = 0.

−320 − 360 + 40 + 40y = 0 => 40y = 640 => y = 16.

Substituting y: x = 24 − 16 = 8.

Therefore Answer = 9(8) + 7(16) = 72 + 112 = 184

Alternate Method

Given:

Mean = 50, Total frequency = 52, Classes and frequencies as per table.

Formula used:

Mean = (Σf_ix_i) ÷ Σf_i, where x_i is the midpoint of the class interval.

0 20 40 60 80 100 8 18 x 2 y Frequency Distribution (Total = 52, Mean = 50) Solving: x = 8, y = 16 → 9x + 7y = 184

Calculations:

Total Frequency: 8 + 18 + x + 2 + y = 52 => x + y = 24

=> Sum of weighted values: 10(8) + 30(18) + 50(x) + 70(2) + 90(y) = 52 × 50

=> 80 + 540 + 50x + 140 + 90y = 2600

=> 50x + 90y = 1840 => 5x + 9y = 184

=> 5(24 − y) + 9y = 184 => 120 + 4y = 184 => y = 16

=> x = 24 − 16 = 8

=> Value of (9x + 7y) = 9(8) + 7(16) = 72 + 112 = 184

Therefore The correct answer is 184 (Option 2).

Additional Information

Assumed Mean Method

Mean = A + (Σf_id_i ÷ Σf_i), where d_i = x_i − A and A is the assumed mean.

Empirical Relation

Mode = 3 × Median − 2 × Mean. This rule helps find missing central tendencies in moderately skewed distributions.

Sum of Deviations

The algebraic sum of deviations of a set of observations from their arithmetic mean is always zero: Σf_i(x_i − Mean) = 0.

Q100. Answer: (d) Two

Given: A, B, C, D, 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.

B lives on the topmost floor.

Only three people live between B and D.

F lives immediately above A, but immediately below E.

Floor	Person
6	B
5	E
4	F
3	A
2	D
1	C

Now, between F (4) and C (1): floors 2 and 3 → 2 people

Hence, the correct answer is Option 4.

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