COMBINED DEFENCE SERVICES (CDS) SOLVED PAPER 2023-I

MATHEMATICS

1. What is the largest number which divides both $2^{35} - 1$ and $2^{91} - 1$?
   (a) 34 (b) 90 (c) 127 (d) 129
2. What is the largest power of 10 that divides the product $29 \times 28 \times 27 \times ... 2 \times 1$?
   (a) 4 (b) 5 (c) 6 (d) 7
3. What is the remainder when 65^{99} is divided by 11?
   (a) 0 (b) 5 (c) 9 (d) 10
4. If the roots of the equation $x^2 - bx + c = 5$ differ by 5, then which one of the following is correct?
   (a) $b^2 = 4c + 5$ (b) $c^2 = 4b - 5$
   (c) $b^2 + c^2 = 5$ (d) $b^2 - c^2 = 5$
5. In a party of 150 persons, 75 persons take tea, 60 persons take coffee and 50 persons take milk. 15 of them take both tea and coffee, but no one taking milk takes tea. If each person in the party takes at least one drink, then what is the number of persons taking milk only?
   (a) 50 (b) 40 (c) 30 (d) 20
6. A, B, C, D and E enter into a business. They invest money in the ratio 2 : 3 : 4 : 5 : 6. However, the time invested by them is in the ratio 6 : 5 : 4 : 3 : 2. If the profit distributed is directly proportional to time and money invested, then who receives the highest amount of profit?
   (a) C (b) Both B and D
   (c) Both C and D (d) All get equal profit
7. Consider the following numbers:
   1. 437 2. 797
   3. 1073
   How many of the above numbers are prime?
   (a) Only one (b) Only two
   (c) All three (d) None
8. A can do a certain work at twice the speed of B. Further, B can do the same work at 1.5 times the speed of C. All of them together can finish the work in 12 days. In how many days can C alone finish the work?
   (a) 36 days (b) 45 days (c) 60 days (d) 66 days
9. The sum of digits of a 2–digit number is 12. When the digits are reversed, the number becomes greater by eighteen. What is the difference between the digits in the number?
   (a) 1 (b) 2 (c) 3 (d) 4
10. The time taken by a train to cross a man travelling in another train is 10 seconds, when the other train is travelling in the opposite direction. However, it takes 20 seconds, if both the trains are travelling in the same direction. The length of the first train is 200 m and that of the second train is 150 m. What is the speed of the first train?
    (a) 60 km/hr (b) 56 km/hr (c) 54 km/hr (d) 52 km/hr
11. If a, b, c, d, e and f satisfy $2a = 3b = 6c = 9d = 12e = 18f$, then what is the value of $(a + b)/(c + d + e + f)$?
    (a) 4/7 (b) 2 (c) 5/2 (d) 9/2
12. If a, b, c are non–zero real numbers such that $a + b + c = 0$, then what are the roots of the equation $ax^2 + bx + c = 0$?
    (a) 2, 1 + (c/a) (b) 1, a/c
    (c) 1, c/a (d) 2, (c/a) – 1
13. Twelve percent of bananas bought by a fruit vendor got lost during transportation. On selling the remaining bananas, the vendor's overall profit turned out to be 4%. If the vendor had not lost any bananas and had sold them at the price of the remaining bananas, what would have been his profit percentage?
    (a) $8\frac{1}{9}\%$ (b) $9\frac{1}{11}\%$
    (c) $18\frac{2}{11}\%$ (d) None of the above
14. If the positive square root of $(5 + 3\sqrt{2})(5 - 3\sqrt{2})$ is α, then what is the positive square root of $8 + 2\alpha$?
    (a) $2 + \sqrt{3}$ (b) $3 - \sqrt{2}$ (c) $\sqrt{7} - 1$ (d) $\sqrt{7} + 1$
15. When every even power of every odd integer (greater than 1) is divided by 8, what is the remainder?
    (a) 3 (b) 2
    (c) 1
    (d) The remainder is not necessarily 1.
16. Consider the following statements:
    1. If n is a natural number, then the number $\frac{n(n^2+2)}{3}$ is also a natural number.
    2. If m is an odd integer, then the number $\frac{m^4 + 4m^2 + 11}{16}$ is an integer.

    Which of the statements given above is/are correct?
    (a) 1 only (b) 2 only
    (c) Both 1 and 2 (d) Neither 1 nor 2

17. It is given that 5 does not divide n – 1, n and n + 1, where n is a positive integer. Which one of the following is correct?
(a) 5 divides $(n^2 + 1)$ (b) 5 divides $(n^2 – 1)$
(c) 5 divides $(n^2 + n)$ (d) 5 divides $(n^2 – n)$

18. What is the largest 5–digit number, which leaves remainder 7, when divided by 18 as well as by 11?
(a) 99981 (b) 99988
(c) 99997 (d) 99999

19. In a business dealing, A owes B ` 20,000 payable after 5 years, whereas B owes A ` 12,000 payable after 4 years. They want to settle it now at the rate of 5% simple interest. Who gives how much money in this settlement?
(a) Both are at par (b) B gives ` 6,000 to A
(c) A gives ` 6,000 to B (d) A gives ` 4,000 to B

20. Average marks in Mathematics of Section A comprising 30 students is 65 and that of Section B comprising 35 students is 70. What are the average marks (approximately) of both the sections if it was detected later that an entry of 47 marks was wrongly made as 74?
(a) 67.28 (b) 67.58 (c) 68.11 (d) 68.63

21. If α and β are the roots of the equation $x^2 – 7x + 1 = 0$, then what is the value of $\alpha^4 + \beta^4$?
(a) 2207 (b) 2247 (c) 2317 (d) 2337

22. Consider the following statements in respect of all factors of 360:
1. The number of factors is 24.
2. The sum of all factors is 1170.
Which of the above statements is/are correct?
(a) 1 only (b) 2 only
(c) Both 1 and 2 (d) Neither 1 nor 2

23. Consider a 6–digit number of the form XYXYXY. The number is divisible by:
(a) 3 and 7 only (b) 7 and 13 only
(c) 3, 13 and 37 only (d) 3, 7, 13 and 37

24. What is the HCF of $3^{29} – 9$ and $3^{38} – 9$?
(a) $3^9 – 1$ (b) $3^{11} – 1$ (c) $3^{11} – 3$ (d) $3^{11} – 9$

25. If $x = \sqrt{4\sqrt{4\sqrt{4\sqrt{4...}}}}$, then what is the value of x?
(a) 2 (b) 4 (c) 8 (d) 16

26. Let m and n be natural numbers. What is the minimum value of (m + n) such that 33m + 22n is divisible by 121?
(a) 3 (b) 4 (c) 5 (d) 10

27. The product of two numbers is 2160 and their HCF is 12. If the sum of the squares of the two numbers is 4896, then what is the mean of the two numbers?
(a) 24 (b) 36 (c) 48 (d) 96

28. The age of Q exceeds the age of P by 3 years. The age of R is twice the age of P and the age of Q is twice the age of S. Further, the age difference of R and S is 30 years. What is the sum of the ages of P and Q?
(a) 35 years (b) 38 years
(c) 39 years (d) 45 years

29. If a, b and c are the sides of a triangle ABC, then $\sqrt{a} + \sqrt{b} – \sqrt{c}$ is always:
(a) Negative (b) Positive
(c) Non–negative (d) Non–positive

30. There are four bells which ring at an interval of 15 minutes, 25 minutes, 35 minutes and 45 minutes respectively. If all of them ring at 9 A.M., how many more times will they ring together in the next 72 hours?
(a) 0 (b) 1 (c) 2 (d) 3

31. Let a, b, c and d be four positive integers such that $a + b + c + d = 200$. If $S = (–1)^a + (–1)^b + (–1)^c + (–1)^d$, then what is the number of possible values of S?
(a) One (b) Two (c) Three (d) Four

32. The number $97^{30} – 14^{30}$ is divisible by:
(a) 37 but not 83 (b) 83 but not 37
(c) Both 37and 83 (d) Neither 37 nor 83

33. Consider the following statements:
1. $\log_{10} 50$ is a rational number.
2. $\log_{100} 10$ is an irrational number.
Which of the statements given above is/are correct?
(a) 1 only (b) 2 only
(c) Both 1 and 2 (d) Neither 1 nor 2

34. If 17 women and 24 men can do a piece of work in 5 days and 12 women and 23 men can do it in 6 days, then which one of the following is correct?
(a) Efficiency of 13 women = Efficiency of 18 men
(b) Efficiency of 11 women = Efficiency of 16 men
(c) Efficiency of 13 women = Efficiency of 17 men
(d) Efficiency of 11 women = Efficiency of 15 men

35. Three taps A, B and C together can fill a tank in 6 hours. Tap C alone can fill the tank in 12 hours. To fill the tank, when it is empty, all the three taps are started together. After working t hours, tap C is closed and the tank is filled in 8 more hours. What is t equal to?
(a) 1 (b) 2
(c) 4 (d) 6

36. A, B and C can complete a work in x, 1.5x and 2x days respectively. If they complete the work together, in what ratio should they be paid?
(a) 2 : 3 : 4 (b) 6 ; 4 : 3 (c) 3 : 2 : 1 (d) 4 : 3 : 2

37. Consider the following statements?
1. $n^3 – n$ is divisible by 6.
2. $n^5 – n$ is divisible by 5.
3. $n^5 – 5n^3 + 4n$ is divisible by 120.
Which of the statements given above are correct?
(a) 1 and 2 only (b) 2 and 3 only
(c) 1 and 3 only (d) 1, 2 and 3

38. What is the last digit of the sum $S = 9^{27} + 27^9$?
(a) 3 (b) 6 (c) 7 (d) 9

39. If $x=\frac{\sqrt{3}+1}{\sqrt{3}-1}$ and $y=\frac{\sqrt{3}-1}{\sqrt{3}+1}$, then what is the value x^3-y^3?

(a) 60 (b) $45\sqrt{3}$ (c) $30\sqrt{3}$ (d) 90

40. The speed of a boat in still water is 15 km/hr. If it can travel 42 km downstream and 28 km upstream in the same time, then what is the speed of the stream?

(a) 2.5 km/hr (b) 3 km/hr (c) 4.5 km/hr (d) 6 km/hr

41. What is the difference between simple interest and compound interest on ` 10,000 for two years at 20% per annum compounded half–yearly?

(a) ` 842 (b) ` 756 (c) ` 641 (d) ` 542

42. Consider the following statements in respect of the polynomial $a(b-c)(x-b)(x-c)+b(c-a)(x-c)(x-a)+c(a-b)(x-a)(x-b)$:

1. The coefficient of x^2 is 0.
2. The coefficient of x is $(a-b)(b-c)(c-a)$.

Which of the statements given above is/are correct?

(a) 1 only (b) 2 only
(c) Both 1 and 2 (d) Neither 1 nor 2

43. Consider the following statements in respect of the polynomial $1-x-x^n+x^{n+1}$, where n is a natural number:

1. It is divisible by $1-2x+x^2$.
2. It is divisible by $1-x^n$.

Which of the statements given above is/are correct?

(a) 1 only (b) 2 only
(c) Both 1 and 2 (d) Neither 1 nor 2

44. For what values of m, is $mx^2+mx+8x+9$ a perfect square?

(a) 1, 4 (b) 4, 9 (c) 9, 16 (d) 4, 16

45. If $x=a+b+\frac{(a-b)^2}{4a+4b}$ and $y=\frac{a+b}{4}+\frac{ab}{a+b}$, then what is the value of $(x-a)^2-(y-b)^2$?

(a) a^2 (b) b^2 (c) ab (d) a^2b^2

46. Consider the following;

1. $\cos^4\theta-\sin^4\theta=\frac{2\tan\theta}{1-\tan^2\theta}, 0<\theta<\frac{\pi}{2}$
2. $\operatorname{cosec}\theta+\cot\theta=\frac{1}{\operatorname{cosec}\theta-\cot\theta}, 0<\theta<\frac{\pi}{2}$
3. $\cos^2\theta-\sin^2\theta=\frac{1-\tan^2\theta}{1+\tan^2\theta}, 0<\theta<\frac{\pi}{2}$

Which of the above equations are identities?

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

47. If $\sin\theta=\frac{12}{13}$, then what is the value of $(\tan\theta+\sec\theta)^2(\operatorname{cosec}\theta-\cot\theta)^{-2}$, $0<\theta<\frac{\pi}{2}$?

(a) $\frac{121}{4}$ (b) $\frac{169}{9}$ (c) $\frac{196}{9}$ (d) $\frac{225}{4}$

48. If $\tan^8\theta+\cot^8\theta=m$, then what is the value of $\tan\theta+\cot\theta$?

(a) $\sqrt{\sqrt{m+2}+2}$ (b) $\sqrt{\sqrt{\sqrt{m+4}+2}}$
(c) $\sqrt{\sqrt{\sqrt{m+2}+2}+2}$ (d) $\sqrt{\sqrt{\sqrt{m+4}+2}+2}$

49. What is the minimum value of $6-4\sin\theta, 0\le\theta\le\frac{\pi}{2}$?

(a) 1 (b) 2 (c) 4 (d) 6

50. What is the value of x that satisfies
$4\cos^2 30°+2x\sin 30°-\cot^2 30°-6\tan 15°\tan 75°=0$?

(a) 1 (b) 2 (c) 3 (d) 6

51. What is the value of $\frac{\cos^2 32°+\cos^2 58°}{\sec^2 50°-\cot^2 40°}+4\tan 13°\tan 37°\tan 53°\tan 77°$?

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

52. What is the value of $(1+\cot^2\theta)(1+\cos\theta)(1-\cos\theta)-(1+\tan^2\theta)(1+\sin\theta)(1-\sin\theta)$?

(a) –1 (b) 0 (c) 1 (d) 2

53. If $2\cos^2\theta+\sin\theta-2=0, 0<\theta\le\frac{\pi}{2}$, then what is the value of θ?

(a) $\frac{\pi}{6}$ (b) $\frac{\pi}{4}$ (c) $\frac{\pi}{3}$ (d) $\frac{\pi}{2}$

54. A person on the top of a vertical tower observes a car moving at a uniform speed coming directly towards it. If it takes 6 minutes for the angle of depression to change from 30° to 45°, and further t minutes to reach the tower, which one of the following is correct?

(a) $7.7<t<8$ (b) $8<t<8.3$
(c) $8.3<t<8.6$ (d) $8.6<t<8.9$

55. A woman is standing on the deck of a ship, which is h (in metres) above water level. She observes the angle of elevation of the top of a tower as 60° and the angle of depression of the base of the tower as 30°. What is the height of the tower?

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

56. Let ABC be a right–angled triangle with sides 5 cm, 12 cm and 13 cm. If p is the length of the perpendicular drawn from vertex A on the hypotenuse BC, then what is the value of 13p?

(a) 24 (b) 48 (c) 60 (d) 90

57. OABC is a rhombus whose three vertices lie on a circle with centre at O. If the area of the rhombus is $32\sqrt{3}$ square cm, then what is the radius of the circle?

(a) 4 cm (b) 6 cm (c) 8 cm (d) 16 cm

58. The surface area of a cube is increased by 25%. If p is the percentage increase in its length, then which one of the following is correct?
(a) $16 < p < 18$ (b) $14 < p < 16$
(c) $12 < p < 14$ (d) $10 < p < 12$

59. A solid cube is cut into two cuboids of equal volume. What is the ratio of total surface area of the given cube to that of one of the cuboids?
(a) 2 : 1 (b) 3 : 2 (c) 4 : 3 (d) 5 : 3

60. The length of a diagonal of a cuboid is 11 cm. The surface area is 240 square cm. What is the sum of its length, breadth and height?
(a) 16 cm (b) 17 cm (c) 18 cm (d) 19 cm

61. What is the area of the circle (approximately) inscribed in a triangle with side lengths 12 cm, 16 cm and 20 cm?
(a) 48 square cm (b) 50 square cm
(c) 52 square cm (d) 54 square cm

62. Two times the total surface area of a solid right circular cylinder is three times its curved surface area. If h is the height and r is the radius of the base of the cylinder, then which one of the following is correct?
(a) $h = r$ (b) $h = 2r$ (c) $2h = 3r$ (d) $3h = 4r$

63. A floor of a big hall has dimensions 30 m 60 cm and 23 m and 40 cm. It is to be paved with square tiles of same size. What is the minimum number of tiles required?
(a) 30 (b) 36 (c) 169 (d) 221

64. How long will a man take to walk around the boundary of a square field of area 25 hectares at the rate of 5 km/hr?
(a) 36 minutes (b) 30 minutes
(c) 24 minutes (d) 18 minutes

65. Let x be the area of a square inscribed in a circle of radius r and y be the area of an equilateral triangle inscribed in the same circle. Which one of the following is correct?
(a) $9x^2 = 16y^2$ (b) $27x^2 = 64y^2$
(c) $36x^2 = 49y^2$ (d) $16x^2 = 21y^2$

66. If the length of a rectangle is increased by $66\frac{2}{3}\%$, then by what percent should the width of the rectangle be decreased in order to maintain the same area?
(a) 50% (b) 45% (c) 40% (d) 35%

67. What is the maximum area that can be covered by three non–intersecting circles drawn inside a rectangle of sides 8 cm and 12 cm?
(a) 16π square cm (b) 18π square cm
(c) 20π square cm (d) 24π square cm

68. ABCD is a square field with AB = x. A vertical pole OP of height 2x stands at the centre O of the square field. If $\angle APO = \theta$, then what is $\cot\theta$ equal to?
(a) $\sqrt{2}$ (b) 2 (c) $2\sqrt{2}$ (d) $3\sqrt{2}$

69. A solid iron ball is melted and 64 smaller solid balls of equal size are made using the entire volume of iron. What is the ratio of the surface area of the larger ball to the sum of the surface areas of all the smaller balls?
(a) 0.25 (b) 0.5 (c) 0.75 (d) 1

70. A triangle ABC has been divided into four smaller triangles P, Q, R, S whose perimeters are 16 cm, 12 cm, 4 cm and 12 cm respectively. P, R and S contain the vertices A, B and C respectively. What is the perimeter of the triangle ABC?
(a) 18 cm (b) 20 cm (c) 22 cm (d) 24 cm

*For the next **ten (10)** items that follow:*
Each item contains a Question followed by two Statements. Answer each item using the following instructions:
(a) Choose this option if the Question can be answered by one of the Statements alone but not by the other.
(b) Choose this option if the Question can be answered by either Statement alone.
(c) Choose this option if the Question can be answered by using both the Statements together, but cannot be answered by using either Statement alone.
(d) Choose this option if the Question cannot be answered even by using both Statements together.

71. A number 277XY5 (where X, Y are digits) is divisible by 25.
Question: What is the value of X?
Statement I: The given number is divisible by 9.
Statement II: $X > 5$.

72. *Question:* What are the unique values of a, b and c if 2 is a root of the equation $ax^2 + bx + c = 0$?
Statement I: Ratio of c to a is 1.
Statement II: Ratio of b to a is (–5/2).

73. *Question:* Is $m > n$, where m, n are non–zero numbers?
Statement I: $\frac{m}{n} > 1$.
Statement II: $m > 2n$.

74. *Question:* Can a circle be drawn through the points A, B and C?
Statement I: AB = 5 cm, BC = 5 cm, CA = 6 cm.
Statement II: AB = 3 cm, BC = 4 cm, CA = 7 cm.

75. x and y are consecutive odd integers.
Question: Can the value of $(x + y)$ be determined uniquely?
Statement I: $(x + y)^4 = 256$.
Statement II: $(x + y)^3 < 16$.

76. *Question:* Is $p^2 + q^2 + q$ odd, where p, q are positive integers?
Statement I: $2p + q$ is odd.
Statement II: $q - 2p$ is odd.

77. *Question:* What is the area of the circle C?
Statement I: An arc of length 7 cm subtends an angle 30° at the centre of C.
Statement II: A chord of length 10 cm subtends an angle 90° at the centre of C.

78. *Question:* Is triangle Δ right angled?
Statement I: The length of the line segment joining the mid–points of two sides of Δ is half of the third side of Δ.
Statement II: The angles of Δ are in the ratio 1 : 2 : 3.

79. The lengths of two longer sides of the triangle Δ are 25 cm and 24 cm.
Question: What is the length of the shortest side?
Statement I: The angles of Δ are in the ratio 1 : 2 : 3.
Statement II: The length of the perpendicular drawn on the longest side of Δ from its opposite vertex is 6.72 cm.

80. A chord PQ of the circle C divides it into two segments such that 3 times the area of the major segment is 4 times the area of the minor segment.
Question: What is the radius of C?
Statement I: Area of the minor segment is 66 square cm.
Statement II: Area of the major segment is 88 square cm.

*Consider the following data for the next **two (02)** items that follow:*

Class	0-30	30-60	60-90	90-120
Frequency	4	5	7	4

81. What is the mode of the distribution?
(a) 60 (b) 72 (c) 75 (d) 80

82. If the median (P) and mode (Q) satisfy the relation $7(Q - P) = 9R$, then what is the value of R?
(a) 6 (b) 5 (c) 3 (d) 1

*Consider the following data for the next **two (02)** items that follow:*

Class	40-50	50-60	60-70	70-80
Frequency	4	3	1	2

83. What is the mean of the distribution?
(a) 51 (b) 52 (c) 54 (d) 56

84. If M is the median, then what is the value of 3M?
(a) $53\frac{1}{3}$ (b) 60 (c) 160 (d) 180

85. The plinth of a house has an area of 200 square metres. It is rectangular in shape and its length and breadth are in the ratio 2 : 1. The owner of the house extends the terrace by 1 m on each side. What is the percentage of area that has increased in the terrace relative to the plinth?
(a) 40% (b) 32% (c) 20% (d) 15.5%

86. A square sheet of side length 44 cm is rolled along one of its sides to form a cylinder by making opposite edges just to touch each other. What is the volume of the cylinder?
(Take $\pi = \frac{22}{7}$)
(a) 6776 cubic cm (b) 6248 cubic cm
(c) 5896 cubic cm (d) 5680 cubic cm

87. The volume of a cuboid is 3600 cubic cm. The areas of two adjacent faces are 225 square cm and 144 square cm. What is the area of the other adjacent face?
(a) 400 square cm (b) 360 square cm
(c) 320 square cm (d) 300 square cm

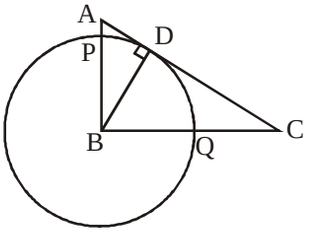
88. The perimeter and the area of a right–angled triangle are 36 cm and 54 square cm respectively. What is the length of the hypotenuse?
(a) 12 cm (b) 14 cm (c) 15 cm (d) 16 cm

89. Let
$X = \{x \mid x = 2 + 4k$, where $k = 0, 1, 2, 3, \ldots 24\}$. Let S be a subset of X such that the sum of no two elements of S is 100. What is the maximum possible number of elements in S?
(a) 10 (b) 11
(c) 12 (d) 13

90. The perimeter of a sector of a circle of radius 5.2 cm is 16.4 cm. What is the area of the sector?
(a) 15.6 square cm (b) 15 square cm
(c) 14.4 square cm (d) 14.1 square cm

*Consider the following for the next **three (03)** items that follow:*

In the triangle ABC, AB = 6 cm, BC = 8 cm and AC = 10 cm. The perpendicular dropped from B meets the side AC at D. A circle of radius BD (with centre B) cuts AB and BC at P and Q respectively as shown in the figure.



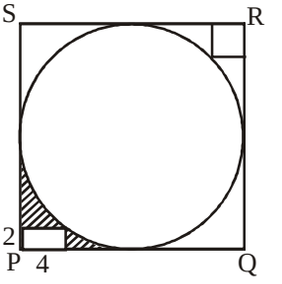
91. What is the length of QC?
(a) 4.4 cm (b) 4.2 cm (c) 3.6 cm (d) 3.2 cm

92. If $\angle ABD = \theta$, then what is $\sin\theta$ equal to?
(a) 0.4 (b) 0.5 (c) 0.6 (d) 0.8

93. What is the radius of the circle?
(a) 5 cm (b) 4.8 cm (c) 4.4 cm (d) 4 cm

*Consider the following for the next **three (03)** items that follow:*

In the figure given below, a circle is inscribed in a square PQRS. A rectangle at the corner P that measures 4 cm × 2 cm and a square at the corner R are drawn.



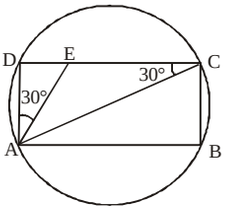
94. What is the area of the circle?
(a) 100π square cm (b) 96π square cm
(c) 50π square cm (d) 48π square cm

95. What is the area of the smaller square?
(a) $50\left(3-\sqrt{2}\right)$ square cm
(b) $25\left(3-2\sqrt{2}\right)$ square cm
(c) $25\left(3+2\sqrt{2}\right)$ square cm
(d) $50\left(3-2\sqrt{2}\right)$ square cm

96. What is the area of the shaded region?
(a) $(96 - 25\pi)$ square cm (b) $(92 - 25\pi)$ square cm
(c) $(96 - 16\pi)$ square cm (d) $(92 - 16\pi)$ square cm

*Consider the following for the next **two (02)** items that follow:*

In the following figure, a rectangle ABCD is inscribed in a circle of radius r. Given $\angle DAE = 30°$ and $\angle ACD = 30°$.



97. What is the ratio of the area of the circle to the area of the rectangle?

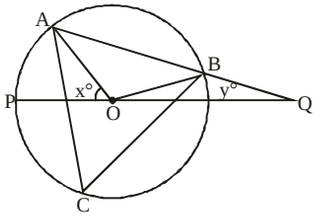
(a) $\frac{\pi}{\sqrt{2}}$ (b) $\frac{\pi}{\sqrt{3}}$ (c) $\frac{2\pi}{\sqrt{3}}$ (d) $\frac{3\pi}{\sqrt{2}}$

98. What is the area of Δ AEC?

(a) $\frac{r^2}{\sqrt{3}}$ (b) $\frac{r^2}{2\sqrt{3}}$ (c) $\frac{r^2}{3\sqrt{3}}$ (d) $\frac{2r^2}{\sqrt{3}}$

*Consider the following for the next **two (02)** items that follow:*

In the following figure, a triangle ABC is inscribed in a circle with centre at O. Let $\angle POA = x°$ and $\angle OQB = y°$. Further, OB = BQ.



99. What is the relation between x and y?

(a) x = y (b) 2x = 3y (c) x = 3 y (d) 3x = 4y

100. If y = 15, then what is $\angle ACB$ equal to?

(a) 30° (b) 40° (c) 45° (d) 60°

GENERAL KNOWLEDGE

1. A sprinter feels cramps and pain in the thigh muscles after a run. This is due to accumulation of

(a) lactic acid (b) CO_2
(c) pyruvic acid (d) ethanol

2. A leaf was plucked from a plant on a sunny day and kept for 2 minutes in boiling water. It was subsequently immersed in boiling alcohol and treated with iodine solution. What will be the final colour of the leaf after the test?

(a) Colourless (b) Green
(c) Blue (d) White

3. If the red blood cells (RBCs) of human blood are isolated and are diluted in normal saline (an isotonic solution to blood), what will happen to the RBCs?

(a) The RBCs will swell
(b) The RBCs will swell and burst
(c) The RBCs will shrink
(d) No change in the diameters of the RBCs

4. Which one of the following statements regarding bile secreted by liver is not correct?

(a) Bile contains enzymes for digestion of lipids.
(b) Bile facilitates emulsification of fats.
(c) Bile neutralizes the acidic pH of the food coming from stomach.
(d) Bile makes the pH of the food alkaline and facilitates action of pancreatic enzymes.

5. The blood pressure of a normal human being is found to be 120/80 mmHg. These 'numbers' represent the blood pressure at

(a) ventricular contraction and ventricular relaxation, respectively
(b) ventricular relaxation and ventricular contraction, respectively
(c) auricular contraction and auricular relaxation, respectively
(d) ventricular contraction and auricular contraction, respectively

6. A person burned a firecracker in front of a cliff and heard its echo 5s after it burst. The distance of the cliff from the person, if the speed of the sound is 340 m/s, is close to

(a) 1700 m (b) 170 m (c) 85 m (d) 850 m

7. Consider the following statements about the microphone and the speaker of a mobile phone:

1. The microphone converts sound to a mechanical signal.
2. The microphone converts sound to an electrical signal.
3. The speaker converts a mechanical signal to sound.
4. The speaker converts an electrical signal to sound.

Which of the statements given above are correct?

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

8. A 100 W electric bulb is used for 10 hours a day. How many units of electrical energy are consumed by the bulb in 3 days? (1 unit = 1 kWh)

(a) 3.00 (b) 1.08 (c) 2.16 (d) 0.33

9. The area under the velocity–time graph for a particle moving in a straight line with uniform acceleration gives

(a) its average velocity
(b) its net displacement
(c) the distance travelled by it
(d) its average speed

10. The power of a lens of focal length 10 cm is

(a) 0.1 dioptre (b) 1 dioptre
(c) 10 dioptre (d) 100 dioptre

11. Consider the following statements regarding burning of magnesium ribbon in air:

1. White powder of MgO is formed.
2. It is an example of combustion reaction.
3. Heat and light are produced.

Which of the statements given above are correct?

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

12. Which of the following statements with regard to the reaction given below are correct?
$CaO(s) + H2O(l)$ $Ca(OH)2$ $(aq) + Heat$
1. Quicklime is used for whitewashing of walls.
2. The solution of slaked lime is used for whitewashing of walls.
3. CaO reacts slowly with CO2 in air to form a thin layer of CaCO3 on walls.
4. Calcium hydroxide called 'slaked lime' is an inorganic compound.
Select the correct answer using the code given below.
(a) 1 and 4 only (b) 2 and 4
(c) 2 and 3 (d) 1, 3 and 4

13. Which of the following statements with regard to heating of lead nitrate powder over a flame are correct?
1. Brown fumes of NO are released.
2. Colourless O2 gas is released.
3. It is an example of oxidation reaction.
4. It is an example of thermal decomposition used for the production of NO2 gas.
Select the correct answer using the code given below.
(a) 1 and 2 (b) 2, 3 and 4
(c) 1, 3 and 4 (d) 2 and 4 only

14. Which one of the following is not an oxidation reaction?
(a) Rusting of iron (b) Opening of soda bottle
(c) Rancidity (d) Combustion

15. Consider the following clues about a State of India:
1. It is known as 'land of red river and blue hills'.
2. It contains three of the six physiographic divisions of India.
3. It covers about 2.39 percent of total areas of the country.
Identify the state on the basis of the given clues.
(a) Karnataka (b) Andhra Pradesh
(c) Assam (d) Chhattisgarh

16. Which of the following sets of States shares boundary with Telangana?
(a) Odisha, Andhra Pradesh, Karnataka, Maharashtra
(b) Chhattisgarh, Andhra Pradesh, Karnataka, Madhya Pradesh
(c) Odisha, Andhra Pradesh, Karnataka, Madhya Pradesh
(d) Chhattisgarh, Andhra Pradesh, Karnataka, Maharashtra

17. Rani told her friends that last year she did boating in four different lakes, namely, Loktak, Barapani, Kolleru and Pulicat. Which of the following States did she visit?
(a) Manipur, Meghalaya, Kerala, Tamil Nadu
(b) Manipur, Meghalaya, Andhra Pradesh, Tamil Nadu
(c) Mizoram, Assam, Kerala, Tamil Nadu
(d) Mizoram, Assam, Andhra Pradesh, Tamil Nadu

18. According to the Census 2011, which of the following statements is/are correct?
1. A person who can only read but cannot write, is not literate.
2. A person aged seven years and above, who can both read and write with understanding in any language is treated as literate.
Select the correct answer using the code given below.
(a) 1 only (b) 2 only
(c) Both 1 and 2(d) Neither 1 nor 2

19. The Tropic of Cancer passes through how many coastal and landlocked States of India, respectively?
(a) 1 and 7 (b) 2 and 6
(c) 2 and 5 (d) 3 and 5

20. Which one of the following situations can lead to inflation?
(a) Rapid growth of aggregate demand outweighing supply
(b) Sluggish growth of aggregate demand
(c) Reduction in the money supply
(d) Higher levels of unemployment

21. Which of the following policies help to raise interest rate unambiguously and thereby lead to appreciation of currency?
(a) Expansionary fiscal and monetary policy
(b) Contractionary fiscal and monetary policy
(c) Contractionary fiscal policy and expansionary monetary policy
(d) Contractionary monetary policy and expansionary fiscal policy

22. The contraction of private investment spending due to deficit spending by the Government is called
(a) crowding out (b) crowding in
(c) pump priming (d) dumping

23. Which among the following is/are the objective/objectives of the NITI Aayog?
1. Imposing policies on the States/UT's
2. Allocation of funds at National and State levels
3. Design strategies and long–term policies and programme frame–works
State the correct answer using the code given below.
(a) 1 and 2 only (b) 2 and 3 only
(c) 1, 2 and 3 (d) 3 only

24. The computation of poverty in terms of Monthly Per Capita Consumption Expenditure (MPCE) based on the Mixed Reference Period was recommended by the
(a) Lakdwala Committee (b) Tendulkar Committee
(c) Dandekar Committee (d) Alagh Committee

25. Which of the following is/are the sub–mission/sub–missions of the National Skill Development Mission (NSDM)?
1. Institutional training 2. Overseas employment
3. Leveraging of public infrastructure
Select the correct answer using the code given below.
(a) 1 only (b) 2 only
(c) 1, 2 and 3 (d) 2 and 3 only

26. Which of the following strategies is/are adopted for implementing the POSHAN Abhiyaan?
1. Inter–sectoral convergence for better service delivery
2. Use of technology (ICT) for real–time growth monitoring of women and children
Select the correct answer using the code given below.
(a) 1 only (b) 2 only
(c) Both 1 and 2 (d) Neither 1 nor 2

27. Which of the following conditions is/are necessary for the issue of a writ of certiorari in India?
1. There should be a tribunal or an officer having legal authority to determine questions affecting rights of subjects and having a duty to act judicially.
2. Such tribunal or officer has acted without jurisdiction.
Select the correct answer using the code given below.
(a) 1 only (b) 2 only
(c) Both 1 and 2 (d) Neither 1 nor 2

28. Who among the following Chief Justices of India ordered the constitution of a Special Bench called 'Social Justice Bench'?
(a) Justice H. L. Dattu (b) Justice K. G. Balakrishnan
(c) Justice R. M. Lodha (d) Justice Y. K. Sabharwal

29. Who among the following is the author of the book, Bandi Jivan?
(a) Rash Behari Bose (b) Veer Savarkar
(c) Aruna Asaf Ali (d) Sachindranath Sanyal

30. In the election held in 1937, in which two provinces was the Indian National Congress not able to emerge as the single largest party?
(a) Punjab and Sind
(b) Assam and North–West Frontier Province
(c) Punjab and Assam
(d) Assam and Madras

31. Consider the following statements:
After forming the Indian National Army, Subhas Chandra Bose
1. recruited a larger number of soldiers from the Indian Prisoners of War in Japanese camp
2. introduced a women's detachment named after the Rani of Jhansi
Which of the statements given above is/are correct?
(a) 1 only (b) 2 only
(c) Both 1 and 2 (d) Neither 1 nor 2

32. Which one of the following pairs denoting various forms of 'Bhakti' is not correctly matched?
(a) Saguna : Belief in Gods with attributes
(b) Nirguna : Belief in Gods without attributes
(c) Alvars : Believed in devotion of Shakti
(d) Nayanars : Believed in devotion of Shiva

33. Which two rivers flow in the region between Gulbarga and Vijayanagara Hampi?
(a) Narmada and Godavari
(b) Mahanadi and Godavari
(c) Kaveri and Periyar
(d) Krishna and Tungabhadra

34. Which of the following is the only paramilitary force with a dual control structure?
(a) Central Reserve Police Force
(b) Assam Rifles
(c) Indo–Tibetan Border Police
(d) Central Industrial Security Force

35. Which one of the following is an ethnic community of Assam?
(a) Bhil (b) Gond (c) Ahom (d) Adi

36. The Chevrons is the name of the cricket team of which one of the following countries?
(a) Australia (b) The Netherlands
(c) Ireland (d) Zimbabwe

37. Cheetahs, brought form Namibia, were introduced in India to which one of the following National Parks?
(a) Kaziranga National Park
(b) Keoladeo Ghana National Park
(c) Keibul Lamjao National Park
(d) Kuno National Park

38. Who among the following is not a recipient of the Nobel Prize in Physics in 2022?
(a) Alain Aspect (b) John F. Clauser
(c) Klaus Hasselmann (d) Anton Zeilinger

39. Reflex arcs are evolved in animals for quick and efficient responses. Which one of the following sequences correctly represents a reflex arc?
(a) Receptor–Sensory neuron–Relay neuron in spinal cord–Brain–Motor neuron–Effector
(b) Receptor–Sensory neuron–Brain–Relay neuron in spinal cord–Motor neuron–Effector
(c) Receptor–Motor neuron–Relay neuron in spinal cord–Sensory neuron–Effector
(d) Receptor–Motor neuron–Brain–Sensory neuron–Effector

40. Which one of the following is essential for thyroid gland to make thyroxin?
(a) NaCl (b) KCl (c) Cholesterol (d) Iodine

41. In plant cells, RNA is present in
(a) cytoplasm only
(b) nuclei and cytoplasm only
(c) nuclei, cytoplasm, mitochondria, chloroplast and endoplasmic reticulum
(d) nuclei, cytoplasm, mitochondria, chloroplast and ribosomes

42. In grasses, intercalary meristem is usually located at
(a) root tip (b) lateral sides of stem
(c) base of leaves (d) shoot tip

43. Xylem is a type of complex tissue in plants for upward conduction of water. Which one of the following xylem tissues consists of living cells?
(a) Tracheid (b) Vessel
(c) Xylem parenchyma (d) Xylem fibre

44. Three resistors of resistances 11 W, 22 W and 33 W are connected in parallel. Their equivalent resistance is equal to
(a) 66 W (b) 22 W (c) 12 W (d) 6 W

45. The r.m.s. potential difference between the red live wire and black neutral wire in Indian domestic electric supply is
(a) 160 V (b) 220 V (c) 300 V (d) 410 V

46. The hydrogen bomb and the uranium bomb are based, respectively on
(a) nuclear fusion and fission
(b) fission and thermonuclear fusion
(c) geothermal fission and fusion
(d) geothermal fusion and fission

47. Sound and light waves are
(a) respectively longitudinal and transverse in air
(b) respectively transverse and longitudinal in air
(c) both longitudinal in air
(d) both transverse in air

48. A car moving with a speed of 12 m/s is subjected to brakes which produces a deceleration of 6 m/s2. The car takes 2 s to stop after the application of brakes. What is the distance covered by the car after the application of brakes?
(a) 12m (b) 24m (c) 36m (d) 48m

49. What is the chemical composition of a soda–acid type fire extinguisher?
(a) Solution of sodium hydrogen carbonate and sulfuric acid
(b) Solution of sodium carbonate and sulfuric acid
(c) Solution of carbon dioxide and sulfuric acid
(d) Solution of sodium chloride and sulfuric acid

50. Consider the following statements:
While diluting concentrated nitric acid solution
1. the concentration of [H3O+] ions/volume increases
2. water must be added slowly to concentrated acid
3. acid must be added slowly to water
Which of the statements given above is/are correct?
(a) 1, 2 and 3 (b) 1 and 2 only
(c) 3 only (d) 2 and 3 only

51. Which one of the following is the correct order of pH for the given substances?
(a) Coffee < Lemon juice < Milk of magnesia < Blood
(b) Milk of magnesia < Blood < Coffee < Lemon juice
(c) Lemon juice < Blood < Coffee < Milk of magnesia
(d) Lemon juice < Coffee < Blood < Milk of magnesia

52. Which one of the following is not true for anodizing process?
(a) It makes aluminium corrosion resistant.
(b) Metals like aluminium, titanium and magnesium can be anodized.
(c) Clean aluminium article is the anode and oxygen gas is evolved at the cathode.
(d) It is used in aircraft industry.

53. Naphthalene burns with a yellow sooty flame. This is because
(a) carbon to hydrogen ratio is low
(b) there is incomplete combustion
(c) there is excess supply of air
(d) of presence of impurities of nitrogen and sulfur

54. Which of the following statements are true for the reaction of Fe2O3 with aluminium?
1. It is known as the 'thermite reaction'.
2. The heat evolved is used for welding purpose.
3. Aluminium metal acts as an oxidizing agent.
4. Molten Fe nad Al are formed at the end of the reaction.
Select the correct answer using the code given below.
(a) 1 and 2 (b) 1 and 3 (c) 2 and 4 (d) 1 and 4

55. Vicky told his friends about his visit to Stewart Island, Bay of Plenty and Hawke Bay. Which country did Vicky visit?
(a) Canada (b) Australia
(c) New Zealand (d) Ireland

56. Manav is planning to visit all UNESCO World Heritage Sites in Delhi. He will be visiting
(a) Red Fort, Qutab Minar, Jama Masjid
(b) Red Fort, India Gate, Qutab Minar
(c) Red Fort, Qutab Minar, Humayun Tomb
(d) Red Fort, Humayun Tomb, India Gate

57. What will be the correct sequence of cities on the bank of river Ganga if someone moves from west to east?
(a) Prayagraj, Kanpur, Bhagalpur, Patna
(b) Prayagraj, Kanpur, Patna, Bhagalpur
(c) Kanpur, Prayagraj, Bhagalpur, Patna
(d) Kanpur, Prayagraj, Patna, Bhagalpur

58. Which one among the following States has the longest extension in north–south direction?
(a) Jharkhand (b) Telangana
(c) Odisha (d) Chhattisgarh

59. Match List–I with List–II and select the correct answer using the code given below the Lists?

List–I (Day)	**List–II (Date)**
A. World Wetlands Day	1. 29 July
B. International Tiger Day	2. 22 April
C. World Water Day	3. 2 February
D. International Mother Earth Day	4. 22 March

Code:

	A	B	C	D		A	B	C	D
(a)	3	4	1	2	(b)	3	1	4	2
(c)	2	1	4	3	(d)	2	4	1	3

60. Which one of the following States/UTs is not among the top five in the Performance Grading Index (PGI), published by the Ministry of Education for the year 2020–2021?
(a) Kerala (b) Punjab
(c) NCT of Delhi (d) Chandigarh

61. Consider the following statements and identify the actress:
She is a renowned film actress, director and producer, and an accomplished Indian classical dancer. She was conferred the Padma Shri in 1992 and has served as the Head of Central Board for Film Certification from 1998 to 2001. In recognition to her exemplary lifetime contribution to Indian Cinema, she was honoured with the prestigious Dadasaheb Phalke Award.
(a) Vyjayanthimala (b) Waheeda Rehman
(c) Mala Sinha (d) Asha Parekh

62. Which one of the following is the venue of the UN 2023 Water Conference?
(a) Washington, DC (b) New York
(c) San Diego (d) New Delhi

63. Which of the following statements is/are correct?
1. Tomb of Sand, written by Geetanjali Shree, is the first book originally written in any Indian language to win the International Booker Prize.
2. Tom of Sand is the first novel translated from Hindi to be given the International Booker Prize.
Select the correct answer using the code given below.
(a) 1 only (b) 2 only
(c) Both 1 and 2 (d) Neither 1 nor 2

64. The eighth edition of the Exercise Garuda Shakti, a bilateral military–to–military exercise, was conducted recently between the special forces of India and
(a) Japan (b) Indonesia
(c) Bhutan (d) Myanmar

65. Which one of the following is a measure that can be used by the Government for combatting inflation?
(a) Increasing the non–planned expenditure on defence, police, etc.
(b) Providing more subsidies on exports
(c) Increasing the rate of interest on savings and fixed deposits
(d) Reduction in the cash reserve ratio (CRR)

66. The sustained decrease in the general price level is called as
(a) deflation (b) stagflation
(c) devaluation (d) recession

67. Which one of the following indicators is included in the National Multidimensional Poverty Index (MPI)?
(a) Years of schooling (b) Literacy rate
(c) Life expectancy (d) Per capita income

68. The unemployment that occurs due to changes in the technology or in the demand for particular products is called
(a) frictional unemployment
(b) structural unemployment
(c) cyclical unemployment
(d) disguised unemployment

69. Which of the following is/are the objective/objectives of the Pradhan Mantri Swasthya Suraksha Yojana (PMSSY)?
1. Correcting regional imbalances in the availability of tertiary health care services
2. Providing universal access to public health services and universal immunization
3. Augmenting facilities for quality medical education in the country

Select the correct answering using the code given below.
(a) 1 and 3 only (b) 2 and 3 only
(c) 1 only (d) 1, 2 and 3

70. Who among the following political leaders suggested the dissolution of the Indian National Congress as a political organization and its replacement by a Lok Sevak Sangh?
(a) Vallabhbhai Patel (b) Dr. B. R. Ambedkar
(c) M. K. Gandhi (d) Jawaharlal Nehru

71. India is the first country in the world to deploy an all–woman contingent to a UN Peacekeeping Mission. In which country did this mission operate?
(a) Liberia (b) Sudan
(c) Burundi (d) Croatia

72. Which one among the following is not a part of the SWAYAM programme?
(a) Video lectures
(b) Classroom lectures
(c) Online discussion forum for clearing doubts
(d) Specially prepared material that can be downloaded/ printed

73. Which one among the following Departments/Authorities is not under the Ministry of Home Affairs?
(a) The Department of States
(b) The Department of Official Language
(c) The National Authority Chemical Weapons Convention
(d) The Department of Jammu, Kashmir and Ladakh Affairs

74. Who among the following is given discretionary powers under the Fifth Schedule of the Constitution of India to set up a Tribes Advisory Council in a State which has Scheduled Tribes but not Scheduled Areas?
(a) The Governor of the concerned State
(b) The President of India
(c) The Inter–State Council
(d) The Parliament of India

75. Which of the following States/UT's are included in the Northern Zonal Council?
(a) Uttarakhand, Uttar Pradesh, Haryana, Punjab, Jammu and Kashmir
(b) Haryana, Punjab, Himachal Pradesh, Rajasthan and NCT of Delhi
(c) Uttar Pradesh, Uttarakhand, Punjab, Haryana and Rajasthan
(d) Uttarakhand, Uttar Pradesh, Himachal Pradesh, Punjab and Haryana

76. The notion of kinship projected by the Kushana rulers is best evidenced through which of the following?
(a) Their identification with deities
(b) Grants to religious institutions
(c) Inscriptional panegyrics
(d) Coins and sculpture

77. Who among the following were referred to as the 'Theris' in ancient India?
(a) Respected women
(b) Elder nuns in Buddhism
(c) Women denied the Bhikkhuni status
(d) Women expelled from the Buddhist Sangha

78. Which member of the Servants of India Society founded the Seva Samiti at Allahabad in 1914?
(a) Shri Ram Bajpai (b) Hriday Nath Kunzru
(c) S. G. Vaze (d) Srinivas Shastri

79. The First Anglo–Maratha War was concluded by which one of the following?
(a) The Treaty of Surat
(b) The Treaty of Purandar
(c) The Convention of Wadgaon
(d) The Treaty of Salbai

80. Name the battle in which the Travancore King defeated the Dutch in 1741.
(a) The Battle of Porto Novo
(b) The Battle of Colachel
(c) The Battle of Pollilore
(d) The Battle of Changanessery

81. In which one of the following revolts did the Koya and Konda tribal chiefs rise against the local overlord from a Mansabdar family?
(a) The Rampa Rebellion, 1879–1880
(b) The Gudem Uprising, 1886
(c) The Rampa Rebellion, 1922–1924
(d) The Telangana Armed Struggle, 1946–1951

82. Which country won the FIFA World Cup (Men) for maximum number of times?
(a) Argentina (b) Brazil
(c) France (d) Spain

83. Who among the following is the author of the famous novel, City of Joy?
(a) Larry Collins (b) Dominique Lapierre
(c) Rudyard Kipling (d) Mark Tully

84. Who among the following is honoured with the UN Environment Programme's 2022 Champions of the Earth Award in the Entrepreneurial Vision category?
(a) Ela Bhatt (b) Amit Dasgupta
(c) Purnima Devi Barman (d) Vanshika Parmar

85. The theme of India's G20 Presidency 'Vasudhaiva Kutumbakam' or 'One Earth–One Family–One Future' is drawn from the
(a) Maha Purana (b) Maha Upanishad
(c) Rig Veda (d) Smriti

86. The 16th edition of Indo–Nepal annual joint training exercise in jungle warfare and counter terrorism operations was held in December 2022 at Nepal Army Battle School, Saljhandi. What is the name of this exercise?
(a) Sampriti (b) Mitra Shakti
(c) Yudh Abhyas (d) Surya Kiran

87. If it is 10:00 a.m. at Greenwich Mean Time (GMT), then what will be the time at 90° E longitude?
(a) 5:00 a.m. (b) 4:00 a.m.
(c) 3:00 p.m. (d) 4:00 p.m.

88. Which of the following groups of planets is termed as 'gas planets' as they are composed primarily of lighter ices, liquids and gases?
(a) Mars, Jupiter, Neptune, Uranus
(b) Jupiter, Uranus, Neptune, Saturn
(c) Saturn, Mars, Jupiter, Neptune
(d) Neptune, Saturn, Mars, Uranus

89. Consider the following characteristics of a soil type:
1. These soils consist of various proportions of sand, silt and clay.
2. These soils contain adequate proportions of potash, phosphoric acid and lime.
3. These soils can be further classified on the basis of their age.

Identify the type of soil on the basis of the given characteristics.
(a) Alluvial (b) Laterite (c) Arid (d) Black

90. Consider the following statements and identify the correct answer using the code given below:
1. In a thermal power station, fuels such as oil, coal or natural gas are used to generate electricity.
2. Fuels are burned to heat water and turn it into steam, which goes through a turbine, which spins and turns, generating electricity.

Code:
(a) Statement 1 is correct but statement 2 is not correct
(b) Statement 2 is correct but statement 1 is not correct
(c) Both the statements are correct and statement 2 explains statement 1
(d) Both the statements are correct but statement 2 does not explain statement 1

91. Indus river basin is extended up to
(a) Ladakh, Jammu and Kashmir, Himachal Pradesh, Punjab
(b) Ladakh, Jammu and Kashmir, Punjab, Haryana
(c) Ladakh, Jammu and Kashmir, Punjab, Haryana, Rajasthan
(d) Ladakh, Jammu and Kashmir, Himachal Pradesh, Punjab, Haryana, Rajasthan

92. Which one of the following statements about the Solicitor General of India (SGI) is not correct?
(a) The SGI is the Government's chief legal advisor.
(b) The SGI is the secondary law officer of the country.
(c) The post of the SGI is a constitutional post.
(d) The SGI is appointed by the Appointments Committee of the Cabinet.

93. Which one of the following committees does not have members from the Rajya Sabha?
(a) The Public Accounts Committee
(b) The Committee on Public Undertakings
(c) The Estimates Committee
(d) The Committee on the Welfare of Scheduled Castes and Scheduled Tribes

94. Which one of the following statements about the election of the President of India is not correct?
(a) A Union Minister shall not be eligible for election as the President.
(b) The President is elected by the elected members of the Parliament and the Legislative Assemblies of States and Union Territories.
(c) The Electoral College does not include elected members of the Legislative Councils.
(d) The system of proportional representation of means of single transferable vote is followed.

95. The Citizenship Act, 1955 deals with the determination of citizenship on or after
(a) 26th January, 1950 (b) 26th November, 1949
(c) 15th August, 1947 (d) 14th August, 1947

96. According to the National Multi–dimensional Poverty Index (MPI) constructed by the NITI Aayog, a household is considered deprived if
1. a single member of the household is identified as under–nourished
2. the body mass index of a woman member, between 15 years and 49 years of age, is below 18.5 kg/m2

Select the correct answer using the code given below.
(a) 1 only (b) 2 only
(c) Both 1 and 2 (d) Neither 1 nor 2

97. The titles of 'Rayagajakesari' and 'Dayagajakesari' were associated with which one of the following dynasties?
(a) Kakatiya (b) Vijayanagara
(c) Gajapati (d) Rashtrakuta

98. Name the location of the musical inscription containing groups of musical notes arranged for the benefit of his pupils by a king in the seventh or eighth century CE.
(a) Ennayiram (b) Uttaramerur
(c) Siyyamangalam (d) Kudumiyamalai

99. In the context of eighteenth century India, what was 'Dastak?
(a) Signature
(b) Land document
(c) Trade permit
(d) Tax on textiles

100. Which one of the following was primarily associated with 'Dadni' system?
(a) Textile production
(b) Warfare
(c) Payment to officials
(d) Revenue collection

101. Consider the following statements about Kanaganahalli archaeological site:
1. It is situated on the bank of Bhima river.
2. The remains of the Kanaganahalli Stupa can be dated between 1st and 3rd centuries CE.
3. Emperor Ashoka's image was found at the site.
Which of the statements given above are correct?
(a) 1 and 2 only (b) 2 and 3 only
(c) 1 and 3 only (d) 1, 2 and 3

102. Which of the following statements about volcanoes are correct?
1. The strength of a volcano is measured by the Volcanic Explosive Index.
2. Iceland and Philippines were created by volcanic activity.
3. Volcanic soils are rich, deep and fertile and allow intensive agriculture to take place.
Select the correct answer using the code given below.
(a) 1 and 2 only (b) 2 and 3 only
(c) 1 and 3 only (d) 1, 2 and 3

103. Consider the following characteristics of a cloud type:
1. They are born through convection.
2. Only cloud type that can produce hail, thunder and lightning.
3. They are large cauliflower–shaped towers, often 'anvil tops'.
Identify the type of cloud on the basis of the given characteristics.
(a) Stratocumulus (b) Cumulonimbus
(c) Cirrocumulus (d) Nimbostratus

104. Meena wants to show diagrammatically how two sets of data, namely, population size and number of services are related to each other. Which one of the following will be the most suitable for the presentation?
(a) Pie chart (b) Scatter graph
(c) Bar chart (d) Triangular graph

105. Which one of the following Indian States has the longest coastline?
(a) Tamil Nadu (b) Gujarat
(c) Maharashtra (d) Andhra Pradesh

106. Which of the following statements is/are correct?
1. Visakhapatnam Port is a landlocked harbour.
2. Deendayal Port is a tidal port.
Select the correct answer using the code given below.
(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

107. There is an increase in forest cover area of India between 2011 an 2021. However, there is a decrease in forest cover area of India during the same period in
(a) very dense forest (canopy density of more than 70 percent)
(b) moderately dense forest (canopy density between 40–70 percent)
(c) open forest (canopy density between 10–20 percent)
(d) Both (b) and (c)

108. Consider the following statements concerning the National Education Policy, 2020:
1. At least 50 percent of the learners through school and higher education system to get exposure to vocational education by 2025.
2. Secondary schools should collaborate with ITIs, Polytechnics and local industries.
3. Vocational education to be exclusively provided by NGOs.
Which of the statements given above is/are correct?
(a) 1 only (b) 1 and 2 only
(c) 2 and 3 only (d) 1, 2 and 3

109. Which of the following sets of States is at the bottom of the Composite SDG India Index, 2022–2021 as per the NITI Aayog?
(a) Assam, Jharkhand, Bihar
(b) Uttar Pradesh, Jharkhand, Bihar
(c) Uttar Pradesh, Bihar, Assam
(d) Odisha, Bihar, Jharkhand

110. Which one of the following is not a part of Article 51 of the Constitution of India?
(a) Promote international peace and security
(b) Maintain just and honourable relations between nations
(c) Use of UN peacekeeping force for resolution of international disputes
(d) Encourage settlement of international disputes by arbitration

111. Who among the following was not in the core leadership of the Non–Aligned Movement (NAM) in its formative phase?
(a) Kwame Nkrumah (b) Gamal Abdel Nasser
(c) Jawaharlal Nehru (d) Fidel Castro

112. In respect to Balutedars, which of the statements given below are correct?
1. They were village servants and artisans.
2. They were employed by individual peasant family.
3. They existed in the Medieval Deccan and Maharashtra.
Select the correct answer using the code given below.
(a) 1 and 2 only (b) 2 and 3 only
(c) 1 and 3 only (d) 1, 2 and 3

113. Which one of the following Viceroys was the first to officially shift his Council to Simla in summer season?
(a) John Lawrence (b) Lord Dalhousie
(c) Lord Mayo (d) William Bentinck

114. Who among the following is the author of Maze Vidyapeeth, the famous poem about the life of working class of Bombay?
(a) Narayan Surve (b) Amol Palekar
(c) Bhalchandra Nemade (d) Narendra Jadhav

115. Who among the following founded the Hindu Dharma Sabha in the 19th century?
(a) Radhakanta Deb
(b) Ram Mohan Roy
(c) Dwarkanath Tagore
(d) Keshab Chandra Sen

116. The resolution adopted by the United Nations General Assembly on 3 March, 2021 decided to celebrate the year 2023 as the International Year of
(a) Basic Sciences for Sustainable Development
(b) Glass
(c) Millets
(d) Camelids

117. Karthik Meiyappan, who secured hat–trick in the ICC Men's T20 World Cup, 2022, represents
(a) Zimbabwe (b) United Arab Emirates
(c) Sri Lanka (d) Namibia

118. Which one of the following statements about the Wassenaar Arrangement is not correct?
(a) There are 42 participating nations in the Arrangement.
(b) It is formed primarily as a nuclear weapon overseer.
(c) India is the current Chairman of the Arrangement.
(d) India joined the Arrangement in the year 2017.

119. Who among the following is known as 'Payyoli Express'?
(a) Hima Das (b) Dutee Chand
(c) P. T. Usha (d) Shiny Abraham

120. Match List–I with List–II relating to Sahitya Akademi Award Winners, 2022 and select the correct answer using the code given below the Lists:

List–I (Title and Genre)	**List–II (Author)**
A. Bhool Satya (Short Stories)	1. Kamal Ranga
B. Tumadi Ke Shabd (Poetry)	2. Veena Gupta
C. Chhe Roopak (Drama)	3. Badri Narayan
D. Alekhun Amba (Play)	4. Manoj Kumar Goswami

Code:

	A	B	C	D
(a)	1	2	3	4
(b)	1	3	2	4
(c)	4	3	2	1
(d)	4	2	3	1

ENGLISH

WORDL CLASSES

Directions : *Each of the following sentences has word/words underlined. Read the sentence carefully and find which word class the underlined word/words belongs/belong to. Indicate your response on the Answer Sheet accordingly.*

1. (a) Noun (b) Demonstrative Pronoun
(c) Participle (d) Conjunction

2. Without health there is no <u>happiness</u>.
(a) Noun (b) Pronoun (c) Adjective (d) Adverb

3. You have <u>no</u> sense.
(a) Noun (b) Determiner
(c) Adverb (d) Preposition

4. <u>None</u> of these cars is in use.
(a) Reflexive Pronoun
(b) Demonstrative Pronoun
(c) Distributive Pronoun
(d) Indefinite Pronoun

5. We shall now begin to work.
(a) Adverb (b) Adjective
(c) Conjunction (d) Pronoun

6. <u>Owing to</u> his ill health, he retired from business.
(a) Conjunction (b) Preposition
(c) Participle (d) Determiner

7. My sister is just sixteen and <u>therefore</u> not eligible to vote.
(a) Gerund (b) Adverb
(c) Adjective (d) Conjunction

8. They tried <u>to</u> find fault with us.
(a) Participle (b) Verb
(c) Infinitive (d) Gerund

9. <u>Which</u> way shall we go?
(a) Noun (b) Gerund
(c) Conjunction (d) Adjective

10. <u>Alas!</u> He is dead.
(a) Determiner (b) Conjunction
(c) Preposition (d) Interjection

FILL IN THE BLANKS

Directions : *Each of the following sentences in this section has a blank space and is followed by four choices. Select the most appropriate choice is fill in the blank space.*

11. He was _____ speaker that I had ever heard.
(a) the most eloquent (b) the more eloquent
(c) very eloquent (d) eloquent

12. What was the name of the person to _____ you spoke on the phone?
(a) who (b) whom (c) whose (d) which

13. Have you seen Mohan _____?
(a) lately (b) yesterday
(c) lastly (d) late

14. We live in -_____ an old house.
(a) rather (b) fairly (c) quite (d) pretty

15. I'm playing tennis tomorrow unless _____.
(a) it rains (b) it doesn't rain
(c) it rained (d) it may rain

16. The _____ of the car is unknown.
(a) make up (b) making (c) made up (d) make

17. He paid his debts _____ to the last penny.
(a) down (b) over (c) full (d) fully

18. Developing _____ in a diverse country requires detailed planning.
(a) growth (b) scarcity
(c) poverty (d) infrastructure

19. _____ provisions have been made to support agriculture.
(a) Procurement (b) Subsidized
(c) Adequate (d) Capital

20. The ____ growth in the Indian financial markets can be attributed to a number of reforms.
(a) efficiency (b) phenomenal
(c) catastrophe (d) meteor

ORDERING OF CHUNKS IN A SENTENCE

Directions **:** Each of the following items in this section consists of a sentence, chunks of which have been jumbled up. These chunks have been labelled as P, Q, R and S. Each sentence is followed by four sequences, namely (a), (b), (c) and (d) indicating the rearrangement of the chunks. You are required to select the most appropriate option.

21. India has become (P) with time (Q) accounting for 25 per cent (R) of the total available water (S) the world's largest extractor of groundwater
(a) PQRS (b) PRSQ (c) QPSR (d) QRPS

22. present existential perils (P) all over the world (Q) the extremes (R) of climate change (S)
(a) RSPQ (b) PRSQ (c) QPSR (d) QRPS

23. the company forecasts (P) aviation market amongst (Q) the G20 (R) countries that India will be the fastest growing (S)
(a) RSPQ (b) PSQR (c) SPQR (d) QRPS

24. near villages or herder camps (P) shangdongs are traditional (Q) stonewalls, usually built (R) trapping pits with inverted (S) funnel–shaped
(a) RSPQ (b) SPQR (c) PRSQ (d) QSRP

25. several antiquities from other (P) nations over the years (Q) India has (R) brought back (S)
(a) RSPQ (b) RQSP (c) QRSP (d) QSPR

26. the Aravalli hill ranges (P) of the Yamuna river and (Q) are spread out over the natural landscapes (R) the biodiversity parks (S)
(a) PRSQ (b) QRSP (c) SRQP (d) QSPR

27. the family found out (P) their mother's friends were going to (Q) that some of Poland in a car (R) (S)
(a) PRQS (b) QSPR (c) SPRQ (d) RQSP

28. earth may seem immense (P) from the perspective of humans (Q) and almost limitless (R) living on its surface (S)
(a) PQRS (b) SPRQ (c) QSPR (d) RPSQ

29. in terms of trading volumes, (P) have grown substantially (Q) market capitalization and turnover (R) the Indian financial (S) markets
(a) PQRS (b) QRPS (c) RSPQ (d) SQPR

30. emerge at last into a (P) those who passed through (Q) country of unearthly beauty (R) that valley of darkness (S)
(a) PRQS (b) QSPR (c) RPQS (d) SQRP

IDIOMS AND PHRASES

Directions : *Given below are some idioms/phrases followed by four alternative meanings to each. Choose the response (a), (b), (c) or (d) which is the most appropriate meaning and mark your response on the Answer Sheet accordingly.*

31. Have an axe to grind
(a) to have a selfish aim or motive
(b) a thing that causes problems
(c) an essential equipment for work
(d) to behave arrogantly

32. Bite the bullet
(a) to be angry and unhappy
(b) to start doing something in a very keen way
(c) to accept something unpleasant and difficult
(d) to try to do more than you are able to do

33. Laughing stock
(a) someone who does something very stupid and is made fun of
(b) to avoid conflict
(c) to laugh at someone secretly
(d) a jovial and respected person

34. Pay over the odds
(a) to get dividends for investments
(b) to work hard to make payments
(c) to treat someone in the bad way
(d) to pay more for something than it is worth

35. Play to the gallery
(a) to do something alone
(b) to say things that will make people admire you
(c) to behave in a very annoying way
(d) to take big risks in business

36. Be in the soup
(a) to be in trouble
(b) to be very healthy
(c) to be good at the workplace
(d) to be honest to people

37. A turn of the screw
(a) to begin to behave in a more positive way
(b) to change people's opinions in your favour
(c) to become unpopular
(d) an action which makes a bad situation worse

38. A white elephant
(a) someone who is completely good and honest
(b) something that has cost a lot of money but has no useful purpose
(c) a situation where you waste time looking for something
(d) to make someone feel anxious

39. A hot potato
(a) someone who is very angry
(b) something that is difficult to deal with
(c) someone who is holier than appears to be
(d) to be unable to decide

40. Apples and oranges
(a) people who are close to each other
(b) people who argue a lot
(c) people who are different and thus incomparable
(d) people who fight over minor issues

SPOTTING ERRORS

Directions : *Each item in this section has a sentence with three underlined parts labelled as (a), (b) and (c). Read each sentence to find out whether there is any error in any underlined part and indicate your response on the Answer Sheet against the corresponding letter, i.e., (a) or (b) or (c). If you find no error, your response should be indicated as (d).*

41. Guest is unwelcome when he stays too long. No error
(a) (b) (c) (d)

42. My friend and benefactor has come. No error
(a) (b) (c) (d)

43. Either he or I am mistaken. No error
(a) (b) (c) (d)

44. Each of these substances are found in India. No error
(a) (b) (c) (d)

45. Who do you wish to see? No error
(a) (b) (c) (d)

46. It was one of the best speeches that has ever been made
(a) (b)
in the Parliament. No error
(c) (d)

47. I played with same bat that you used. No error
(a) (b) (c) (d)

48. His written statement defers in several important respects
(a) (b)
from his oral statement. No error
(c) (d)

49. I have ordered for three cups of coffee. No error
(a) (b) (c) (d)

50. One must not boast of one's own success. No error
(a) (b) (c) (d)

SYNONYMS

Directions : *Each item in this section consists of a sentence with an underlined word followed by four words/groups of words. Select the option that is* ***nearest in meaning*** *to the underlined word and mark your response on the Answer Sheet accordingly.*

51. There are plenty of graduates anxious for work.
(a) composed (b) eager
(c) indifferent (d) prominent

52. The power of the monarchy was circumscribed by the new law.
(a) constrained (b) naturalized
(c) circumvented (d) notified

53. We caught him eavesdropping outside the window.
(a) wandering aimlessly (b) talking loudly
(c) listening secretly (d) reflecting calmly

54. The party leader exhorted his members to start preparing for the formation of their government.
(a) expected (b) urged
(c) facilitated (d) discouraged

55. The local people are hospitable to strangers.
(a) surly (b) distant
(c) frosty (d) cordial

56. Such traditional methods seem incongruous in our technical age.
(a) unswerving (b) constant
(c) unvarying (d) inappropriate

57. Mohan has mercurial temperament.
(a) volatile (b) pleasant
(c) agreeable (d) merciful

58. It is obligatory for all employees to wear protective clothing.
(a) voluntary (b) elective
(c) optional (d) essential

59. She has a genetic predisposition to liver disease.
(a) resistance (b) immunity
(c) vulnerability (d) exemption

60. She wore a sardonic smile on her face.
(a) mocking (b) respectful
(c) reverential (d) deferential

ORDERING OF SENTENCES

Directions : *In this section, each item consists of six sentences of a passage. The first and sixth sentences are marked as S1 and S6. The middle four sentences in each have been jumbled up and labelled as P, Q, R and S. This is followed by four options each suggesting a sequence of the sentences. Identify the most appropriate option.*

61. S1: Like many of its tropical counterparts, India was a colony of Britain, which ruled out any move to adjust the exchange rate.
S6 : Banks were left with unrecoverable assets.
P : Indebted business failed.
Q : With devaluation made politically impossible, fall in export demand led to sustained and deep deflation.
R : Indebted households liquidated a variety of assets to repay loans when they could.
S : Real interest rates rose.
The correct sequence should be
(a) RSPQ (b) QSRP (c) SQPR (d) PSRQ

62. S1 : Consider the potential effect of just a small increase in the earth's atmospheric temperature.
S6 : If the sea level rose only a few feet, dozens of coastal cities would be destroyed and life would change utterly.
P : Some deserts might anyway bloom.
Q : But lands now fertile might turn to deserts, and many hot climates could become uninhabitable.
R : A rise of only a few degrees could melt the polar ice caps and submerge the planet in a short time.
S : Rainfall patterns would change.
The correct sequence should be
(a) SQPR (b) RQSP (c) RSPQ (d) QRSP

63. S1 : In the ancient times, the kings and the royal families had their own banner and seal.
S6 : So the high officials commanded great respect because of the descent, ability and character.
P :All the members of the royal family shared in the administration as far as possible.
Q : The royal palace was maintained in a great state.
R : The king was in theory an autocrat.
S : There were opportunities to influence the king in the formulation of policies.
The correct sequence should be
(a) RSPQ (b) QRPS (c) PQSR (d) QPSR

64. S1 : The rise of East Asia in the late twentieth century may ultimately prove to be a more important world–historical event than the collapse of communism.
S6 : Translated into political terms, this means that industrial capitalism is always accompanied by liberal democracy.
P : In the final two decades of the twentieth century, economic growth rates on the western rim of the Pacific Basin were between two and four times higher than those in the 'developed' economics of Europe and North America.
Q :The widespread assumption has been that modernization means westernization.
R :Certainly, the balance of the world's economy shifted markedly from the West to the East in this period.
S :However, the notion that there is distinctively East Asia political form is less familiar one.
The correct sequence should be
(a) RSPQ (b) PQSR (c) SPQR (d) RPSQ

65. S1: Manipur has a long and glorious history from before the beginning of the Christian Era.
S6 : Manipur regained its independence in 1947 and merged into Indian Union in 1949.
P : Then, Manipur came under the British rule in 1891.
Q : The independence and sovereignty remained uninterrupted until the Burmese invasion and occupation for around seven years in the first quarter of the 19th century (1819–1826).
R : The political history of Manipur could be traced back to 33 AD with the coronation of Nongda Lairen Pakhangba.
S : After Pakhangba, a number of kings ruled over the Kingdom of Manipur.
The correct sequence should be
(a) RSPQ (b) PQRS (c) RSQP (d) QPRS

66. S1 : In agriculture, water is mainly used for irrigation.
S6 : Hence, it is difficult to practice agriculture without assured irrigation during dry seasons.
P : The large tracts of the country are deficient in rainfall and are drought prone.
Q : Winter and summer seasons are more or less dry in most part of the country.
R :Irrigation is needed because of spatio–temporal variability in rainfall in the country.
S : North–Western India and Deccan Plateau constitute such areas.
The correct sequence should be
(a) RPSQ (b) RSPQ (c) SPQR (d) QPRS

67. S1 : Vijayanagara or 'city of victory' was the name of both a city and an empire.
S6 :They remembered it as Hampi, a name derived from that of the local Mother Goddess, Pampadevi.
P : In its heyday, it stretched from the river Krishna in the North to the extreme South of the peninsula.
Q : The empire was founded in the fourteenth century.
R : In 1565, the city was destroyed and subsequently deserted.
S : Although it fell into ruin in the seventeenth–eighteenth centuries, it lived on in the memories of people living in the Krishna–Tungabhadra Doab.
The correct sequence should be
(a) PRQS (b) SPRQ (c) QPRS (d) RSPQ

68. S1 :During the past two decades, many organizations in both the manufacturing and service sectors have faced dramatic changes in their business environment.
S6 :These changes have had a significant influence on management accounting systems.
P : To succeed in today's highly competitive environment, companies have made customer satisfaction an overriding priority.
Q : They have also adopted new management approaches and manufacturing companies have changed their manufacturing systems and invested in new technologies.
R : Deregulation and extensive competition from overseas companies in domestic markets have resulted in a situation in which most companies now operate in a highly competitive global market.
S : At the same time there has been a significant reduction in product life cycles arising from technological innovations and the need to meet increasingly discriminating customer demands.
The correct sequence should be
(a) PQRS (b) RSPQ (c) SRQP (d) QPRS

69. S1 : Gregor Johann Mendel was born on July 22, 1822 in Austria.
S6: Based on his experiments on a total of seven characteristics in garden pea, he established Law of Segregation and Law of Independent Assortment.
P : His pioneering work laid the foundation of science of genetics and therefore, he is known as the 'Father of Genetics'.
Q : There he was exposed to the lab facilities and got interested in research and teaching.
R : In 1843, Mendel began studying even while being a monk at St. Thomas Monastery in Brno.
S : His experiments focused on cross–breeding of pea plants and gathering data on the variations of several generations.
The correct sequence should be
(a) RSPQ (b) PQSR
(c) PRQS (d) SPQR

70. S1 :Mahatma Gandhi found in salt a powerful symbol that could unite the nation.
S6 : The tax on salt and the government monopoly over its production, Mahatma Gandhi declared, revealed the most oppressive face of the British rule.
P : On 31 January, 1930, he sent a letter to Viceroy Irwin stating eleven demands.
Q : The idea was to make the demands wide–ranging, so that all classes within Indian society could identify with them and everyone could be brought together in a united campaign.
R : Salt was something consumed by the rich and the poor alike, and it was one of the most essential items of food.
S : The most stirring of all was the demand to abolish the salt tax.
The correct sequence should be
(a) PQSR (b) SRQP (c) RPQS (d) QPRS

ANTONYMS

Directions : *Each item in this section consists of a sentence with an underlined word followed by four words or groups of words. Select the option that is* ***opposite in meaning*** *to the underlined word and mark your response on the Answer Sheet accordingly.*

71. Brevity is the soul of wit.
(a) concision (b) economy
(c) terseness (d) verbosity
72. Blend the grains to make a smooth paste.
(a) separate (b) mingle
(c) coalesce (d) amalgamate
73. The project wasted a considerable amount of time and money.
(a) substantial (b) trifling
(c) plentiful (d) abundant
74. She has always been disdainful of people who haven't been to college.
(a) contemptuous (b) dismissive
(c) scornful (d) respectful
75. He had a frugal lunch.
(a) sparing (b) extravagant
(c) meagre (d) delicious
76. He is forced to lead an itinerant life.
(a) vagrant (b) roving
(c) settled (d) nomadic
77. His malicious intentions were aborted.
(a) pernicious (b) spiteful
(c) benevolent (d) vindictive
78. Comics tend to perpetuate several myths.
(a) cease (b) conserve
(c) sustain (d) maintain
79. Krishna is a redoubtable person.
(a) formidable (b) fearsome
(c) awe inspiring (d) unimpressive
80. The movie is about fusion of old and contemporary ideas.
(a) joining (b) bonding
(c) separation (d) blending

CLOZE COMPOSITION

Directions : *In this section, there is a passage having some blank spaces with four words or groups of words given. Select whichever word or group of words you consider the most appropriate for the blank space and indicate your response on the Answer Sheet accordingly*

81. It is necessary, _____
(a) in regard to any war, to consider, not its proper justification in
(b) connecting
(c) describing
(d) linking
82. Past agreements, _____
(a) and its real justification in the balance of good which it
(b) until
(c) but
(d) unless
83. Is to bring to mankind. At the beginning of a war, each nation, under the influence of what is called _____
(a) disloyalty, believes that its own victory is
(b) patriotism,
(c) infidelity,
(d) falseness,
84. _____
(a) nationally certain and of great importance to mankind. the praiseworthiness of
(b) individually
(c) autonomously
(d) both
85. This belief has become an accepted maxim of common sense: even when war is actually in progress it _____
(a) is held to be natural and right that a citizen of an enemy country
(b) has been withheld
(c) was held
(d) had been withheld
86. Should regard the victory of his side as assured and highly _____
(a) unpleasant. By (b) unlikely.
(c) desirable. (d) malignant.
87. Concentrating attention upon the supposed advantages of the victory of our own side, we _____
(a) becoming more or less blind to the evils inseparable from war and
(b) become
(c) had become
(d) have been becoming
88. Equally certain whichever side many ultimately prove _____
(a) successful Yet so long (b) thriving.
(c) victorious. (d) failing.

89. As these are not fully realized, it is impossible _____
(a) to judge justly (b) to be judged
(c) to judging (d) having judged

90. _____
(a) whether a war is or is not likely to be beneficial to the human race. Although
(b) therefore (c) however
(d) since
the theme is trite, it is necessary therefore briefly to remind ourselves what the evils of war really are.

PREPOSITIONS AND DETERMINERS

Directions : *Each of the following sentences in this section has a blank space with four options. Select whichever preposition or determiner you consider the most appropriate for the blank space and indicate your response on the Answer Sheet accordingly.*

91. Steve has gone away. He will be away ____ Monday.
(a) on (b) by (c) until (d) from

92. I'll see you _____ Friday morning.
(a) in (b) on (c) along (d) at

93. Write your name _____ the top of the page.
(a) at (b) in (c) by (d) with

94. Sohan is studying _____ the university.
(a) in (b) at (c) on (d) from

95. He is indebted _____ his friend.
(a) from (b) with (c) by (d) to

96. Can I be held responsible _____ my spouse's debts?
(a) for (b) to (c) by (d) with

97. It was fun to hang out _____ the pier.
(a) down (b) with (c) in (d) beneath

98. Can you pass _____ sugar, please?
(a) a (b) an (c) the (d) No article

99. Our train leaves from _____ platform number 5.
(a) a (b) an (c) the (d) No article

100. ____ children learn very quickly.
(a) Some (b) A (c) Any (d) Much

COMPLETION OF SENTENCE

Directions : *Each of the following items features one part of a sentence followed by four alternatives. Complete the sentence by choosing the correct alternative.*

101. They were informed that the inaugural version of the scheme
(a) had three parts. (b) was three parts.
(c) have three parts. (d) had has three parts.

102. What would you do
(a) if you would won a lot of money?
(b) if you have won a lot of money?
(c) if you will win a lot of moneys?
(d) if you won a lot of money?

103. If it stopped raining
(a) we had gone out.
(b) we could go out.
(c) we should go out.
(d) we ought to go out.

104. Let me know
(a) if you have any further news.
(b) if you had any further news.
(c) if you has any further news.
(d) if you had have any further news.

105. We stayed
(a) at the cheap hotel in the town.
(b) at the cheaper hotel in the town.
(c) at the cheapest hotel in the town.
(d) at a cheapest hotel in the town.

106. Julia got married
(a) as she was 22.
(b) when she was 22.
(c) because she was 22.
(d) since she was 22.

107. What time
(a) does this train get at London?
(b) does this train get in London?
(c) does this train get into London?
(d) does this train get to London?

108. How are you
(a) getting on in your new job?
(b) getting of in your new job?
(c) getting along your new job?
(d) getting off in your new job?

109. I am trying to
(a) shut down on coffee.
(b) cut down on coffee.
(c) break down on coffee.
(d) turn down on coffee.

110. Many accidents
(a) cause careless driving.
(b) have caused careless driving.
(c) are caused by careless driving.
(d) will cause careless driving.

COMPREHENSION

Directions : *In this section, you have **two** short passages. After each passage, you will find some items based on the passage. First, read a passage and answer the items based on it. You are required to select your answers based on the contents of the passage and the opinion of the author only.*

Passage–I

The third great defect of our civilization is that it does not know what to do with its knowledge. Science has given us powers fit for the gods, yet we use them as small children. For example, we do not know how to manage our machines. Machines were made to be humanity's servants, yet man has grown so dependent on them that they are in a fair way to become his masters. Already most people spend most of their lives looking after and waiting upon machines. And the machines are very stern masters. They must be kept at the right temperature. And if they do not get their meals when they expect them, they grow sulky and refuse to work or burst with rage and blow up and spread ruin and destruction all around. So we have to wait upon them very attentively and do all that we can to keep them

in a good temper. Already we find it difficult either to work or play without the machines, and a time may come when they will rule us altogether, just as we rule the animals.

And this brings me to the point at which I asked, "What do we do with all the time which the machines have saved for us, and the new energy they have given us?" On the whole, it must be admitted, we do very little. For the most part, we use our time and energy to make more and better machines which will give us still more time and still more energy, and what are we to do with them? The answer, I think, is that we should try to become more civilized. For the machines themselves, and the power which the machines have given us, are not civilization but aids to civilization. But you will remember that we agreed at the beginning that being civilized meant making and linking beautiful things, thinking freely and living rightly and maintaining justice equally among people. A person has a better chance today to do these things than he/she ever had before; he/she has more time, more energy, less to fear and less to fight against. If he/she will give his/her time and energy which his/her machines have won for him/her to make more beautiful things, to find out more and more about the universe, to remove the cause of quarrels between nations, to discover how to prevent poverty, then I think our civilization would undoubtedly be the greater as it would be more lasting than it has ever been.

111. The general tone of the passage is
(a) critical (b) descriptive
(c) demonstrative (d) informational

112. The use of machines has failed to bring us
(a) spiritual freedom
(b) more leisure and more energy
(c) slavery and destruction
(d) culture and civilization

113. According to the passage, our civilization would be made greater.
(a) if man devotes his time to make more beautiful things
(b) if man looks after and waits upon machines
(c) if machines are made man's servants
(d) if man discovers how to prevent poverty

114. According to the passage, which one of the following descriptions about machines is true?
(a) They already rule us like we rule animals.
(b) They wait upon us attentively.
(c) They are inexorable masters.
(d) They have made man more civilized.

115. According to the passage, how do we use the powers bestowed upon us by science?
(a) Judiciously (b) Temperamentally
(c) Divinely (d) Irrationally

Passage–II

Plastic is an essential commodity with multiple uses based on its key qualities of malleability, flexibility, and durability. Plastics are omnipresent in agriculture, fisheries, renewable energy, transport, technology, retail, textiles, personal care products, and all the other sectors and industries that directly or indirectly affect our daily life. Plastic has indeed made our lives more convenient, but it has come at a higher price than we imagined. The plastic pollution overflowing our landfills, clogging waterways, and infiltrating the ocean is primarily made of discarded items and packaging. Plastic lasts for hundreds of years, slowly disintegrating into smaller and smaller pieces, but never fully degrading. Indeed, one of the key perks of plastic is its longevity. And yet, the plastic packaging of nearly every product we purchase and many plastic products themselves are intended to be discarded after a single use. Throwaway plastic is an oxymoron, but it has become our sad, increasingly dangerous reality.

Plastic pollution should make everyone angry. This is a crisis we can see with the naked eye, day in and day out. Plastic has been found on even the most remote, uninhabited islands, and in the deepest parts of the ocean. Because we can see it, we more keenly aware of it, unlike some other forms of pollution. In 2019, the World Health Organization (WHO) called for further studies on the impacts of microplastics on human health. An initial study, hampered by a lack of adequate data, concluded microplastics pose no danger at current levels (WHO, 2019). Although the WHO report was inconclusive about the effects of plastic on human health, other studies have linked the chemicals in plastic to negative health outcomes including endocrine disruption (Dabre 2020). Plastic particles have been detected in drinking water and in the food we eat, with a 2019 study commissioned by WWF estimating humans consume about five grams (or one credit card in weight) of plastic every week.

We have seen the devastating effects plastic has on marine life. For instance, unable to process ingested plastic waste pieces, seabirds and other sea creatures starve to death. We have seen sea turtles and other animals tangled in fishing nets or trapped in plastic pack rings. Plastic pollution also wreaks havoc on land, clogging drains and preventing rainwater from soaking into the soil, which leads to flooding. Terrestrial creatures also suffer the effects of plastic waste, with some getting trapped in discarded plastic bags and suffocating to death.

116. Plastic has distressing effects on
(a) only humans
(b) only marine life
(c) both humans and marine life
(d) None of the above

117. Plastic and plastic particles can be found
(a) in the oceanic depths
(b) on mountain tops
(c) in metals and minerals
(d) All of the above

118. Plastic pollution appears to be
(a) an epidemic (b) a pandemic
(c) a small menace (d) a temporal health issue

119. Plastic is considered an essential commodity because
(a) it has made our lives easier
(b) it causes health hazard
(c) it clogs natural ecosystem
(d) it has multiple uses in our everyday lives

120. The word 'clogging' in the passage means
(a) obstruction (b) flow
(c) opening (d) clearing

HINTS & EXPLANATIONS

MATH

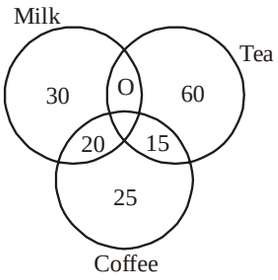
1. (c) H.C.F of $(2^{35}-1)(2^{91}-1)$ =
The greatest no. that divides $(a^m-1)(a^n-1)$ will be $a^{(H.C.M.\ (m.n)-1)}$
$\therefore$ H.C.F of $(2^{35}-1)(2^{91}-1) = (2^{H.C.F\ of\ (91,\ 35)}-1)$
$35 = 5 \times 7$
$91 = 13 \times 7$
So, H.C.F of $(2^{35}-1)(2^{91}-1) = (2^7-1) = 127$.

2. (c) It is sufficient to find the power of 5 in the prime factory of 29! (the power of 2 is obviously larger than the power of 5)
This is $\left\lfloor \frac{29}{5} \right\rfloor + \left\lfloor \frac{29}{25} \right\rfloor = 5+1 = 6.$
$\therefore$ 10^6 in the no. that divided 29!

3. (d) $\frac{65^{99}}{11} \rightarrow \frac{(-1)^{99}}{11}$
$\therefore$ $11-1 = 10$ will be the remainder.

4. (a) Difference of roots = 5
Let α and β are the roots
$\rightarrow (\alpha-\beta)^2 = (\alpha+\beta)^2 - 4\alpha\beta$
$(\alpha-\beta)^2 = b^2 - 4(c-5)$
$25 = b^2 - 4c + 20$
$b^2 - 4c = 5$
$b^2 = 4c + 5$

5. (c)



$n(M \cup T \cup C) = n(m) + n(T) + n(c) - n(m \cap T) - n(m \cap c) - n(T \cap c) + n(m \cap T \cap c)$
$150 = 50 + 75 + 60 - 0 - n(m \cap c) - 15 + 0$
$n(m \cap c) = 170 - 150$
$n(m \cap c) = 20$
only coffee $= 60 - (20 + 15) = 25$
only milk $= 50 - 20 = 30$

6. (a)

Parterns →	A	B	C	D	E
Investment →	2 :	3 :	4 :	5 :	6
Time Ratio →	6 :	5 :	4 :	3 :	2
Profit →	12 :	15 :	16 :	15 :	12

(Invest × Time)
C receives the highest amount of profit i.e 16.

7. (a) first we find any perfect square number near about of just less than the given number i.e.,
437 → perfect square number is 400 i.e. 20.
797→ perfect square number is 784 i.e. 28.
1073→ perfect square number is 1023 i.e. 32.
Then we divide the given number by the prime numbers less than the perfect square number.
So, 437 is divisible by 19
797 is not divisible by any prime number less than 28.
1073 is divisible by 29.
Therefore only one i.e. 797 is the prime number.

8. (d) $A = 2B$
$\frac{A}{B} = \frac{2}{1}$ ...(1)
$\frac{B}{C} = \frac{1.5}{1} = \frac{3}{2}$ ...(2)
from (1) and (2)
A : B : C = 6 : 3 : 2
A + B + C (1 day work) = 11 units.
A. T. Q.
A + B + C can finish a work in 12 days.
So Total units of work finished by A + B + C = 11 × 12 = 132 units
Efficiency of C = 2 units per day
Time taken by C to finish the work
$= \frac{132}{2} = 66$ days

9. (b) Let x represents the "tens" digit.
Let y represents the "ones" digit.
So, The original number is 10x + y
reversed number = 10y + x.
A.T.Q.
$10x + y + 18 = 10y + x$ ...(1)
But $x + y = 12$
$x = 12 - y$ ...(2)
using (2) in (1)
$10(12-y) + y + 18 = 10y + 12 - y$
$120 - 10y + y + 18 = 9y + 12$
$126 = 18y$
$y = 7$
So, $x = 12 - 7 = 5$
Difference between the digits in the number = 2.

10. (c) Let the speed of train 1 be SI
then the speed of man be SM
A.T.Q.
Time taken by train when both are travelling in opposite direction
$\text{Time taken} = \frac{\text{Length of Train 1}}{SI + SM}$
$(SI + SM) \times 10 = 200$

SI + SM = 20 ...(1)
Now when both trains travelling in same direction

$$\text{Time taken} = \frac{\text{Length of Train 1}}{\text{SI} - \text{SM}}$$

$$\text{SI} - \text{SM} = \frac{200}{20}$$

SI – SM = 10. ...(2)
from (1) and (2)

SI = 15m sec or $\left(15 \times \frac{18}{5}\right)$ Km/hr = 54 Km/hr.

11. (b)

$2a = 3b; \quad 3b = 6c; \quad 6c = 9d; \quad 9d = 12e; \quad 12e = 18f$

$$\frac{a}{b} = \frac{3}{2}; \quad \frac{b}{c} = \frac{2}{1}; \quad \frac{c}{d} = \frac{3}{2}; \quad \frac{d}{e} = \frac{4}{3}; \quad \frac{e}{f} = \frac{3}{2}$$

a : b : c : d : e : f = 18 : 12 : 6 : 4 : 3 : 2
let ratio be x.
A.T.Q.

$$\frac{(a+b)}{(c+d+e+f)} = \frac{(18x+12x)}{(6x+4x+3x+2x)} = \frac{30x}{15x} = 2$$

12. (c) Given equation: $ax^2 + bx + c = 0$
Putting x = 1,
$a(1)^2 + b(1) + c = 0$
$\Rightarrow a + b + c = 0$
$\therefore$ x = 1 is a root of the given equation

$$\text{Product of roots} = \frac{c}{a}$$

$$1.(\alpha) = \frac{c}{a} \quad \{\text{where } \alpha = \text{other root}\}$$

$$\therefore (\alpha) = \frac{c}{a}$$

Hence, 2 roots are 1 and $\frac{c}{a}$

13. (c) Let the total no. of bananas be 100 and 12% got lost

$$\text{during transportation i.e } 100 \times \frac{12}{100} = 12$$

Remaining bananas = 100 – 12 = 88.
Let the CP of 1 banana = Rs 1.
CP of 100 banana = Rs. 100.
Vendor sell at 4% overall profit = Rs. 104

$$\text{SP of 1 banana} = \frac{104}{88} = 1.\overline{18}$$

$$\text{Profit percent} = \frac{0.\overline{18}}{1} \times 100 = \frac{18}{99} \times 100$$

$$= \frac{200}{11}\%$$

$$= 18\frac{2}{11}\%$$

14. (d) $\left(5+3\sqrt{2}\right)\left(5-3\sqrt{2}\right) = \alpha$

$$\sqrt{(5)^2 - \left(3\sqrt{2}\right)^2} = \alpha$$

A. T. Q.

$$\sqrt{8+2\sqrt{7}}$$

$$\sqrt{8+2\sqrt{7}}$$

$\sqrt{7} + 1$

we need the positive root so $\sqrt{7}+1$

15. (c) $\frac{a}{8}$ even power where a is always odd will give 1 remainder always
Even power of a odd number will always give odd number

$$\text{Eg. } \frac{7^2}{8} = \frac{49}{8} \text{ Remainder} = 1$$

$$\frac{53^2}{8} = \text{Remainder is 1.}$$

16. (c) (I) putting n = 1 in $\frac{n\left(n^2+2\right)}{3}$

i.e. $\frac{1(3)}{3}$ which is divisible by 3 so by putting any value of 'n' The number $\frac{n\left(n^2+2\right)}{3}$ is always a multiple of 3.

(II) $\frac{m^4+4m^2+4+7}{16}$

$$\Rightarrow \frac{\left(m^2+2\right)^2+7}{16}$$

putting m = 5 in above equation

$$\text{i.e. } \frac{(25+2)^2+7}{16} = \frac{736}{16} = 46$$

So any number in the form of $\frac{m^4+4m^2+1}{16}$ in an integer or leads to be an integer.

17. (a) It is given that the three given numbers are consecutive numbers.
No. which is not divisible by 5 must be in the form of 5K + n where $1 \le x \le 4$.
A.T.Q,
5K + 1 = n – 1
5K + 2 = n
Now $[(5K + 2)^2 + 1] = 25K^2 + 20K + 4 + 1$

$= \boxed{25K^2 + 20K + 5}$ so this is divisible 5 so option "a" is correct.

18. (c) Largest 5 digit number = 99999.
L.C.M of (18, 11) → 198.
largest 5 digit number which in divisible by 198 will be → 99990
A.T.Q.
Remainder = 7
So largest 5 digit number which will gives remainder 7 = 99997

19. (c) Let Principal of A = P_A.
Am. paid by A to B after 5 yrs @ 5% = Rs. 20,000

$$P_A + \frac{P_A \times 5 \times 5}{100} = 20,000$$

$125\,P_A = 20,000 \times 100$

$$P_A + \frac{20,000 \times 100}{125} = \text{Rs.}\,16,000$$

Let Principal of B be P_B.
Am. paid by B to A after 4 years @ 5% = Rs. 12,000

$$P_B + \frac{P_B \times 5 \times 4}{100} = 12,000$$

$120\,P_B = 12000 \times 100$
P_B = Rs. 10,000
B gives to A = 16,000 – 10,000 = Rs 6,000

20. (a) Total marks in Maths of section A = 30 × 65 = 1950
Total marks in Maths of section B = 35 × 70 = 2450
Total correct Maths of both sections = (1950 + 2450) – (74 – 47) = 4400 – 27 = 4373

$$\text{Avg. marks of both sections} = \frac{4373}{65} = 67.28$$

21. (a) $\alpha + \beta = \frac{-(-7)}{1} = 7$

$$\alpha\beta = \frac{c}{a} = 1$$

$(\alpha + \beta)^2 = \alpha^2 + \beta^2 + 2\alpha\beta$.
$49 = \alpha^2 + \beta^2 + 2$
$\alpha^2 + \beta^2 = 47$
Again squaring on b.t.s
$(\alpha^2 + \beta^2)^2 = (47)^2$
$\alpha^4 + \beta^4 + 2\alpha^2\beta^2 = 2209$
$\alpha^4 + \beta^4 = 2209 - 2$
$\alpha^4 + \beta^4 = 2207$

22. (c) $360 = 2^3 \times 3^2 \times 5^1$
No of factors = (p + 1) (q + 1) (r + 1)
= (3 + 1) (2 + 1) (1 + 1)
= (4) (3) (2) = 24
Sum of factors = $(2^0 + 2^1 + 2^2 + 2^3)(3^0 + 3^1 + 3^2)(5^0 + 5^1)$
= (1 + 2 + 4 + 8) (1 + 3 + 9) (1 + 5)
= (15) (13) (6)
= 1170.
Both the above statements are correct.

23. (d) Number xy xy xy
We can write the number as below
= xy × 10000 + xy + 100 + xy
= xy (10000 + 100 + 1)
= xy × 1010%
10101 is divisible by 3, 7, 13, 37.

24. (d) H.C.F of $(3^{29} - 3^2)$ and $(3^{38} - 3^2) = 3^2$.
$(3^{\text{H.C.F of } 27,\ 36} - 1)$
$= 3^2 (3^9 - 1)$
$= 3^{11} - 9$.

25. (b) $x = \sqrt{4x}$
squaring on both the sides
$x^2 = 4x$
$x^2 - 4x = 0$
$x(x - 4) = 0$
x = 0 amd x = 4

26. (b) 33 m + 22n = 11(3m + 2n)
Now we have to find the minimum value of (3m + 2n) which make it divisible by 11, As
11(3m + 2n) = 11 × 11
3m + 2n = 11
3m + 2n – 11 = 0
We have to take minimum value of m and n so that result is 0.
put m = 3; n = 1
3(3) + 2(1) – 11 = 0
So, one value by (m, n) will be (3, 1)
put m = 1 and n = 4.
3(1) + 2(4) – 11 = 0
but minimum value of (m, n) is (3, 1)
so, m + n = 3 + 1 = 4

27. (c) Let the two numbers = a and b
Product of two numbers = H.C.F × L.C.M.
2160 = 12 L.C.M.
L.C.M = 180.
A.T.Q.
$a^2 + b^2 = 4896$
$(a + b)^2 = a^2 + b^2 + 2(2160)$
= 4896 + 4320
$a + b = \sqrt{9216} = 96$
A.T.Q.
mean of two numbers

$$= \frac{a + b}{2} = \frac{96}{2} = 48.$$

28. (d) A.T.Q ages of
Q = P + 3 ...(1)
R = 2.P

$$P = \frac{R}{2} \quad ...(2)$$

Q = 2S ...(3)
using (2) and (3) in (1)

$$2S = \frac{R}{2} + 3$$

4S = R + 6
R = 4S – 6 ...(4)
Given
R – S = 30 ....(5)
using (4) in (5)
4S – 6 – S = 30
3S = 36
S = 12
Q = 24
24 = P + 3
P = 21
Now, P + Q = 21 + 24
= 45 yrs.

29. (b) If a, b and c are the sides of the triangle then $\sqrt{a}+\sqrt{b}-\sqrt{c}$ it always positive because the sum of two sides of the triangle is always greater than the third side.

30. (c) Time interval in which all bells ring together
L.C. M of (15, 25, 35, 45) = 1575 min
60 min = 1 hour

$1\text{min} = \frac{1}{60}$

$1575\text{ min} = \left(\frac{1}{60}\times 1575\right)$ hours.

= 26.25 hours
So in next 72 hours bells will ring 2 times.

31. (c) We know that sum of even and even = even
sum of odd and even = odd
sum of odd and odd = even.
In question a + b + c + d = 200, which means that two of the four are either even or odd, or all are odd or all are even.
So when (a, b) = even and (c, d) = odd
$S = (-1)^{even} + (-1)^{even} + (-1)^{odd} + (-1)^{odd} = 0$
$S = (-1)^{even} + (-1)^{even} + (-1)^{even} + (-1)^{even} = 4.$
$S = (-1)^{odd} + (-1)^{odd} + (-1)^{odd} + (-1)^{odd} = -4$
So S has 3 possible values.

32. (c) $a^n - b^n$ is always divisible by (a – b) and $a^n - b^n$ is divisible by (a + b) when n is even so $(97^{30} - 14^{30})$ is divisible by both (97 – 14) and (97 + 14), i.e. 83 and 111
$111 \rightarrow 3 \times 37$
so 37 also divides.

33. (a) $(y) = \text{Log}_{10} 50$
$= \text{Log}(10 \times 5)$
$= \text{Log}_{10}(10) + \text{Log}_{10}(5)$
$= 1 + 0.699$

$= \frac{1699}{100}.$

so $\text{Log}_{10} 50$ is a rational number.
(II) $y = \text{Log}_{100} 10$

$\text{Log}_b a = \frac{\text{Log } a}{\text{Log } b}$ where b = 100 and a = 10.

$\frac{\text{Log } 10}{\text{Log } 100} = \frac{\text{Log } 10}{\text{Log } 10^2} = \frac{1}{2}$

so y is rational.

34. (a) 17 women + 24 men = 5 days
work done by same in 1 day
(17 × 5) womens + (24 × 5) men = 1 day
85 women + 120 men = 1 day ....(1)
Similarly
12 women + 23 men = 6 days
72 women + 138 man = 1 day ...(2)
from (1) and (2)
85 women + 120 men = 72 women + 138 men
13 women = 18 men.
Efficiency of 13 women = efficiency of 18 men.

35. (b) $A + B + C \rightarrow 6$ — 2, 12, $C \rightarrow 12$ — 1
Efficiency of A + B = 1.
All three opened for t hours.
(A + B + C)t + (A + B)8 = 12
2t + 8 = 12
t = 2.

36. (b) Ratio in which all are paid will be the efficiency ratio.
So,
$A \rightarrow 10x$, $B \rightarrow 15x$, $C \rightarrow 20x$ — 60x — 6, 4, 3
Efficiency of A, B and C will be 6, 4, 3 respectively
So, ratio in which all are paid will be 6 : 4 : 3.

37. (d) (1) $n^3 - n = n(n^2 - 1)$
= n(n + 1) (n – 1) which is a product of consecutive number so it is divisible by 6.
(2) $n^5 - n = n(n^4 - 1)$
$= n(n^2 - 1)(n^2 + 1)$
$= n(n-1)(n+1)(n^2+1)$
Let n = 1, 2, 3, ----------
i.e. [2.(1). (3). (5)] which is divisible by 5.
(3) $n^5 - 5n^3 + 4n \rightarrow n(n^4 - 5n^2 + 4)$
put $n^2 = y$, Then $n(y^2 - 5y + 4)$
$n(y^2 - y - 4y + 4)$
n (y-1) (y-4)
$n(n^2 - 4)(n^2 - 1)$
n(n – 2) (n + 2) (n – 1) (n + 1)
put n = 3
Then 120 which is divisible by 120.

38. (b) $S = 9^{27} + 27^9$
$= 3^{54} + 3^{27}$
We know the cyclicity of 3 is $(3)^4 = 1$
$(3^4)^{13} \cdot 3^2 + (3^4)^6 \cdot 3^3$
$\rightarrow 9 + 27 \rightarrow 6$ (last digit)

39. (c) $x - y = \left[\frac{\sqrt{3}+1}{\sqrt{3}-1} - \frac{\sqrt{3}-1}{\sqrt{3}+1}\right]$

$= \left[\frac{(\sqrt{3}+1)^2 - (\sqrt{3}-1)^2}{(\sqrt{3})^2 - (1)^2}\right]$

$= \frac{4 + 2\sqrt{3} - 4 + 2\sqrt{3}}{2}$

$x - y = 2\sqrt{3}$
Cubing on both the sides

$(x-y)^3 = (2\sqrt{3})^3$

$x^3 - y^3 - 3xy(x-y) = 24\sqrt{3} = 30\sqrt{3}$

40. (b) Let the speed of the stream = x Km/hr.
Speed of boat in downstream = 15 + x
Speed of boat in upstream = 15 – x

A.t.Q.
Time taken in downstream = The taken in upstream

$$\frac{42}{15+x}=\frac{28}{15-x}$$

$45-3x=30+2x$
$15=5x$
$x=3$ Km/hr

41. (c) Rate $=\frac{20}{2}=10\%$
Time $=2\times2=4$

Compound interest $=10000\times\left(1+\frac{10}{100}\right)^4-10000$
$=14641-10000=$ Rs. 4641

Simple interest $=\frac{10000\times20\times2}{100}=$ Rs. 4000
Hence, required difference $=4641-4000=$ Rs. 641

42. (c) $a(b-c)(x^2-bx-cx+bc)+b(c-a)(x^2-cx-ax+ac)+c(a-b)(x^2-ax-bx+ab)$
$\Rightarrow x^2[ab-ac+bc-ab+ca-bc]-x[a(b-c)(b+c)+b(c-a)(c+a)+c(a-b)(a+b)]+abc(b-c)+abc(c-a)+abc(a-b)$
$\Rightarrow 0\times x^2-x[ab^2-ac^2+bc^2-ba^2+ca^2-cb^2]+abc[b-c+c-a+a-b]$
$\Rightarrow 0\times x^2-x[abc+ab^2-ac^2+bc^2-ba^2+ca^2-cb^2-abc]+abc\times0$
$\Rightarrow 0\times x^2-x[abc-ac^2+bc^2-cb^2-ba^2+ab^2+ca^2-abc]$
$\Rightarrow 0\times x^2-x[c(ab-ac+bc-b^2)-a(ab-b^2-ac+bc)]$
$\Rightarrow 0\times x^2-[(c-a)(ab-ac+bc-b^2)]$
$\Rightarrow 0\times x^2-x[(c-a)\{a(b-c)-b(b-c)\}]$
$\Rightarrow 0\times x^2-x(c-a)(b-c)(a-b)$
Hence, both statements 1 and 2 are correct.

43. (c) $1-x-x^n+x^{n+1}$
$\Rightarrow (1-x)-x^n(1-x)$
$\Rightarrow (1-x^n)(1-x)$
So, it is divisible by $(1-x^n)$
And, $1-2x+x^2$
$\Rightarrow (1-x)^2$
So, for n-natural number,
$(1-x^n)(1-x)$ also divisible by $(1-x)^2$ Hence, both statements 1 and 2 are correct.

44. (d) $mx^2+mx+8x+9$
For make prefect square m's value should be even number.
$\because\ mx^2+x(m+8)+3^2$
Multiple of x should be divisible by 2.
Hence, m = 4, 16

45. (b) $x=a+b+\frac{(a-b)^2}{4(a+b)}$ and $y=\frac{a+b}{4}+\frac{ab}{a+b}$
$\Rightarrow (x-a)^2-(y-b)^2$.
$\Rightarrow (x-a-y+b)(x-a+y-b)$

By putting value of $x-a=b+\frac{(a-b)^2}{4(a+b)}$

$$\left(b+\frac{(a-b)^2}{4(a+b)}+b-\frac{a+b}{4}-\frac{ab}{a+b}\right)\times\left(b+\frac{(a-b)^2}{4(a+b)}-b+\frac{a+b}{4}+\frac{ab}{a+b}\right)$$

$$\Rightarrow\left[2b+\frac{(a-b)^2-(a+b)^2-4ab}{4(a+b)}\right]\left[\frac{(a-b)^2+(a+b)^2+4ab}{4(a+b)}\right]$$

$$\Rightarrow\left[2b+\frac{a^2+b^2-2ab-a^2-b^2-2ab-4ab}{4(a+b)}\right]\left[\frac{a^2+b^2-2ab+a^2+b^2+2ab+4ab}{4(a+b)}\right]$$

$$\Rightarrow\left[[2b+\left(\frac{-8ab}{4(a+b)}\right)]\left[\frac{2(a^2+b^2+2ab)}{4(a+b)}\right]\right.$$

$$\Rightarrow\left(\frac{2ab+2b^2-2ab}{a+b}\right)\left(\frac{a+b}{2}\right)$$

$$\Rightarrow\left(\frac{2b^2}{a+b}\right)\left(\frac{a+b}{2}\right)$$

$\Rightarrow \frac{2b^2}{2}$
$\Rightarrow b^2$.

46. (b) (1) $\cos^4\theta-\sin^4\theta=\frac{2\tan\theta}{1-\tan^2\theta}$
Taking L.H.S.
$\cos^4\theta-\sin^4\theta=(\cos^2\theta-\sin^2\theta)(\cos^2\theta+\sin^2\theta)$
$=(\cos^2\theta+\sin^2\theta)(1)$
$=\cos2\theta$.
Which is not equal to R.H.S.

(2) $\operatorname{cosec}\theta+\cot\theta=\frac{1}{\operatorname{cosec}\theta-\cot\theta}$
$(\operatorname{cosec}\theta+\cot\theta)(\operatorname{cosec}\theta-\cot\theta)=1$
$\operatorname{cosec}^2\theta-\cot^2\theta=1$
Hence, it is R.H.S. = L.H.S.

(3) $\cos^2\theta-\sin^2\theta=\frac{1-\tan^2\theta}{1+\tan^2\theta}$
Taking L.H.S
$\cos^2\theta-\sin^2\theta=\cos2\theta$

and $\cos2\theta=\frac{1-\tan^2\theta}{1+\tan^2\theta}$ is an identity
So L.H. S = R.H.S.

47. (d) $\sin\theta=\frac{12}{13}\rightarrow\frac{P}{H}$
$P\rightarrow12$; $H\rightarrow13$; $B=5$ ($\because$ By Pythagorean triplet)

$$\frac{(\tan\theta+\sec\theta)^2}{(\operatorname{cosec}\theta-\cot\theta)^2}=\left(\frac{\frac{P}{B}+\frac{H}{B}}{\frac{H}{P}-\frac{B}{P}}\right)^2$$

$$=\left(\frac{\frac{12}{5}+\frac{13}{5}}{\frac{13}{12}-\frac{5}{12}}\right)^2=\frac{225}{4}$$

48. (c) $\tan^8\theta+\frac{1}{\tan^8\theta}=m$

$$\left(\tan^4\theta+\frac{1}{\tan^4\theta}\right)^2=\tan^8+\frac{1}{\tan^8\theta}+2$$

$$\tan^4\theta+\frac{1}{\tan^4\theta}=\sqrt{m+2}$$

$$\left(\tan^2\theta+\frac{1}{\tan^2\theta}\right)^2=\tan^4+\frac{1}{\tan^4\theta}+2$$

$$\tan^2\theta+\frac{1}{\tan^2\theta}=\sqrt{\sqrt{m+2}+2}$$

Again

$$\left(\tan\theta+\frac{1}{\tan\theta}\right)^2=\tan^2\theta+\frac{1}{\tan^2\theta}+2$$

$$\tan\theta+\cot\theta=\sqrt{\sqrt{\sqrt{m+2}+2}+2} \quad \left\{\because \cot\theta=\frac{1}{\tan\theta}\right\}$$

49. (b) Maximum value of $\sin\theta$ is 1 when $\theta = 90°$ we will get minimum value from the given equal only when we subtract maximum value of '4sinθ' i.e., 4.
So, 6 – 4 = 2

50. (d) $4\cos^2 30° + 2x\sin 30° - \cot^2 30° - 6\tan 15°\tan 75° = 0$

$$4.\frac{3}{4}+2.x.\frac{1}{2}-\left(\sqrt{3}\right)^2-6\cot 75.\tan 75°=0$$

$$2.x.\frac{1}{2}=6$$

$x = 6$

51. (d) $\frac{\sin^2 58°+\cos^2 58°}{\sec^2 50°-\tan^2 50°}+4\times\tan 13°\times\tan 37°\times\tan 53°\times\tan 77°$

$\Rightarrow 1 + 4.\cot 77°.\tan 77°.\cot 53°.\tan 53°$

$\Rightarrow$ 5

52. (b) $(1+\cot^2\theta)(1-\cos^2\theta)-(1+\tan^2\theta)(1-\sin^2\theta)$

$\Rightarrow (\text{cosec}^2\theta)(\sin^2\theta)-(\sec^2\theta)(\cos^2\theta)$

$$\begin{cases}\because 1-\cos^2\theta=\sin^2\theta\\ 1-\sin^2\theta=\cos^2\theta\end{cases}$$

$$\Rightarrow 1-1=0\begin{cases}\because 1+\cot^2\theta=\text{cosec}^2\theta\\ 1+\tan^2\theta=\sec^2\theta\end{cases}$$

53. (a) $2\cos^2\theta + \sin\theta - 2 = 0$

$2(1-\sin^2\theta) + \sin\theta - 2 = 0 \{\because \cos^2 = 1-\sin^2\theta\}$

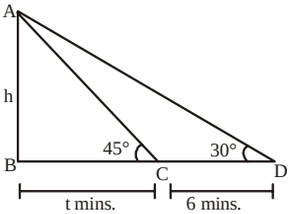
$2 - 2\sin^2\theta + \sin\theta - 2 = 0$

$2\sin^2\theta = \sin\theta$

$$\sin\theta=\frac{1}{2}$$

$$\theta=\frac{\pi}{6}\text{ i.e. }30°$$

54. (b)



Let the height of the tower = h

In ΔABD

$$\tan 30° = \frac{h}{BD}$$

$BD = h.\sqrt{3}$

In ΔABC

$$\tan 45° = \frac{h}{BC}$$

BC = h.

CD = BD – BC

$CD = h(\sqrt{3}-1)$

$$\text{Speed of Car} = \frac{\text{Dist.}}{\text{time taken}} = \left(\frac{h(\sqrt{3}-1)}{6}\right)$$

Time taken from C to B

$$\text{time}(t) = h\times\frac{6}{h(\sqrt{3}-1)}=\frac{6}{(\sqrt{3}-1)}$$

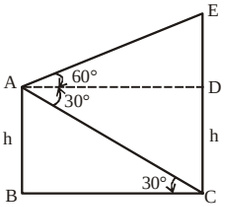
$$=\frac{6\times(\sqrt{3}+1)}{(\sqrt{3}-1)(\sqrt{3}+1)}=\frac{6\times(\sqrt{3}+1)}{2}$$

$= 3(2.7) \{\because \sqrt{3} = 1.7\}$

$t \sim 8.1$ min.

$\therefore 8 < t < 8.3$

55. (c)



In ΔAED

$$\tan 60° = \frac{ED}{AD}$$

$$\sqrt{3} = \frac{ED}{AD} = AD = \frac{ED}{\sqrt{3}} \quad \text{...(1)}$$

In ΔABC

$$\tan 30° = \frac{h}{BC}$$

$BC = h.\sqrt{3}$ ...(2)

$\therefore BC = AD$

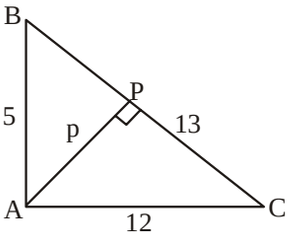
$$\frac{ED}{\sqrt{3}} = h\sqrt{3}$$

ED = 3h

So, EC = ED + DC

= 3h + h = 4h.

56. (c)

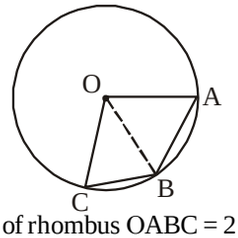


$AP = \frac{AB \times AC}{BC}$

$\therefore\ 13p = 13\left(\frac{5 \times 12}{13}\right)$

$\Rightarrow 13p = 60$

57. (c) Area of rhombus $= 32\sqrt{3}cm^2$



But area of rhombus OABC = 2 × ar. of ΔOAB

Ar. of $\Delta OAB = \frac{\sqrt{3}}{4}.r^2\ (\because OA = OB = AB)$

A.T.Q

$2 \times \frac{\sqrt{3}}{4}.r^2 = \sqrt{3} \times 32$

$\Rightarrow\ r = \sqrt{64} = 8.$

58. (d) Let the side of cube be 10 unit
Surface area of cube = 4 (side)^2
$= 4\ (10)^2 = 400\ unit^2$

25% increase in surface area $= 400 \times \frac{125}{100}$

$= 500\ unit^2$
A.T.Q
Increased surface area = 500
$4a^2 = 500$
$a^2 = 125$

$\boxed{a = 5\sqrt{5}}$

Percentage increase in its length

$\Rightarrow \frac{\left(5\sqrt{5} - 10\right)}{10} \times 100$

$\Rightarrow \frac{11.18 - 10}{10} \times 100 \Rightarrow 11.80\%$

$\therefore\ 10 < p < 12$

59. (b) Vol. of Big. Cube = col. of cuboid 1 + vol. of cuboid 2
Breadth of cuboid = side of cube i.e. a.
Height of cuboid = height of cube i.e. a.

Length of cuboid $= \frac{\text{side of cube}}{2} = \frac{a}{2}$ T.S.A of cube $= 6a^2$
T.S.A of cuboid = 2 (LB + BH + HL)

$= 2\left(\frac{a}{2}.a + (a.a) + (a)\left(\frac{a}{2}\right)\right)$

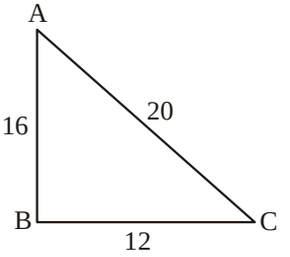
$= 4a^2.$

Required ratio $= \frac{6a^2}{4a^2} = 3:2$

60. (d) Diagonal of cuboid $= \sqrt{L^2 + B^2 + H^2} = 11$
$L^2 + B^2 + H^2 = 121$
Surface area of cuboid = 2(LB + BH + HL)
2LB + 2BH + 2HL = 240
A.T.Q
$(L + B + h)^2 = L^2 + B^2 + H^2 + 2LB + 2BH + 2HL$

$L + B + H = \sqrt{121 + 240}$
L + B + H = 19 cm

61. (b)



Given ΔABC is an right angle triangle by Pythagorean triplet.

So, Inradius of $\Delta ABC = \left(\frac{P + B - H}{2}\right)$

where P – Perpendicular; B = Base & H = Hypotenuse.

In radius $= \frac{16 + 12 - 20}{2} = 4cm.$

Area of In circle = πr^2

$= \frac{22}{7} \times 16 = \frac{352}{7} \simeq 50\ cm^2.$

62. (b) T.S.A of circular cylinder = $2\pi r(h + r)$
C.S.A. of circular cylinder = $2\pi rh$
A.T.Q.
$2[2\pi r(h + r)] = 3[2\pi rh]$
$2[2\pi rh + 2\pi r^2] = 6\pi rh$
$4\pi rh + 4\pi r^2 = 6\pi rh$
$4\pi r^2 = 2\pi rh$
2r = h

63. (d) Area of floor = 30.60 × 23.40.

Max. size of square tile = H.C.F of $\left(\frac{3060}{100}, \frac{2340}{100}\right)$

$= \frac{180}{100} = 1.8cm$

Mini. no. of tiles required $= \frac{\text{Area of floor}}{\text{Area of square tile}}$

$= \frac{3060 \times 2340 \times 10 \times 10}{100 \times 100 \times 18 \times 18}$

= 221 tiles.

64. (c) Area of square field = 2,50,000 m^2

Side of field = $\sqrt{250000}$

= 500 m.

Total distance to be covered = 4 × 500 = 2000 m.

Speed of man $= 5 \times \frac{5}{18} = \frac{25}{18}$ m / sec.

Time taken to cover the distance $= \frac{2000 \times 18}{25}$

= 1440 sec or 24 min.

65. (b) Diagonal of square = Diameter of circle

$\sqrt{2}$ × side of square = 2r.

Side of square = $\frac{2r}{\sqrt{2}}$

Area of square = $\left(\frac{2r}{\sqrt{2}}\right)^2 = 2r^2$

$x = 2r^2 \rightarrow \frac{x}{2} = r^2$ ...(1)

Circum radius of equilateral triangle

$= \frac{\text{side of triangle}}{\sqrt{3}}$

Side of triangle $= \sqrt{3}r$

Area of equilateral triangle $= \frac{\sqrt{3}}{4}(\text{side})^2$

$= \frac{\sqrt{3}}{4}.3r^2$

$y = \frac{3\sqrt{3}}{4}r^2$

$\frac{4y}{3\sqrt{3}} = r^2$ ...(2)

from (1) and (2)

$\frac{x}{2} = \frac{4y}{3\sqrt{3}}$

squaring both the side

$\left(\frac{x}{2}\right)^2 = \left(\frac{4y}{3\sqrt{3}}\right)^2$

$\Rightarrow 27x^2 = 64y^2$

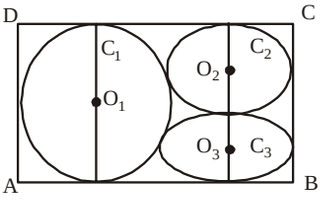
66. (c)

	Old		New
Length	3	⟶	5
Width	5	⟶	3
Area (Length × Width)	15		15

percentage decreased in width/Breadth

$= \frac{2}{5} \times 100 = 40\%$

67. (d)



Three circles can be drawn as represented in the figure.

Circle 1 with centre O_1 in and radius r_1 circle 2 with centre O_2 and radius r_2; circle 3 with centre O_3 and radius r_3.

$r_1 = \frac{8}{2} = 4\text{cm};\ r_2 = \frac{4}{2} = 2\text{cm};\ r_3 = \frac{4}{2} = 2\text{cm}$

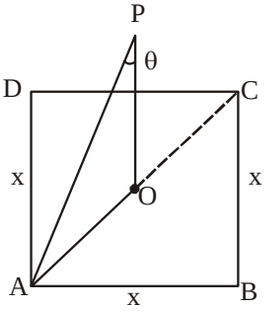
A.T.Q

Maximum area that can be covered by three circle namingly C_1, C_2 and $C_3 = \pi r_1^2 + \pi r_2^2 + \pi r_3^2$.

$= \pi((4)^2 + (2)^2 + (2)^2)$

$= 24\pi\ \text{cm}^2$.

68. (c)



OP = 2x.

∠APO = θ

AC is the diagonal of square

AC = $\sqrt{2}$x.

AO is half of the diagonal AC

So, AO = $\frac{\sqrt{2}x}{2}$

In ΔAPO

$\tan\theta = \frac{AO}{OP} = \frac{\sqrt{2}x}{2.2x} = \frac{\sqrt{2}}{4}$

$\cot\theta = \frac{1}{\tan\theta} = \frac{4}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}}$

$= 2\sqrt{2}$.

69. (a) Let the Radius of solid iron big ball = R.

Then the radius of smaller ball = r.

Vol. of sphere = $\frac{4}{3}\pi r^3$

A.T.Q

Vol. of solid iron big ball = 64. (Vol. of smaller ball)

$\frac{4}{3}\pi R^3 = 64 \times \frac{4}{3}\pi r^3$

$R^3 = 64r^3$

$R = 4r$.

Required Ratio of Surface area

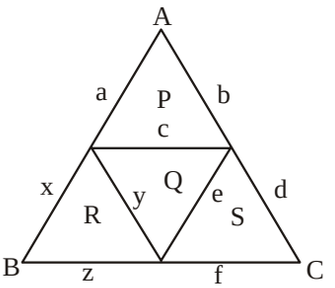
$$= \frac{\text{Surface Area of big ball}}{\text{Sum of Surface Area of all smaller balls}}$$

$$\text{Required ratio} = \frac{4\pi R^2}{64.4\pi r^2} \begin{cases} \because R = 4r \\ R^2 = 16r^2 \end{cases}$$

$$= \frac{1}{4}$$

i.e. 0.25

70. (b)



Perimeter of $\Delta P = a + b + c = 16$ cm

Perimeter of $\Delta Q = c + y + e = 12$ cm

Perimeter of $\Delta R = x + y + z = 4$ cm

Perimeter of $\Delta S = e + d + f = 12$ cm

Perimeter of $\Delta ABC = [(a + b + c) + (x + y + z) + (e + d + f)] - (c + y + e)$

$= (16 + 4 + 12) - 12$

$= 20$ cm

71. (c) Statement I and statement II:

$$\Rightarrow \frac{2 + 7 + 7 + x + y + 5}{9}$$

$$\Rightarrow \frac{21 + x + y}{9}$$

$\Rightarrow x + y = 6$ or $x + y = 15$

$x + y \neq 6$ is not possible as 277605 is not divisible by 25.

$x + y = 15$ is possible for $x = 8$ and $y = 7$ as. last two digits should be 75.

$\because$ 277875 is divisible by 25 and 9 and $x > 5$

$\boxed{x = 8}$

72. (c) Statement I and Statement II:

$$\frac{c}{a} = \frac{1 \times 2}{1 \times 2}, \frac{b}{a} = \frac{-5}{2}$$

$$\frac{c}{a} = \frac{2}{2}, \frac{b}{a} = \frac{-5}{2}$$

$ax^2 + bx + c$

$2x^2 - 5x + 2$

As 2 is a root of the equation.

Put $x = 2$

$\Rightarrow 2 \times (2)^2 - 5 \times 2 + 2$

$\Rightarrow 8 - 10 + 2$

$\Rightarrow 0$

$a = 2, b = -5, c = 2$

73. (a) $m > n$, where m, n are non-zero numbers

Let $m = 3$ and $n = 2$

According to Statement I:

$$\frac{m}{n} > 1$$

$$\frac{3}{2} > 1$$

$1.5 > 1$

According to statement II

$m > 2n$

$3 > 2 \times 2$

$3 > 4$ is False.

It can be answered by statement I alone.

74. (a) According to statement I:

As, $AB + B > CA$ $(10 > 6)$

$AB + CA > BC$ $(11 > 5)$

$BC + CA > AB$ $(11 > 5)$

A circle can be drawn through the points A, B and C.

According to statement II:

As, $AB + BC = CA$ $(7 = 7)$

$\therefore$ A circle can not be drawn through the point A, B, & C.

Hence Statement I alone is sufficient.

75. (c) According to Statement I:

$(x + y)^4 = 256$

$(x + y)^4 = (\pm 4)^4$

$x + y = \pm 4$

As x and y are consecutive odd integers

$x = 1, y = 3$

$x = -1, y = -3$

(the value of $(x + y)$ can not be determined uniquely)

According to Statement II:

$(x + y)^3 < 16$

$(-1 + 1)^3 < 16$ $0 < 16$ is true, $-64 < 16$ is true

$(-4)^3 < 16$ $\qquad$ $(-1-3)^3 < 16$

$64 < 16$ is false $\qquad$ $(1 + 3)^3 < 16$

(the value of $(x + y)$ can not be determined uniquely)

According to both statements

(i) $(x + y)^4 = 256$ $\qquad$ $[x + y = -4]$

$(-4)^4 = 256$

(ii) $(x + y)^3 < 16$

$(-4)^3 < 16$

$-64 < 16$

The value of $(x + y)$ can be determined uniquely by both statements.

76. (d) $p^2 + q^2 + q$ odd, where p, q are positive integers.

Let $\rightarrow p = 1$

$q = 2$

$\Rightarrow 1^2 + 2^2 + 2$

$\Rightarrow 7 =$ odd

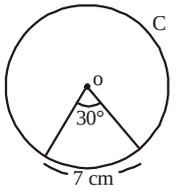
According to statement I

$2p + q$

$\Rightarrow 2 \times 1 + 2$

= 4 is not odd.
According to statement II
$q - 2p$
$\Rightarrow 2 - 2 \times 1$
$\Rightarrow 0$ is not odd
It can not be answered even by using both statements together.

77. (b) According to statement I



$$2\pi r = \frac{Arc}{\theta} \times 360°$$

$$2 \times \frac{22}{7} \times r = \frac{7}{30°} \times 360$$

$$r = \frac{84 \times 7}{44}$$

$$r = \frac{147}{11} \text{ cm}$$

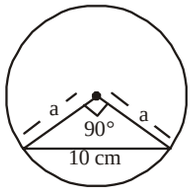
Area of circle $c \Rightarrow \pi r^2$

$$\Rightarrow \frac{22}{7} \times \frac{147}{11} \times \frac{147}{11}$$

$$\Rightarrow 2 \times 21 \times \frac{147}{11}$$

$\Rightarrow 561.27\,cm^2$

According to statement II:



$2a^2 = 100$

$a = 5\sqrt{2}$ cm

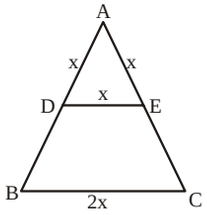
Area of circle $C = \pi r^2$

$$\Rightarrow \frac{314}{100} \times 25 \times 2$$

$\Rightarrow 157\,cm^2$

The question can be answered by either statement alone.

78. (a) According to statement I:



As AB = BC = AC
This triangle is equilateral Δ
According into statement II:
$\angle A + \angle B + \angle C = 180°$
$x + 2x + 3x = 180$
$6x = 180$

$\boxed{x = 30°}$

$\angle C = 3x$
$\angle C = 3 \times 30°$

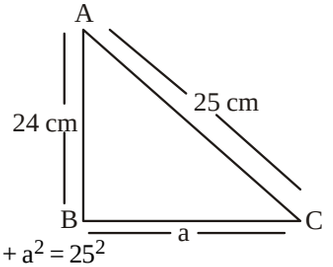
$\boxed{\angle c = 90°}$

So, Δ ABC is right angle triangle.
It can be answered by one of the statements alone.

79. (b) The lengths of two longer sides of the triangle Δ are 25cm and 24 cm.
According to statement I:
$\angle A + \angle B + \angle C = 180$
$x + 2x + 3x = 180$
$6x = 180$

$\boxed{x = 30°}$

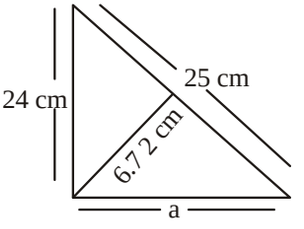
$\angle C = 3x$
$\angle C = 30 \times 3 = 90°$



$24^2 + a^2 = 25^2$
$a^2 = 625 - 576 = 49$

$\boxed{a = 7cm}$

The length of the shortest side = 7 cm
According to statement II:

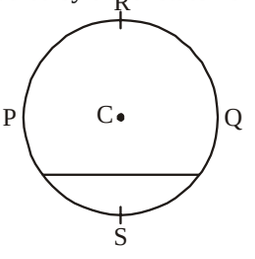


$$24 \times a = 25 \times \frac{672}{100}$$

$\boxed{a = 7cm}$

It can be answered by either statement alone.

80. (b)



$$\frac{\text{Area of PQR}}{\text{Area of PQS}} = \frac{4}{3}$$

According to the statement I:

$$\frac{\text{Area of PQR}}{66} = \frac{4}{3}$$

Area of PQR= 88 cm^2

Area of circle 'c' $\Rightarrow 88 + 66$

$ar^2 = 154\ cm^2$

$$\frac{22}{7} \times r^2 = 154$$

$\boxed{r = 7\ cm}$

According to the statement II:

$$\frac{88}{\text{Area of PQS}} = \frac{4}{3}$$

Area of PQS = 66 cm^2

Area of Circle 'c' = 88 + 66

$\pi r^2 = 154\ cm^2$

$$\frac{22}{7} \times r^2 = 154$$

$\boxed{r = 7\ cm}$

It can be answered by either statement alone.

81. (b)

Class	Mid – Value x_1	No. of Frequency f_1	C.F	$f_1.x_1$
0 – 30	15	4	4	60
30 – 60	45	5	9	225
60 – 90	75	7	16	525
90 – 120	105	4	20	420
		$\sum f_1 = 20$		$\sum f_1 x_1 = 1230$

$$\text{Mean } (x) = \frac{\sum f_1 x_1}{\sum f_1} = \frac{1230}{20} = 61.5$$

Modal class $\rightarrow 60 - 90$

So, l = 60, $f_0 = 5$, $f_1 = 7$, $f_2 = 4$ and h = 30

$$\text{Mode} = l + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times h$$

$$\Rightarrow 60 + \frac{7-5}{14-5-4} \times 30$$

$$\Rightarrow 60 + \frac{7-5}{14-5-4} \times 30$$

$\Rightarrow 60 + 12$

Mode of the distribution $\Rightarrow$ 72

82. (a) n = 20 then $\frac{H}{2} = \frac{20}{2} = 10$

Median class = 60 – 90

So, C.F = 9, F = 7, l = 60 and h = 30

$$\text{Median} = l + \frac{\frac{N}{2} - C.F}{F} \times h$$

$$\Rightarrow 60 + \frac{10-9}{7} \times 30$$

$$\Rightarrow 60 + \frac{30}{7}$$

$$\Rightarrow \frac{450}{7}$$

$7(Q - P) = 9R$

$$7\left(72 - \frac{450}{7}\right) = 9R$$

$$7\left(\frac{504-450}{7}\right) = 9R$$

$54 = 9R$

$\boxed{R = 6}$

83. (d)

Class	Mid – Value x_1	No. of Frequency f_1	C.F	$f_1\ x_1$
40 – 50	45	4	4	180
50 – 60	55	3	7	165
60 – 70	65	1	8	65
70 – 80	75	2	10	150

$\sum f_1 = 10$ $\sum f_1\ x_1 = 560$

Mean of the distribution $\Rightarrow \frac{\sum f_1 x_1}{\sum f_1} = \frac{560}{10} = 56$

84. (c) n = 10 then $\frac{n}{2} = \frac{10}{2} = 5$

Median class = 50 – 60

So, C. F = 4, F = 3, l = 50 and h = 10 Median

$$= l + \frac{\frac{N}{2} - C.F}{F} \times h$$

$$\Rightarrow 50 + \frac{5-4}{3} \times 10$$

$$\Rightarrow 50 + \frac{10}{3}$$

$$\Rightarrow \frac{160}{3}$$

$$3M = 3 \times \frac{160}{3} = 160$$

85. (b) Let the length of the rectangle $\Rightarrow 2x$

the breadth of the rectangle $\Rightarrow x$

Area of rectangle $\Rightarrow$ length × breath

$200 = 2x \times x$

$\boxed{x = 10}$

length $\Rightarrow 2x = 20$ M

breadth $\Rightarrow x = 10$ M

length of the terrace $\Rightarrow$ 22 M

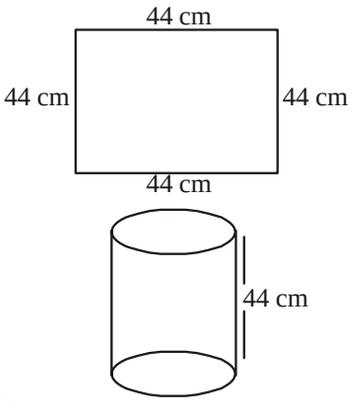
breadth of the terrace $\Rightarrow$ 12M
Area of the terrace $\Rightarrow$ 264M
The percentage area that has increased

$\Rightarrow \frac{264-200}{200} \times 100$

$\Rightarrow \frac{64}{200} \times 100$

$\Rightarrow 32\%$

86. (a)



$2\pi r = 44$

$2 \times \frac{22}{7} \times r = 44$

$\boxed{r = 7 \text{ cm}}$

Volume of the cylinder
$\pi r^2 h$

$\Rightarrow \frac{22}{7} \times 7 \times 7 \times 44$

$\Rightarrow 6776 \text{ cm}^3$

87. (a) Volume of a cuboid = 3600 cm^3
$lbh = 3600 \text{ cm}^3$
Area of adjacent face = 225 cm^2
Area of other adjacent face = 144 cm^2
$bh = 144 \text{ cm}^2$
$lb \times bh = 225 \times 144$
$lbh \times b = 225 \times 144$
$3600 \times b = 225 \times 144$

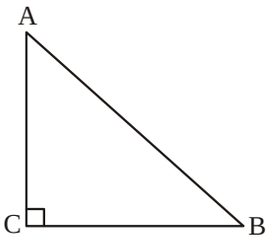
$\boxed{b = 9 \text{ cm}}$

Area of other adjacent face $= \frac{lbh}{b}$

$\Rightarrow \frac{3600}{9}$

$\Rightarrow 400 \text{ cm}^2$.

88. (c)



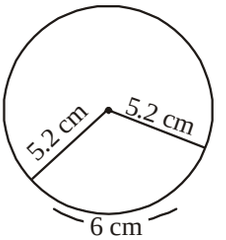
$\frac{1}{2} \times AC \times BC = 54$
$AC \times BC = 108$
$AB + BC + AC = 36$ cm
$(AC + BC)^2 = AC^2 + BC^2 + 2 \times 108$
$(36 - AB)^2 = AB^2 + 216$
$(296 + AB^2 - 72\,AB)$
$= AB^2 + 216$

$AB = \frac{1080}{72}$

$\boxed{AB = 15 \text{ cm}}$

89. (d) $X = \{x = 2 + 4k$ where $k = 0, 1, 2, 3,$ ------- $24\}$
$X = \{2, 6, 10, 14,$ --------- $98\}$
S is a subset of X such that the sum of no two elements of S is 100.
$S = \{2, 6, 10, 14, 18, 22, 26, 30, 34, 38, 42, 46, 50\}$
Maximum possible number of elements in s $\Rightarrow$ 13

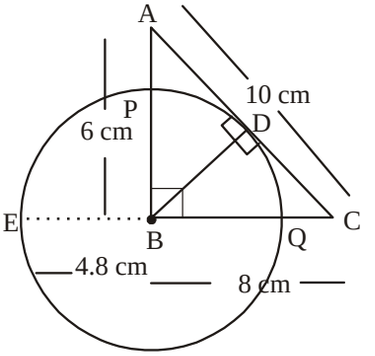
90. (a) Perimeter of a sector $\Rightarrow$ 16.4 cm
radius of a circle $\Rightarrow$ 5.2 cm



Area of the sector $\Rightarrow \frac{\pi r^2}{2\pi r} \times 6$

$\Rightarrow 3r$
$\Rightarrow 3 \times 5.2$
$\Rightarrow 15.6 \text{ cm}^2$

91. (d)



$AB \times BC = BD \times AC$
$6 \times 8 = 30 \times 10$

$\boxed{BD = 4.8 \text{ cm}}$

In ΔABC and ΔBDC
$\Delta ABC \sim \Delta BDC$

$\frac{AC}{BC} = \frac{BC}{DC}$

$\frac{10}{8} = \frac{8}{DC}$

$\boxed{DC = 6.4}$

$CD^2 = CQ \times CE$
$6.4 \times 6.4 = CQ \times 12.8$

$$CQ = \frac{6.4 \times 6.4}{12.8}$$

$\boxed{CQ = 3.2 \text{ cm}}$

92. (c) IN ΔABD

$$\cos\theta = \frac{BD}{AB}$$

$$\cos\theta = \frac{48}{60} = \frac{4}{5}$$

$$\sin\theta = \sqrt{1-\cos^2\theta}$$

$$\sin\theta = \sqrt{1-\left(\frac{4}{5}\right)^2}$$

$$\sin\theta = \sqrt{1-\frac{16}{25}}$$

$$\sin\theta = \sqrt{\frac{9}{25}}$$

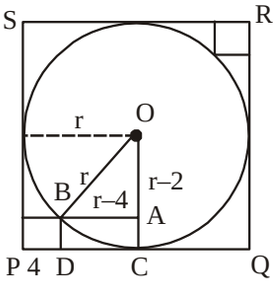
$$\sin\theta = \frac{3}{5}$$

$\boxed{\sin\theta = 0.6}$

93. (b) In ΔABC
$AB \times BC = BD \times AC$
$6 \times 8 = BD \times 10$

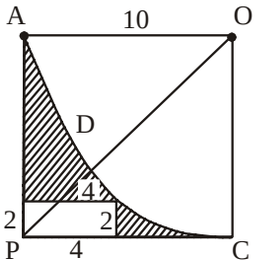
$\boxed{BD = 4.8 \text{ cm}}$

94. (a)



In ΔAOB
$OA = r-2$ {$\because$ where "r" is the radius of circle}
$OB = r$.
and $AB = r - 4$.
So, by using Pythagoras theorem
$(OB)^2 = (AB)^2 + (OA)^2$
$(r)^2 = (r-4)^2 + (r-2)^2$
$r^2 - 12r + 20 = 0$
$r^2 - 10r - 2r + 20 = 0$
$r(r-10) - 2(r-10) = 0$
$r = 2, 10$
here $(r = 2)$ is not possible.
$\therefore r = 10$
$\therefore$ Area of circle $= \pi r^2$
$= \pi(10)^2$.
$= 100\,\pi \text{ cm}^2$.

95. (d)



AOCP is a square.
$OP = 10\sqrt{2}$ ($\because$ Diagonal of square)
In PQRS,
PR is the diagonal of square and side of square PQRS is diameter of circle.
So, $PR = 20\sqrt{2}$
Now,
PR = OP + 10 + d, where d is the diagonal of smaller square.

$10\sqrt{2} + 10 + d = 20\sqrt{2}$
$d = 10\sqrt{2} - 10$
$d = 10\left(\sqrt{2}-1\right)$
Diagonal of a square = $\sqrt{2} \times$ side

$$\text{Side} = \frac{10\left(\sqrt{2}-1\right)}{\sqrt{2}}$$

$$\text{Area of square} = \left(\frac{10\left(\sqrt{2}-1\right)}{\sqrt{2}}\right)^2$$

$= 50\left(2+1-2\sqrt{2}\right) = 50\left(3-2\sqrt{2}\right)\text{cm}^2$

96. (b) Area of shaded region including rectangle
= Area of square AOCP – Ar. of quadrant AOB

$$= \left[(10)^2 - \frac{90}{360^\circ} \times 100\pi\right]$$

$= (100 - 25\,\pi)$
Area of shaded region excluding rectangle
$= (100 - 25\pi) - (4 \times 2)$
$= (92 - 25\pi)\text{ cm}^2$.

97. (b) Since AC is diameter of circle
So In ΔABC,
$\angle B = 90^\circ$
$\angle ABC + \angle ACB + \angle BAC = 180^\circ$
$\angle BAC = 30^\circ$
So, $\angle DAE + \angle EAC + \angle BAC = 90^\circ$
$\angle EAC = 30^\circ$
In ΔADC, we know that if the angles of triangle is $30^\circ - 60^\circ - 90^\circ$. Then ratio of sides will be $1 : \sqrt{3} : 2$

$\therefore$ $AD = \sqrt{3}$
$CD = 1$
$AC = 2$.

AC is diameter so radius of circle (r) $= \frac{2}{2} = 1$

A.T.Q.

$$\frac{\text{area of circle}}{\text{area of rectangle}} = \frac{\pi r^2}{L \times B} = \frac{\pi(1)^2}{\sqrt{3} \times 1} = \frac{\pi}{\sqrt{3}}$$

98. (a) In ΔAEC

$$\frac{\sin 120^\circ}{AC} = \frac{\sin 30^\circ}{AE} = \frac{\sin 30^\circ}{CE}$$

$$\frac{\cos 30^\circ}{2r} = \frac{1}{2.AE} = \frac{1}{2.CE}$$

$$\frac{\sqrt{3}}{2.2r} = \frac{1}{2.AE} \Rightarrow AE = \frac{2r}{\sqrt{3}}$$

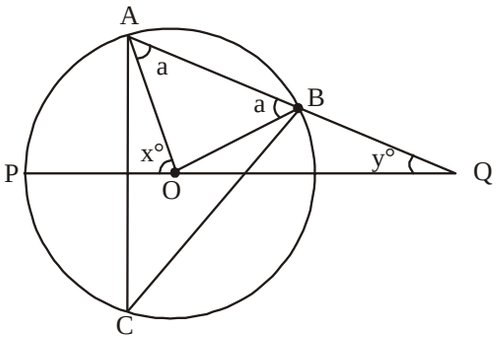
AC = diameter of circle = 28

So, Ar. of $\Delta AEC = \frac{1}{2} \times AE \times \sin 30 \times AC$

$$= \frac{1}{2} \times \frac{2}{\sqrt{3}} r \times \frac{1}{2} \times 2r$$

$$= \frac{r^2}{\sqrt{3}}$$

99. (c)



OA = OB = radius of circle

In ΔOAB

Let $\angle OAB = a$ & $\angle OBA = a$ (angle opp. The same sides are equal)

$\angle POA = \angle OAQ + \angle AQO$ (exterior angle property)

$x° = a + y°$

and

$a + y° + \angle AOQ = 180°$

$\angle AOQ = 180° - (a + y)$

$\angle POA + \angle AOQ = 180°$ (Linear pair angle)

$x° + 180° - (a + y) = 180°$

$x° = a + y$ ...(1)

OB = BQ.

$\therefore \angle BOQ = \angle BQO = y°$

$\angle ABO = y° + y°$ (exterior angle property)

$a = 2y$ ...(2)

using (2) in (1)

$x° = 3y°$

100. (d) $\angle PAO = 3(15°) = 45°$

$\angle AOB = 180° - x - y$

$= 180° - (45 + 15)°$

$\angle AOB = 120°$.

$$\angle ACB = \frac{1}{2}\angle AOB = 60°$$

{$\because$ angle on the circumference is half of the angle at the centre}

GENERAL KNOWLEDGE

1. (a) Lactic Acid Buildup Causes Muscle Fatigue and Soreness. Anyone who has pushed themselves through an intense workout will be familiar with "feeling the burn" — that sensation of fatigue and pain that sets in when you subject your muscles to lifting heavy loads repeatedly or sprinting all-out.

2. (c)

Starch Test

- Iodine solution is used to test leaves for the presence of starch.
- Heat a plant leaf in boiling water (this kills the leaf, stopping any chemical reactions)
- Add the leaf to boiling alcohol (ethanol) for a few minutes (the boiling ethanol dissolves the chlorophyll and removes the green colour from the leaf - it turns white so it is easy to see the change in colour)
- Wash with water to rehydrate and soften the leaf and spread onto a white tile
- Add iodine solution, the parts of the leaf that contain starch turn the iodine from brown to blue/black.
- The parts without chlorophyll do not photosynthesise, and so they do not make starch and the iodine does not change colour.

3. (d) There will be no effect on red blood cell as it is in isotonic solution that is Normal saline whose osmotic concentration is equivalent to that of blood.

4. (*)

- **Digestion of Lipids:** The hydrophobic and hydrophilic properties of bile salts have the capability to form micelles at the lipid-water interface. The micelles formed by the bile acids help the lipases (enzymes that break down fat) in the digestion of lipids and brings them close to the intestinal brush border that aids in fat absorption.
- Bile salts break down the fats into smaller globules and result in a milky emulsion. These **emulsified fats** are again digested by pancreatic lipase into fatty acid and glycerol. Through the process of emulsification, bile acids break down large lipid droplets into smaller ones, increasing the surface area for digestive enzymes. Emulsification is possible due to the amphipathic property of bile salts
- It is well known that both bile and pancreatic juice play a rôle in neutralizing the acidic chime (food coming from stomach) ejected into the duodenum and that pancreatic juice as a rule is more alkaline (pH 7.8—9.0), than hepatic bile (pH 7.4—8.5), and that gall bladder bile is acid (pH 5.4—6.9).

5. (a)

- Blood pressure is measured using two numbers: The first number, called systolic blood pressure, measures the pressure in your arteries when your heart beats. The second number, called diastolic blood pressure, measures the pressure in your arteries when your heart rests between beats.
- **Systolic Pressure**: It is dynamic and not constant when pressure is exerted by the blood flow through

the arteries. When there is an active heartbeat (systole), it ejects blood into arteries. Such a dynamic ejection of the blood into the arteries results in an increase in the pressure in the arteries. This peak blood pressure which is reached at the time of active cardiac contraction is referred to as the systolic blood pressure. Normally, the systolic blood pressure in an individual quietly sitting is 120 mmHg or below.

- **Diastolic Pressure**: This pressure is exerted by blood in the arteries between heartbeats – when the heart is not ejecting blood into the arteries actively. Once the heart contracts, the cardiac ventricles momentarily relax for it to be refilled with blood preparing for the next contraction. This phase of ventricular relaxation is referred to as diastole, the blood pressure at the time of diastole is referred to as diastolic blood pressure. Normally, the diastolic blood pressure when sitting quietly is 80 mmHg or below.

6. (d)
- Time = 5 s
- Speed of sound = 340 m/s
-
- Here, twice the distance would be travelled by the sound to hear the echo. Thus,
- Distance
- Distance 850 metres.

7. (d)
- Microphones convert sound to **electrical energy (singal). Hence, statement 2 is correct.**
- A speaker is a device that converts electrical energy (signal) to sound. **Hence, statement 4 is correct.**

8. (a)
- The power (P) of bulb= 100 W
- Time for which bulb is on (t)= 10 hours for 3 days = 30 hours.
- Let us assume that 'x' kWh is the energy consumed by the bulb in 30 hours.
- We will use the formula: Energy (E) = Power (P) × Time (t)
- E = 100 × 30 = 3000 W-hours
- E = 3 kW-h
- Thus, 3 units were consumed.

9. (b)
- The velocity-time graph is a depiction of the variation of the velocity of a body with time.
- The slope of the velocity-time graph gives us the acceleration of the body.
- The area of the velocity-time graph is the product of velocity and time.
- We know, *velocity* × *time* = *displacement*.
- Thus, it is obvious that the area under the velocity-time graph gives the displacement of a moving object.

10. (c)
- The power of a lens is defined as the **reciprocal** of its focal length in meters, or D = , where, D is the power in diopters and f is the focal length in meters.
- Given, the focal length = 10 cm = 0.1 m
- 10 Dioptre

11. (d)
- **Burning of Magnesium ribbon in air:** Mg burns in the air, emitting a bright white flash and heat, and then combines with oxygen to form white powder of magnesium oxide. **Thus, statement 1 and 3 are correct.**
  $2Mg + O_2$ '! 2MgO + Heat + Light
- The experiment shows that burning magnesium ribbon in air is a direct combination reaction.
- The formation of magnesium oxide is a chemical change.

Theory:
- Magnesium is an extremely active metal. Magnesium oxide is formed when it reacts with oxygen.
- During this process, two elements, magnesium and oxygen, react to form the compound magnesium oxide. Such reactions are referred to as combination reactions.
- A combustion reaction is a reaction which produces heat. Combustion takes place at an elevated temperature. It is a heat releasing (exothermic), redox chemical reaction that usually occurs between a fuel and oxidizing agent (mostly oxygen of the atmosphere). The products released are often gaseous, and the resultant mixture is commonly called smoke. The products of combustion are called oxides. ***Thus, statement 3 is correct.***

12. (b)

Limewash
- It is pure slaked lime in water. It produces a unique surface glow due to the double refraction of calcite crystals.
- When whitewash or limewash is initially applied, it has very low opacity, which can lead novices to over-thicken the paint.
- The solution of the substance used for whitewashing is calcium oxide also called quicklime with the chemical formula CaO.
- Quicklime is used for whitewashing as it produces calcium hydroxide (CaOH) when it reacts with water (H_2O) and absorbs carbon dioxide (CO_2) from the environment, as a result, it produces calcium carbonate ($CaCO_3$) which creates a hard coating on the walls.
- It forms slacked lime or calcium hydroxide when the quick lime reacts with water **CaO (s) + H2O (l) '! Ca(OH)2(aq)**
- A solution of slaked lime is used for whitewashing walls. **Thus, statement 2 is correct.**
- Calcium hydroxide (CaOH) reacts slowly with the carbon dioxide (CO_2) in the air to form a thin layer of calcium carbonate on the walls. **Thus, statement 3 is not correct.**
- Calcium carbonate is formed after two to three days of whitewashing and gives a shiny finish to the walls.
- It is interesting to note that the chemical formula for marble is also $CaCO_3$.
- $Ca(OH)_2(aq) + CO_2(g)$ '! $CaCO_3(s) + H_2O(l)$

		Slaked Calcium	Carbon
Lime	dioxide	carbonate	

13. (d) Lead nitrate on heating undergo thermal decomposition reaction to form a yellow residue of lead oxide, brown fumes of nitrogen dioxide and oxygen is released.
$2\,Pb(NO_3)_2(aq) \rightarrow 2\,PbO(s) + 4\,NO_2(g) + O_2(g)$

14. (b) Opening of soda bottle is not an oxidation reaction. When a soda bottle is opened, the gas inside is released due to the decrease in pressure. There is no oxidation or reduction of any substance involved in this process.
The rusting of iron, Rancidity, combustion all are examples of oxidation reaction. In the rusting process, iron is used to combine with oxygen in the presence of water. It is example of an oxidation reaction where oxygen acts as an oxidising agent.

15. (c) Assam is the land of the 'Red river and blue hills'. The red refers to another name of the mighty Brahmaputra — Lauhitya and the blue from the hills simmering in the distance creating a blue haze.

16 (d) Telangana is surrounded by Maharashtra and Chhattisgarh in the North, Karnataka in the West and Andhra Pradesh in the South and East directions.

17. (a) Loktak lake is in Manipur.
Barapani Lake is a reservoir located in the hills 15 km to the North of Shillong in Meghalaya.

18. (c) For the purpose of census 2011, a person aged seven and above, who can both read and write with understanding in any language, is treated as literate. A person, who can only read but cannot write, is not literate.

19. (b) The Tropic of Cancer passes through these 8 states in India: Gujarat, Rajasthan, Madhya Pradesh, Chhattisgarh, Jharkhand, West Bengal, Tripura, and Mizoram. Gujarat and West Bengal are the coastal states and rest are land locked.

20. (a) The most common cause of inflation is -when the aggregate demand in an economy strongly outweighs the aggregate supply" and prices go up.

21. (d) A contractionary monetary policy is focused on contracting (decreasing) the money supply in an economy and thereby increasing the interest rate. Fiscal policy that increases aggregate demand directly through an increase in government spending is typically called expansionary.

22. (b) Crowding out occurs when rising interest rates leads to lower private investment spending, but higher public sector spending.

23. (d) Some of the major objectives of the NITI Aayog are,
- To evolve a shared vision of national development priorities, sectors and strategies with the active involvement of States.
- To foster cooperative federalism through structured support initiatives and mechanisms with the States on a continuous basis, recognizing that strong States make a strong nation.
- To develop mechanisms to formulate credible plans at the village level and aggregate these progressively at higher levels of government.
- To design strategic and long-term policy and programme frameworks and initiatives, and monitor their progress and their efficacy. The lessons learned through monitoring and feedback will be used for making innovative improvements, including necessary mid-course corrections.

24. (b) The Suresh Tendulkar Committee was constituted to review the concept of poverty line in 2005. The committee recommended shifting away from the calories model. The committee proposed MPCE or the Monthly Per Capita Expenditure to measure poverty in India.

25. (c) The National Skill Development Mission (NSDM) aims to consolidate efforts of skill training and development across sectors and states and help sectors expedite steps to achieve various skilling efforts at scale at a fast pace. NSDM's mission is to create an end-to-end framework which promotes sustainable livelihoods for citizens while aligning them with the demands of potential employers.
The sub-missions under the National Skill Development Mission are Institutional Training, Convergence, Infrastructure, Sustainable Livelihoods, Trainers, Overseas Employment, and Capitalizing on Public Infrastructure.

26. (c) Strategies adopted for implementing the POSHAN Abhiyaan- The programme, through use of technology, convergence and community involvement with a targeted approach strives to reduce the level of stunning, under-nutrition, Anaemia and low birth weight in children, as also focus on adolescent girls, pregnant women and lactating mothers, thus holistically addressing malnutrition.

27. (c) Generally the writ of certiorari was issued by the Supreme or High Court for quashing the order passed by inferior courts or subordinate courts, tribunals or and other public authorities to submit the record of a proceeding for review. Generally the writ of certiorari was issued by the Supreme or High Court for quashing the order passed by inferior courts or subordinate courts, tribunals or other quasi judicial authorities.
Conditions for Issue of Writ of Certiorari:
- There must be a court, tribunal or an authorised person having a legal right to act judicially.
- Such court, tribunal or officer must acted or passed an order without jurisdiction or in excess of judicial authority.
- If the order was against the principle of Natural Justice.
- If the order contains an error of judgement.
- If it is against the constitution or contravention to the fundamental rights.

28. (a) The Supreme Court had issued a notification to set up a special Bench known as the Social Justice Bench in December 2014, when Justice Chief HL Dattu was the Chief Justice of India (CJI).

29. (d) Bandi Jivan meaning 'A life of Captivity' in English is the autobiographical three part account written by great Freedom activist Sachindranath Sanyal.

30. (a)
- Provincial elections were held in British India in the winter of 1936-37 as mandated by the **Government of India Act 1935.** Elections were held in eleven provinces – Madras, Central Provinces, Bihar, Orissa, United Provinces, Bombay Presidency, Assam, NWFP, Bengal, Punjab and Sindh. Except for Bengal, Punjab, and Sindh, the Congress had fared well in other regions

31. (c) The India National army was first formed in 1942 under Rash Behari Bose by Indian POWs of the British Indian Army captured by Japan in the Malayan campaign and at Singapore. Rash Behari Bose handed over INA to Subhas Chandra Bose and It was revived under the leadership of Subhas Chandra Bose after his arrival in Southeast Asia in 1943.
There was also an all-women regiment named after Rani of Jhansi, Lakshmibai.

32. (c) **Alvars** were the famous Tamil Poet Saints of who praised the Hindu Supreme God Vishnu and his Avatars. Nayanars on the other hand were the worshipers of Lord Shiva and Shakts were the worshippers of Shakti.

33. (d) Among the given answers only the Tungabhadra and Krishna rivers flow in the region between Gulbarga and Kalburgi division.

34. (b) The Assam Rifles is the only paramilitary force with a dual control structure. Dual Control means while the administrative control of the force is with the MHA, its operational control is with the Indian Army, which is under the Ministry of Defence (MoD).

35. (c) Ahom is one of the ethnic communites of Assam. The Ahom ethnic group are said to be descendants of the Tai people who arrived in Brahmaputra's Assam Valley in mixed 1228, and local indigenous peoples have joined them throughout history.

36. (d) The Zimbabwe **cricket** team is popularly known as the '**Chevrons**'. It is named after The Great Zimbabwe Stone Monument with a distinct chevron pattern on its walls. Chevron refers to a pattern of lines, which are in the shape of 'V' arranged in a zig-zag manner.

37. (d) Cheetahs released into the wild at the Kuno National Park (KNP) in Sheopur district of Madhya Pradesh. Now a total of six cheetahs live in the wild in Kuno National Park.

38. (c) Alain Aspect, John Clauser and Anton Zeilinger received the Nobel Prize in Physics 2022 for their wok that have demonstrated the potential to investigate and control particles that are in entangled states.
Klaus Hasselmann received the Nobel Prize in Physics in 2021.

39. (a) A **reflex** is an involuntary and nearly instantaneous movement in response to a stimulus. The reflex is an automatic response to a stimulus that does not receive or need conscious thought as it occurs through a reflex arc. Reflex arcs act on an impulse before that impulse reaches the brain.
The components of a reflex arc are as follows: stimulus '! **receptor** '! **sensory neuron** '! **relay neuron** (interneuron) **'! motor neuron** '! **effector** '! response.

40. (d) Iodine is required to make the thyroid hormones thyroxine and triiodothyronine, which assist with the creation of proteins and enzyme activity, as well as regulating normal metabolism.
The thyroid gland regulates many metabolic processes, including growth and energy expenditure.

41 (d) Ribonucleic acid (RNA) is a nucleic acid present in all living cells. RNA is most often single-stranded. An RNA molecule has a backbone made of alternating phosphate groups and the sugar ribose, rather than the deoxyribose found in DNA.
In plant cells RNA in addition to Nucleus, Chloroplast and Mitochondria is found inside cytoplasm and ribosomes.

42. (c) While the apical meristem is located at the apex and the lateral meristem at the girth, the **intercalary meristem is found in the internodes. Intercalary meristems is located in the leaves and internodes at the intercalary position.**
They differ, however, in being situated between regions of mature tissue, such as at the base of grass leaves, which are they located on mature stem tissue.

43. (c) Xylem parenchyma is the only Xylem tissue that consists of living tissues. These cells are living cells with the cellulose cell wall. The function of xylem parenchyma is storage and radial conduction of water. Other types of Xylem tissues are - tracheids, trachea and xylem fibre. These all are consist of non-living tissues.

44. (d) $1/R_{Eq} = (1/11) + (1/22) + (1/33)$
Therefore, $R_{Eq} = 6$ ohm

45. (b) In India the difference in voltage of Red live wire and black neutral wire is 220 volts. This means the Red live wire carries current at 220 V and the black neutral wire at 0 V.

46. (a) Hydrogen, bomb or the thermonuclear bomb is based upon nuclear fusion. On the other hand the atomic bombs use the principle of **nuclear fission**.

47. (a) Sound waves are longitudinal waves because their oscillations are parallel to the direction of the energy transport.
Light is an example of a transverse wave as the displacement of the medium is perpendicular to the direction of propagation of the wave.

48. (a) Here, $a = -6$ m/s2, $t = 2$ s and $v = 0$ m/s
Using the equation, $v = u + at$, we get $0 = u + (-6 \times 2)$
$u = 12$ m/s
Now by using the equation
$v2 = u2 + 2as$
$0 = 122 - (2 \times 6 \times S)$
$S = 12$m

49. (a) A soda-type fire extinguisher contains **solutions of sulphuric acid (H2SO4) and sodium hydrogen carbonate (NaHCO3) in separate containers. The reaction is given by,**
$2NaHCO_3 + H_2SO_4$ '! $Na_2SO_4 + 2CO_2 + 2H_2O$
A blanket of carbon dioxide comes out with the liquid and cut the supply of air to the burning substance and the supply of air is cut and fire gets extinguished.

50. (c) Conc. HNO_3 is added to water and the solution that forms is very dilute and the small amount of heat released is not enough to vaporize and spatter it. In the reverse case water is added to acid it forms an extremely concentrated solution of acid initially and the solution may boil very violently, splashing concentrated acid.

51. (d) The pH of Lemon Juice is 2.5
pH of coffee is 5.0
pH of Human blood is 7.4
The pH value of the Milk of Magnesia is 10.5.

52. (c) Anodizing is an electrolytic process that results in a stable, thick oxide layer that forms on the metal's surface.
Aluminium develops a thin oxide layer when exposed to air. This aluminium oxide coat makes it resistant to further corrosion. The resistance can be improved further by making the oxide layer thicker.
During this process, clean aluminium article is made the anode and is electrolysed with dilute sulphuric acid. The oxygen gas evolved at the anode (and not cathode) reacts with aluminium to make a thicker protective oxide layer.
Magnesium and Titanium can also be anodized to improve its surface properties.

53. (b) Naphthalene burns with a yellow flame due to unburnt hot carbon particles. These unburnt carbon particles are also formed during combustion of unsaturated compounds that emit yellow light and therefore the flame appears yellow.

54. (a) A **thermite reaction** is a reaction in which a metal oxide is reduced by using aluminium as the reducing agent. It is generally exothermic in nature, and used as wielding purposes to produce coalescence between metals.

55. (c) Stewart Island is New Zealand's third-largest island, located 30 kilometres south of the South Island, across the Foveaux Strait. *Hawke Bay* is a large bay on the east coast of the North Island of New Zealand. The Bay of Plenty is a large bight along the northern coast of New Zealand's North Island. It is famous for its prime surfing conditions, fishing spots, glistening white sands and safe swimming waters.

56. (c) World Heritage Sites are designated by UNESCO for having cultural, historical, scientific or other form of significance. Around 40 UNESCO World Heritage Sites are in India.
UNESCO world heritage sites in Delhi are,
- Humayun's Tomb
- Qutb Minar and its Monuments, and Red Fort Complex

57. (d) The correct sequence of Cities situated at the bank of Ganga from West to East is,
Kanpur, Prayagraj, Patna, and Bhagalpur

58. (d) Chhattisgarh is the state with maximum North-South extension among the given states. The length of the state from north to south is - 700 to 800 km. The width of the state from east to west is - 435 km.

59. (b)
- World Wetlands Day is celebrated annually on *2* February, aims to raise global awareness about the vital role of wetlands for people and planet.
- International Tiger Day is celebrated every year on July 29th as a way to raise awareness about this big cat.
- World Water Day is celebrated on 22 March every year to raise awareness of water and its conservation.
- International Mother Earth Day is an annual event on April 22 to demonstrate support for environmental protection.

60. (c) Kerala, Punjab, Chandigarh, Maharashtra, Gujarat, Rajasthan, and Andhra Pradesh have achieved level 2 (901 to 950 points) in PGI 2020-21. Kerala, Punjab and Maharashtra have scored the highest 928 points. Chandigarh, Gujarat, Rajasthan, and Andhra Pradesh scored 927, 903, 903, and 902 points, respectively.

61 (d) Asha Parekh is a renowned Actress, Director and Film Producer as well. She was awarded the Padma Shri in 1992 and has also served as the head of Central Board of Film Certification from 1998 to 2001. She has been selected for the Dadasaheb Phalke award 2020, the highest Award in the field of Cinema in India.

62 (b) The venue of UN 2023 Water Conference was at UN Headquarters in New York between 22-24 March 2023. The conference was co-hosted by the Government of Tajikistan and the **Kingdom of the Netherlands.**

63. (c) Geetanjali Shree's 'Ret Samadhi' (2018), which was translated into English as '*Tomb of Sand'* is a novel written originally in Hindi. The novel won the 2022 International Booker Prize. The novel was translated in English by Daisy Rockwell. It became the first novel translated from an Indian language to win the International Booker Prize.

64. (b) Indian Special Forces troops engaged in a bilateral joint training Exercise **Garuda Shakti** with Indonesian Special Forces at Sangga Buana Training Area, Karawang, Indonesia. Exercise Garuda Shakti is the eighth edition of the series of bilateral exercises under this banner.
The exercise aims at enhancing understanding, cooperation and interoperability between the Special Forces of both armies.

65. (c) Raising interest rates helps to reduce the overall level of demand and therefore helps in controlling the upward pressure on prices. Higher interest rates reduce inflation whereas lower interest rates lead to a rise in inflation.

66. (a) A sustained decrease in the general price level in an economy is known as deflation.
Deflation is when consumer and asset prices decrease over time, and purchasing power increases.

67. (a) Across three dimensions of health, education and standard of living, The National Multidimensional Poverty Index (NMPI) includes indicators on nutrition, child and adolescent mortality, maternal care, years of schooling, school attendance, cooking fuel, sanitation, drinking water, electricity, housing, bank accounts and assets.

68. (b) Structural unemployment is a type of unemployment that can last for many years and can be caused by changes in technology or shifting demographics.

69. (a) The Pradhan Mantri Swasthya Suraksha Yojana (PMSSY) aims at correcting the imbalances in the availability of affordable healthcare facilities in the different parts of the country in general, and augmenting facilities for quality medical education in the under-served States in particular.

70. (c) **Mahatma Gandhi proposed** to dissolve the Congress Party after Independence of India, which was the main objective of INC. He suggested to replace it with 'Lok Sevak Sangh'.
A day before he passed away, Gandhiji had drafted a constitution for the Lok Sevak Sangh, or association of servants of the people, into which he wanted the Indian National Congress to dissolve itself.

71. (a) India became the first country to deploy an all-women contingent to a UN peacekeeping mission. In 2007, the Formed Police Unit in Liberia provided 24-hour guard duty, conducted night patrols in the capital Monrovia, and helped to build the capacity of the Liberian police.

72. (b) The 'Study Webs of Active-Learning for Young Aspiring Minds (SWAYAM) is an online platform of the Ministry of HRD through which online programmes/courses is being offered to students in India.
This is done through a platform that facilitates hosting of all the courses, taught in classrooms from Class 9 till post-graduation to be accessed by anyone, anywhere at any time. The courses hosted on SWAYAM are in 4 quadrants –
- Video lecture,
- Specially prepared reading material that can be downloaded/printed
- Self-assessment tests through tests and quizzes and
- An online discussion forum for clearing the doubts.

Steps have been taken to enrich the learning experience by using audio-video and multi-media and state of the art pedagogy / technology.

73. (c) The National Authority Chemical Weapons Convention (NACWC) has been established under the Chemical Weapons Convention Act, 2000 for implementing the provisions of the Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction, signed on behalf of the Government of India at Paris on the 14th day of January, 1993. NACWC is an office in the Cabinet Secretariat, Government of India.

74. (b) Para 4 of the Fifth Schedule provides for establishment of a Tribes Advisory Council (TAC) in any State having Scheduled Areas. If the President so directs, there will be established a TAC in a State having Scheduled tribes but not Scheduled Areas therein, consisting of not more than twenty members of whom, three-fourths shall be the representatives of the Scheduled Tribes in the Legislative Assembly of the State.

75. (b) The Northern Zonal Council, comprising the States of Haryana, Himachal Pradesh, Jammu & Kashmir, Punjab, Rajasthan, National Capital Territory of Delhi and Union Territory of Chandigarh. Uttarakhand and Uttar Pradesh are part of the Central Zonal Council.

76. (d) The notions of kinship projected by the Kushana rulers are perhaps best evidenced in their coins and sculpture. Colossal statues of Kushana rulers have been found installed in a shrine at Mat near Mathura. Information available suggests that the Kushan rulers accepted the prevalent Indian and Chinese concept of the **divinity of kingship**, and borrowed the Achaemenid and subsequently **Indo-Greek and Indo-Parthian system** of appointing satraps as provincial governors, while the **feudal lord** (dandanayaka) was their **own creation.**

77. (b) 'Theri' refers to senior bhikkunis in the Buddhist Tradition. it refers to distinguished women (nuns) of wisdom and character. Buddhist text Therigatha is often translated as Verses of the Elder Nuns.

78 (b) Hridayanath Kunzru founded the Seva Samiti at Allahabad in 1914. He was a member of the servants of Indian society. The Servants of India Society was formed in Pune, Maharashtra, on June 12, 1905 by Gopal Krishna Gokhale.

79. (d) The First Anglo-Maratha War was concluded by signing the Treaty of Salbai, signed in 1782 lasted from 1775 to 1782, with the victory of the British East India Company. The, ended the war.

80 (b) During the Travancore-Dutch War, forces of Travancore King **Marthanda Varma's** defeated the Dutch East India Company's forces in the Battle of Colachel.

81. (a) The rebellion that took place in 1879-80 in Chodavaram is known as the Rampa Rebellion. The tribal Koya and Konda Kora hill chiefs, also known as Muttadars, had risen against their overlord. It should be noted that in 1922 The Koya tribal community revolted at in the Godavari Agency against the British under leadership of Alluri Sitarama Raju and the Revolt is also known as Rampa Rebellion 1922.

82. (b) The men's Brazil football team has the most FIFA World Cup wins. Brazil have lifted the World Cup a record **five times** – 1958, 1962, 1970, 1994 and 2002.

83. (b) French author Dominique Lapierre wrote the novel 'City of Joy'. It tells the story of unsung heroes of a Kolkata slum and is influenced by real-life incidents.

84. (c) Dr. Purnima Devi Barman is honoured with 2022 Champion of the Earth Award for Entrepreneurial Vision. She is the **founder of the Hargila Army and Senior Project Manager of the Avifauna Research and Conservation Division, Aaranyak.**

85. (b) The theme of India's G- 20 Presidency 'Vasudhaiva Kutumbakam' is taken from Maha Upanishad. It is also referred to in the Hitopadesha and other literary works of India. The vesre is made up of *three Sanskrit words, Vasudhaa (earth/world), iva (like) and kutumbakam (large/extended family*). It means, "the whole world is one family."

86. (d) The 16th Edition of Indo-Nepal joint training Exercise "Surya Kiran-Xvi" between India and Nepal was conducted at Nepal Army Battle School, Saljhandi (Nepal), from 16 - 29 December 2022.
Exercise "Surya Kiran" is conducted annually between India and Nepal with the aim to enhance interoperability in jungle warfare & counter terrorism operations in mountainous terrain and HADR under UN mandate.

87. (d) One sinodic day (360° rotation) is equal to 24 hours. Thus, the difference between 1° is equal to 4 minutes.
(1°/360°) × (24 h/1h) × (60 minute) = 4 minutes
The time in the eastern region is more further rather the western part. Based on this data, you can easily calculate, Time on the 90° East is at the moment
Will be 90 X4 = 360 minute =6 hr, hence the Time on the 90° East is at the moment when at 0° is at 10:00 AM will be, 10:00 AM + 6hr = 4 PM

88. (b) Neptune, Uranus, Saturn, and Jupiter are known as the four gas giants in our solar system. These are also called the Jovian planets. A gas giant is a large planet mostly composed of helium and/or hydrogen.

89. (a) Alluvial soil is formed when silt, sand, and clay are deposited on flat lands or basins. This soil contains a large amount of minerals like potash, phosphoric acid, and lime, which makes it suitable for agriculture. According to their age alluvial soils can be classified as old alluvial (Bangar) and new alluvial (Khadar).

90. (c) Thermal power plants generate electricity by using heat from a fuel source. These may be based on coal, Gas, Diesel etc.
The heat usually generates steam in a boiler. The steam is then used to turn a turbine, which is connected to a generator that produces electricity

91. (d) In India, the Indus basin spreads over the states of Himachal Pradesh, Punjab and a part of Rajasthan, Haryana, and Union Territory of Chandigarh, Jammu & Kashmir and Ladakh.

92. (c) The Attorney General for India is the chief legal advisor of the Government of India and is its chief advocate in the courts. The office of the Attorney General is created by the Constitution. In addition to the Attorney General, there are other law officers of the Government of India.
They are the solicitor general of India and additional solicitor general of India. They assist the AG in the fulfilment of his official responsibilities. In other words, Article 76 does not mention about the solicitor general and additional solicitor general. The Appointments Committee of the Cabinet (ACC) recommends the appointment and officially appoints the Solicitor General.

93. (c) The Estimates Committee has 30 members and all these members are from Lok Sabha-the Lower House of the Parliament. There is no representation from the Upper House- the Rajya Sabha.

94. (a) The President is elected by an Electoral College, which consists of the elected members of both Houses of Parliament and the elected members of the Legislative Assemblies of all the States and also of NCT of Delhi and the Union Territory of Puducherry.
As per Article 55(3) of the Constitution of India, the election of the President shall be held in accordance with the system of proportional representation by means of single transferable vote and the voting at such election shall be by secret ballot.
Eligibility for election as President —
- is a citizen of India,
- has completed the age of thirty-five years, and
- is qualified for election as a member of the House of the People.

A person shall not be eligible for election as President if he holds any office of profit under the Government of India or the Government of any State or under any local or other authority subject to the control of any of the said Governments.
For the purposes of this article, a person shall not be deemed to hold any office of profit by reason only that he is the President or Vice-President of the Union or the Governor of any State or is a Minister either for the Union or for any State.

95. (a) According to **Citizen Act 1955,** determination of citizenship **is based -**on or after the 26th day of January, 1950.

96. (c) A household is considered deprived if any child between the ages of 0 to 59 months, or woman between the ages of 15 to 49 years, or man between the ages of 15 to 54 years -for whom nutritional information is available - is found to be undernourished.
A woman (15 to 49 years) or a man (15 to 54 years) is considered undernourished if their Body Mass Index (BMI) is below 18.5 kg/m2. Children under 5 years of age are considered malnourished if their z-score of height-for-age (stunting) or weight-for-age (underweight) is below minus two standard deviations from the median of the reference population.

97. (a) Rayagajakesari and Dayagajakesari are titles associated with the Kakatiya dynasty. The Kakatiya dynasty was an Indian dynasty that ruled most of eastern Deccan region comprising present day Telangana and Andhra Pradesh, and parts of eastern Karnataka and southern Odisha between 12th and 14th centuries. Their capital was Orugallu, now known as Warangal. Early Kakatiya rulers served as feudatories to Rashtrakutas and Western Chalukyas for more than two centuries.

98. (d) The peculiar feature of kudumiyanmalai inscription is that there are seven sub-sections and 16 sets of four swaras each. The kind of notes that are used in musicology presently are also found there, but with a different intensity.

99. (c) In 18th-century India in the Bengal region, Dastak was a trade permit exempting European traders, mostly of the British East India Company, from paying customs or transit duties on their private trade.

100. (a) **Dadni system** was used by European merchants during 18th century. Dadni is actually a kind of advance money paid to the farmers for especially textile production by the European merchants. During the 17th and 18th century the bulk of cotton textiles production was organised on the basis of this type of agreement among the merchants,merchant-middlemen and weavers.

101. (d) Kanagamahalli archaeological Site is an ancient Buddhist site, situated on the bank of River Bhima River near Kanaganahalli in Kalaburagi district in Karnataka.
During excavation, an abandoned well was discovered. Which turned out to be "Maha Stupa". The Maha Stupa is referred as "Adholoka Maha Chaitya" in the Ashoka's inscriptions. It is likely that, the Maha Stupa have been developed in three constructional phases, namely, Mauryan Phase, Early Satavahana Phase and Later Satavahana phase, during 3rd Century B.C. to 3rd Century A.D.

102. (d) The most widely used measure of eruption size is called the Volcanic Explosivity Index, or VEI. VEI incorporates eruption magnitude and intensity into a single number by assuming that they increase and decrease in unison. It measures magnitude as the amount of fragmental lava produced in an eruption. Beginning about seventy million years ago — long after the earth's other continents had formed — lava from volcanic eruptions along the mid-ocean ridge cooled as basalt (a dark rock) to make all of Iceland's present-day land surface. Iceland's entire surface is made of volcanic rock, most of it basalt.
Volcanic soil is fertile because it is derived from both volcanic lava and volcanic ash. Both of these are rich in certain key nutrients, such as iron, calcium, magnesium, sodium, potassium etc.

103. (b) Cumulonimbus clouds are born through convection, often growing from small cumulus clouds over a hot surface. It is the only cloud type that can produce hail, thunder and lightning. Shapes of these clouds are fibrous upper edges with anvil top.

104. (c) A bar chart is a representation of numerical data in pictorial form of rectangles (or bars) having uniform width and varying heights proportional to the values. The bar chart is used for two variables here that is population size and number of services.

105. (b) Among the states Gujarat has the longest coastline in India along its kathiawar region. The length of the Gujarat coastline is about 1600 km surrounded by the Arabian Sea.
The islands of Andaman and Nicobar have the longest coastline in India in 2020, amounting to a little over 1,900 kilometers,

106. (c) Visakhapatnam is the landlocked and well-protected harbour. This port was originally planned as an outlet for the export of iron ore. Kandla port also known as the Deendayal Port, is a tidal port.

107. (b) In 2021-2011, the country lost 4.3% of area under moderately dense forests. Moderately dense forests also declined between 2019 and 2021.

108. (b) NEP 2020 recognizes that the vocational education is perceived to be inferior to mainstream education. Hence, this policy aims to overcome the social status hierarchy associated with vocational education and requires integration of vocational education programmes into mainstream education in all education institutions in a phased manner. Towards this, secondary schools will also collaborate with ITIs, polytechnics, local industry, etc. Skill labs will also be set up and created in the schools in a hub and spoke model which will allow other schools to use the facility.
By 2025, at least 50% of learners through the school and higher education system shall have exposure to vocational education, for which a clear action plan with targets and timelines will be developed. This is in alignment with Sustainable Development Goal 4.4 and will help to realize the full potential of India 's demographic dividend.

109. (a) **Assam, Jharkhand and Bihar were at the bottom of** Niti Aayog's SDG India Index 2020-21. **Kerala has retained the top rank in Niti Aayog's SDG India Index for the same period.**

110. (c) The State shall endeavour to—
- promote international peace and security;
- maintain just and honourable relations between nations;
- foster respect for international law and treaty obligations in the dealings of organised peoples with one another; and
- encourage settlement of international disputes by arbitration.

111. (d) The term 'Non-Alignment' was used for the first time in 1950 at the United Nations by India and Yugoslavia, Drawing on the principles agreed at the Bandung Conference in 1955, the Non-Aligned Movement as an organization was founded on the Brijuni islands in Yugoslavia in 1956 and was formalized by signing the Declaration of Brijuni on 19 July 1956.
The Declaration was signed by Yugoslavia's President, Josip Broz Tito, Indian Prime Minister Jawaharlal Nehru and Egypt's President, Gamal Abdel Nasser.
The Non-Aligned Movement and held the Belgrade Conference in 1961 under the leadership of Josip Broz Tito of Yugoslavia, Gamal Abdel Nasser of Egypt, Jawaharlal Nehru of India, Kwame Nkrumah of Ghana, and Sukarno of Indonesia.

112. (c) The Balutedar system was a caste-based labour system that was prevalent in Maharashtra for centuries. It was designed to maintain a hierarchical social order and ensure a steady supply of labour for landowners. However, the system was criticized for its inherent inequality and the exploitation of the lower castes.

113. (a) **Sir John Lawrence** officially declared Simla the summer capital of the British empire in 1864.

114 (a) Narayan Surve is the author of Majhe Vidyapeeth. He received 11 prizes for this about the working claoss of Bombay. He is known as one of the best poets of Marathi language and actively worked in the workers' union movement in Mumbai

115. (a) Dharma Sabha was formed in 1830 in Calcutta by Radhakanta Deb. The organization was established mainly to counter the ongoing social reform movements led by protagonists such as Raja Ram Mohun Roy and Henry Derozio.

116. (c) The United Nations General Assembly at its 75th session in March 2021 declared **2023** the International Year of Millets (IYM 2023) following a proposal by India.

117. (b) Karthik Palaniapan Meiyappan playing for UAE's squad for the 2022 ICC Men's T20 World Cup in Australia against Sri Lanka, took a hat-trick by dismissing Bhanuka Rajapaksa, Charith Asalanka, and Sri Lankan captain Dasun Shanaka.
This was the first T20I hat-trick by a UAE player, the fifth at a T20 World Cup, and the first hat-trick taken by a player from an ICC associate member against an ICC full member.

118. (b)
- The Wassenaar Arrangement is a voluntary export control regime. The Arrangement, formally established in July 1996, has 42 members who exchange information on transfers of conventional weapons and dual-use goods and technologies.
- It has 42 member states comprising mostly NATO (North Atlantic Treaty Organization) and EU states.
- Participating States are required to report their arms transfers and transfers/denials of certain dual-use goods and technologies to destinations outside the Arrangement on a six-monthly basis.
- India became a member of the Arrangement in 2017 and officially assumed the chairmanship from 1st January, 2023.

119. (c) PT Usha although born in Kuttali, a village in Kerala she studied in nearby Payyoli that later gave rise to her nickname *The Payyoli Express*. In the Los Angeles Olympics, 1984 she missed out on the bronze medal by just one-hundredth of a second during 400m hurdles final.
During the 1985 Asian Championships at Jakarta, PT Usha set a new record by winning six medals, including five golds. She won her next four golds at the 1986 Seoul Asian Games, each in Asian record time, including a silver.

120 (c)

Book/Play/drama	Author
Bhul Satya	Manoj Kumar Goswami
Tumadi Ke Shabd	Badri Narayan
Chhe Roopak	Veena Gupta
Alekhun Amba(Play)	Kamal Ranga

ENGLISH

1. (b) The word 'that' in the sentence 'I like that boy' functions as a demonstrative pronoun, which is used to indicate a particular person or thing. In this case, 'that' points to the 'boy'.
Demonstrative pronoun: A demonstrative pronoun is a type of pronoun that is used to point out or identify a specific person, thing, or idea. Demonstrative pronouns include words like "this," "that," "these," and "those." They are used to replace nouns or noun phrases in order to avoid repetition and provide clarity in a sentence.

2. (a) 'Without health there is happiness', in this sentence happiness is a noun. It is an abstract noun.
Abstract noun: an abstract noun is a noun that refers to an intangible concept such as an emotion, a feeling, a quality, or an idea.
Abstract nouns can encompass a wide range of concepts and emotions, such as love, happiness, bravery, freedom, justice, knowledge, beauty, and patience. They are typically not physical entities, but rather qualities, states, or abstract ideas that exist in our minds or experiences.
'Happiness' is the noun form of 'happy', and it denotes an emotion.

3. (b) 'You have no sense', In this sentence 'no' is a determiner.
A determiner is a word or a group of words that is used before a noun or noun phrase to provide information about the reference or quantity of the noun. Determiners help to specify whether the noun is definite or indefinite, and they can also indicate possession or quantity.
Determiners play an important role in structuring and clarifying the meaning of a noun phrase within a sentence. They help to convey information such as specificity, ownership, quantity, and definiteness.

4. (d) 'None of these cars are in use', In this sentence 'none' is an Indefinite pronoun.
Indefinite pronoun: An indefinite pronoun is a pronoun that does not refer to a specific person, thing, or amount. Instead, it refers to a non-specific or unidentified person, thing, or quantity. Indefinite pronouns are used when we want to refer to an unknown or general entity.

5. (a) 'We shall now begin to work', In this sentence 'now' is an adverb.
Adverb: An adverb is a word that modifies or describes a verb, adjective, or another adverb. It provides more information about how an action is performed, how an adjective is characterized, or how an adverb is intensified. Adverbs often answer questions such as "how," "when," "where," "why," or "to what extent." They can indicate manner, time, place, frequency, degree, or reason.

6. (b) 'Owing to his health, he retired from business', in this sentence 'owing to' is a preposition.
Preposition: A preposition is a word that typically comes before a noun, pronoun, or noun phrase to

show its relationship to another word in the sentence. Prepositions often indicate location, direction, time, manner, or other relationships between objects or ideas. Some common prepositions include "in," "on," "at," "under," "over," "through," "with," "to," and "from."

7. (d) 'My sister is just sixteen, and therefore not eligible to vote', In this sentence 'therefore' is a conjunction.
Conjunction: A conjunction is a part of speech that connects words, phrases, or clauses within a sentence. It is used to coordinate or link different elements together, expressing relationships such as addition, contrast, cause and effect, or time. Conjunctions allow for the creation of complex and compound sentences.

8. (c) 'They tried to find fault with us', in this sentence 'to' is an infinitive.
Infinitive: An infinitive is the base form of a verb that typically includes the word "to" before the verb. It is called an infinitive because it is not conjugated to reflect tense, person, or number. In English, infinitives are often used as noun phrases, verb phrases, or adverbial phrases.

9. (d) 'Which way shall we go?', In this sentence 'which' is an adjective. Adjective: An adjective is a part of speech that describes or modifies a noun or pronoun. It provides additional information about the noun or pronoun by giving details such as its quality, quantity, size, color, or appearance. Adjectives can be used to enhance the understanding and visualization of the noun or pronoun in a sentence.

10. (d) 'Alas! He is dead', In this sentence 'alas' is an interjection.
Interjection: An interjection is a part of speech that expresses strong emotions, feelings, or reactions. It is often used to convey surprise, joy, anger, pain, or other intense emotions. Interjections are usually short, exclamatory words or phrases that are not grammatically connected to the rest of the sentence. They are used to add emphasis or to convey the speaker's immediate reaction to a situation.

11. (a) He was the most eloquent speaker that I ever heard.
The sentence should use the adjective 'eloquent' in superlative degree, as the speaker makes a drastic statement - 'that I ever heard', implying he has never heard such an eloquent speaker before.

12. (b) What was the name of the person to whom you spoke over the phone?
The blank requirements to be studied from the perspective- if it needs a pronoun that's in private form (who) or objective form (whom).
In case of confusion, it can be simplified- You spoke to whom/ him over the phone. Then, both whom/ him' are in objective case. So whom' is applicable.

13. (a) Have you seen Mohan lately? The judgment needs an adverb,' lately ' to modify the verb' see'. (b) is also an adverb of time, but it has the incorrect operation of tense.
The judgment is in present tense, so' history'(connoting past time) is doubtful.' Incipiently' as an adverb is used to introduce the last of a series of points or conduct.' Late' implies a passage of time, which isn't needed.

14. (c) We live in quite an old house.
'Quite' is used to emphasize more than a little but less than very.
From the above 'Quite' is the correct choice of word.
'Rather', though an adverb means more than was expected.
'Fairly' is used to denote 'quite' but it is used in a positive sense, on the other hand sentence does not evoke hope and positivity.
'Pretty' is used to denote 'quite' but it is used in a positive sense, but the sentence does not evoke hope and positivity.
Hence, they are eliminated.

15. (a) I'm playing tennis tomorrow unless it rains.
This sentence has given with a condition that expresses a future event, when one clause is present indefinite tense / future indefinite tense, the conditional clause is always in present indefinite tense (unless it rains). Option (b) involves the usage of double negatives, Hence, option (b) is incorrect.
Option (c) has an error in tense.

16. (d) The make of the car is unknown. In this sentence 'make' is used as a noun, inferring the 'form/build.'
'Making' is 'the process of being made', which is incorrect.

17. (a) He paid his debts down to the last penny.
The saying -paying down to the last penny it means all the money that one is left with.
The preposition 'down' resembles the bottom of the money that one has. 'Over' fails to create the idea.
'Full' does not describe 'to the last penny'.
'He paid his debts fully' makes sense, relating it to 'the last penny' does not.

18. (d) Developing infrastructure in a diverse country requires detailed planning.
The blank requires a positive word. The word 'scarcity' and 'poverty' can be eliminated because they cannot contribute to a detailed planning in a diverse country.
The infrastructure that will promote the development of an economy.

19. (c) Adequate provisions have been made to support agriculture.
From the sentence, agriculture needed support, thus the adequate measures have been adopted.
'Subsidized' connotes' to give money in order to keep the cost of a service low', it can be applicable to price, not provisions.

20. (b) The phenomenal growth in the Indian financial markets can be attributed to a number of reforms.
'Meteor', 'catastrophe', 'efficiency' cannot denote growth.

21. (c) (Q) With time
(P) India has become
(S) the world's largest extractor of groundwater
(R) accounting for 25 percent of the total available water.

The correct sequence is QPSR.
'With time' marks the starting of the sentence, it starts with an adverb phrase of time, it gradually moves on to what has happened with time.
P-S is an appropriate sequence, telling what India has become – the world's largest extractor of groundwater.
This is followed by what makes India the world's largest extractor of groundwater-it accounts for 25 percent of the total available water.

22. (a) (R) The extremes
(S) of climate change
(P) present existential perils
(Q) all over the world.
The correct sequence is RSPQ.
The sentence has a cause and effect relationship, so it must start with 'the extremes of climate change', which is the cause and then the effect – present existential perils all over the world.

23. (b) (P) The company forecasts
(S) that India will be the fastest growing
(Q) aviation markets amongst
(R) the G20 countries.
The correct sequence is PSQR.
The sentence must start with the subject 'the company'+ verb 'forecasts' that + object 'India'. The part that India will be the fastest growing...(S) must be followed by aviation markets (Q) and these markets are present in the G20 countries.

24. (d) (Q) Shangdongs are traditional
(S) trapping pits with inverted funnel-shaped
(R) stone-walls, usually built
(P) near villages or herder camps.
The correct sequence is QSRP.
The sentence is about Shangdongs, so starting should be Q. It is obvious that they are pits with inverted funnel-shaped stone-walls that are built near villages or herder camps.

25. (a) (R) India has
(S) brought back
(P) several antiquities from other
(Q) nations over the years.
The correct sequence is RSPQ.
The subject is India, so R is the starting part, it will be followed by the verb, brought back (S), then object – several antiquities.

26. (c) (S) The biodiversity parks
(R) are spread out over the natural landscapes
(Q) of the Yamuna river
(P) and the Aravalli hill ranges.
The correct sequence is SRQP.
Since the subject is 'biodiversity parks', S start the sentence, followed by a verb 'spread out over', the natural landscapes are described in the Yamuna river and the Aravalli hill ranges. So RQP is an important link.

27. (a) (P) The familyfound out
(R) that some of
(Q) their mother's friends were going to
(S) Poland in a car.
The correct sequence is PRQS.
The subject is the family (P) that found out something, which is disclosed in Q-some of their mother's friends were going to Poland in a car.

28. (c) (Q) From the perspective of humans
(S) living on its surface,
(P) Earth may seem immense
(R) and limitless.
The correct sequence is QSPR.
The key link is P-R- how Earth seems immense and limitless. So only option (b) or (c) is correct. But the starting has to be 'from the perspective of humans', who live on the surface of Earth.

29. (d) (S) The Indian financial markets
(Q) have grown substantially
(P) in terms of trading volumes
(R) market capitalization and turnover.
The correct sequence is SQPR.
The subject is the 'Indian financial markets', so S is the starting. Next follows the verb 'have grown substantially' and this is in respect to trading volumes, market capitalization and turnover. Thus, QPR is a logical link.

30. (b) (Q) Those who passed through
(S) that valley of darkness
(P) emerge at last into a
(R) country of unearthly beauty.
The correct sequence is QSPR.
The starting has to be 'those who passed through', the place is mentioned in S- that valley of darkness, those people emerge at last into a country of unearthly beauty.

31. (a) The idiom "axe to grind" usually suggests that having a private motive or ulterior purpose in following a specific course of action or holding a selected opinion. It implies that somebody encompasses a hidden agenda or an unconditional interest in a very matter that goes on the far side the apparent issue at hand. So, the right answer is 'to have a selfish aim or motive'.
Example- "Deepak continually criticizes the government's policies, however it's clear he has Associate in Nursing axe to grind as a result of her brother lost his job thanks to a recent change."

32. (c) The idiom 'bite the bullet' is The idiom "bite the bullet" means to face a difficult or unpleasant situation with courage and determination, even though it may be painful or uncomfortable. It often implies that one must endure or accept something unpleasant or difficult in order to achieve a desired outcome or to fulfill a responsibility.
So, the right answer is "to accept something unpleasant and difficult."
Example- "After weeks of procrastination, I finally bit the bullet and started studying for the exam, even though I knew it would be a challenging process."

33. (a) The idiom "laughing stock" refers to a person or thing that becomes the object of ridicule, mockery, or amusement by others. It implies that someone or something has become so foolish, absurd, or inept

that it elicits laughter or derision from others. Being a laughing stock means being the subject of jokes or being viewed as a source of amusement or scorn.
So, the meaning is: to accept something unpleasant and difficult.
Example:"After his failed attempt at singing, he became the laughing stock of the talent show, and his performance was met with laughter and ridicule from the audience."

34. (d) The idiom "pay over the odds" means to pay more than the fair or reasonable price for something. It suggests that the amount paid is higher than what is considered appropriate or necessary.
So, the meaning is: 'to pay more for something than it is worth.
Example: We had to pay over the odds to get tickets to the most demanding concert of Mika Singh.

35. (b) The idiom "play to the gallery" means to behave or perform in a way that seeks to gain approval, support, or applause from a particular audience or crowd, often at the expense of authenticity, substance, or genuine expression.
So, the meaning is: 'to say things that will make people admire you'.
Example: "During the political debate, instead of addressing the real issues, the candidate decided to play to the gallery by making exaggerated promises and using emotional appeals to win over the voters."

36. (a) The idiom "be in the soup" means to be in a difficult or troublesome situation. It implies being in a predicament or facing a problem that is challenging or unpleasant. The phrase suggests that someone is in trouble or facing unfavorable circumstances from which it may be difficult to escape or find a solution.
Example:"After losing his job and facing financial difficulties, John found himself in the soup and struggled to find a way out."
The idiom 'be in the soup' means 'to be in trouble'.

37. (d) The idiom "turn of the screw" refers to a situation or action that increases pressure, tension, or difficulty. It suggests a gradual escalation or intensification of a problem or challenge. The phrase can be used to describe a series of events or actions that make a situation more complicated or demanding.
Example:"As the project deadline approached, the client's demands kept increasing, putting the team under a relentless turn of the screw, making it harder to meet the expectations."
The idiom 'turn of the screw' means 'to exert excessive and coercive pressure, force, or threats of violence on someone.'

38. (b) The idiom "a white elephant" refers to something that is expensive or burdensome to maintain, but is of little or no value or practical use. It often refers to an item or property that is costly to possess, operate, or maintain, yet serves no purpose or provides no benefit. It can also be used to describe a project, venture, or undertaking that becomes more of a liability than an asset.
Example:"The grand mansion he inherited turned out to be a white elephant, as the high maintenance costs and lack of buyers made it a financial burden."
The idiom "a white elephant" means'something that has cost a lot of money but has no useful purpose'.

39. (b) The idiom "a hot potato" means a controversial or sensitive issue or topic that is difficult to handle or deal with. It refers to something that is highly contentious, often resulting in disagreement or causing discomfort or trouble for those involved. The idiom suggests that the issue is so sensitive or problematic that people want to avoid being associated with it or addressing it directly.
Example:"The decision to cut funding for public education has become a hot potato for the government, as it has sparked widespread protests and criticism."
The idiom "a white elephant" means- something that is difficult to deal with.

40. (c) The idiom "apples and oranges" is used to compare or describe two things that are fundamentally different from each other and therefore cannot be directly compared or contrasted. It highlights the idea that the two things being discussed have significant dissimilarities or are unrelated in nature.
Example: If someone says, "Comparing the intelligence of dogs and cats is like comparing apples and oranges," they mean that dogs and cats possess different qualities and characteristics, making it difficult or unfair to make a direct comparison between them.
So, the correct meaning is: people who are different and incomparable.

41. (a) The indefinite composition' a' should antecede' guest', because the statement refers to any guest in general.
For referring to a species or genus with a general tone, 'a or an' is applicable.
So, the correct sentence is: A guest is unwelcome when he stays too long.

42. (d) It is to be noted that the person who is the friend and also the benefactor, so singular verb 'has' is correct.
When two articles antecede the nouns, like 'the friend and the benefactor', then it will take the plural verb (have).
So, the correct sentence is: My friend and benefactor has arrived.

43. (d) There's no error in pronoun, because when nouns are joined by the conjunction'either-or, neither-nor', the pronoun for the blank is decided by looking at the alternate subject, then, the alternate subject is' I', so' am' is applicable.
So, there's no error in the statement.

44. (c) When the statement starts with the distributive pronoun' each', the verb is consistently in singular. When we use' each' with a plural noun as subject, it's typically followed by a singular verb.
So, the correct statement is Each of these substances is set up in India.

45. (a) The subject in the sentence is 'you', so the other noun should be the object, as in 'whom', not 'who'.
To simplify: You wish to see whom?
I wish to see him. Here, both 'whom' and 'him' are in objective case.
So, the correct sentence is: Whom do you wish to see?

46. (b) There is an error of subject-verb agreement.
If a relative pronoun joins a subject and the verb, then the verb will agree with the precedent to the relative pronoun.
Pattern: Subject + Relative pronoun + Verb (will agree with antecedent).
In the given sentence a relative pronoun "that" preceding the antecedent 'speeches'.
So, the verb required is "have." Thus, error is in (b).

47. (b) The bat being referred in the sentence is known, and since the definite article is used before a noun, to indicate the identity of the noun is known, 'the' will antecede the bat.
So, the correct sentence is: I played with the same bat that you used.

48. (d) There is no error in the sentence.
The correct sentence is:'Defers in several important aspects'.

49. (a) The verb 'ordered' need not take 'for' after it, it is unnecessary.
So, the correct sentence is: I have ordered three cups of coffee.

50. (d) The verb 'boast' can be followed by 'of'and'for'.
So, there is no error in the sentence.

51. (b) Anxious means very eager or concerned to do something or for something to happen or worried and afraid. It is evident from the sentence that plenty of graduates are eager for more work. Other options are irrelevant, and they are not followed by 'for'.

52. (a) 'Circumscribed' means restrict or confine within limits. Since the sentence talks of the power of the monarchy, it is apparent that the new law must constrain/limit the power of the monarchy. 'circumvented' implies 'find a way around.'

53. (c) 'Eavesdropping' means to listen secretly to other people talking. Moreover, catching a person for listening outside the window' means to listen secretly.

54. (b) 'Exhorted' means "strongly encourage or urge (someone) to do something." A party leader is expected to urge the members to start prepare the formation of the party.

55. (d) 'Hospitable' implies 'given to generous and cordial reception of guests.' So 'cordial' is correct. Other options are incorrect as they convey a negative meaning, like 'surly' means 'bad-tempered and unfriendly.'

56. (d) 'Incongruous' means 'not suitable in a particular situation'. The pitting of traditional methods against technology is inappropriate.

57. (a) 'Mercurial' means,someone whose mood or behavior is changeable and unpredictable. It is synonymous to 'volatile'. Other options have positive intonations, Hence, can be rejected.

58. (d) 'Obligatory' implies 'imposing moral or legal obligation; binding: an obligatory promise.' The sentence clarifies that it is compulsory for all employees to wear protective clothing.

59. (c) 'Predisposition' denotes a condition that makes somebody/something likely to behave in a particular way or suffer from a medical condition. In the sentence, the girl has a genetic tendency/ vulnerability of liver ailments.

60. (a) 'Sardonic' means showing that you think you are better than other people and not taking others seriously. Other options are synonyms of each other, all of them mean 'respectful'.

61. (c) The only options with this pair are (b) and (c). P and R end up banding together because both are businesses and households in debt to each other. R will precede P because R offers the cause and P the effect of liquidating a variety of assets by indebted households.

62. (c) The opening statement is about a hypothetical situation in which there has been a slight change in the Earth's atmosphere. The idea is further continued in the statement (R) byan example such as an increase in temperature of a few degrees and by the consequence that rainfall patterns might change in the statement (S). Thus, the sequence will be SIRS. **This combination is present in the option (c).**

63. (b) The hint for this question is on S6.S6 states "so," which indicates that the reason must have been stated in the previous statement. The reason is given in the statement (S) that the abilities of the dignitaries were highly valued because they had a way of influencing the King. This combination is present in option (B). Hence, it is the answer.

64. (d) The opening paragraph states that the second half of the 20th century was marked by the collapse of communism and the rise of East Asia.Statement (R) further asserts that there was a shift in the world's economy from West to East. This is continued in the statement in (P), which talks about the final two decades of the twentieth century.The sequence will be S1RP.

65. (c) The paragraph is about thehistory of Manipur. RS is a pair because R mentions the coronation of Pakhangba and S describes the history after Pakhbanga. So, options (b) and (d) are eliminated. Out of options (a) and (c), option (c) is the correct answer because Q, P, and S6 are in the chronologically correct order.

66. (a) The statements P and S make a pair because (S) mentions "such an area," which relates to the specific area described in P. The only option with this pair is option (A). Also, S6 describes the "dry season," and the statement (Q) also talks of the dry season, so another pair is QS6.

67. (c) The opening sentence (S1) talks about "Vijayanagara". The obvious sentence to follow this one is the statement (Q), which mentions that the state was established in the fourteenth century.So, S1 and Q make a pair. Also, in S6, the pronoun "they" is mentioned, which refers to "the people," mentioned in S. So, S and S6 is a pair.

68. (b) The opening sentence (S1) describes the dramatic changes in the business environment over the last 20 years. (R) elaborates on the changes. The idea in (R) is carried forward in the statement (S) by mentioning "at the same time." So, the sequence is SIRSQP.

69. (c) The paragraph is about GregorMendel. QS is a sequence because Q talks about Mendel's laboratory facilities and handling of research, and S talks about his experiments.After S, there should be S6, because S6 further continues the idea by talking about the establishment of laws based on his experiments. Thus, the order will be QSS6. This is present in option (c). Hence, it is the correct answer.

70. (c) Statement S1 states that Mahatma Gandhi saw salt as a powerful tool to unite nations. The statement (R) tells the logic behind his thought. So, the sequence is S1R. The only option that starts with (R) is option (c).

71. (d) "Brevity" means shortness of duration, especially shortness or conciseness of expression. **Example: "If you give a report on agriculture in the northern hemisphere in 3 minutes, you have done it with incredible brevity."** The antonym of brevity is verbosity. **"Verbosity"** means the factor quality of using more words than needed;wordiness. Conciseness', terseness and economy are close-meaning words for brevity.

72. (a) "Blend" means to mix together so thoroughly that things become inseparable. Example: "First blend the flour and the melted butter together." Mingle and amalgamate are similar words for blend. Coalesce means to come together to form one mass or whole. **Separate is the antonym of blend.**

73. (b) "Considerable" means notably large in size, amount, or extent. Example: "A considerable number of people preferred the old building to the new one."Substantial, plentiful, and abundant are close meaning words for considerable. **Triflingis** antonym of considerable. Trifling means very small or unimportant.

74. (d) "Disdainful" means showing the feeling that somebody/something is not good enough to deserve your respect or attention synonym contemptuous. Example: "He is highly disdainful of anything to do with the literary establishment." Contemptuous, scornful, and dismissive are synonyms of disdainful. **Respectful** is the antonym of disdainful.

75. (b) "Frugal" means economical, sparing, or meagre **(careful to use only as much money, food, etc. as is necessary).** Example: "He built up his savings by being very frugal."Extravagant means spending or costing too much money; it is also called excessive or elaborate. **Extravagant** is the antonym of frugal.

76. (c) "Itinerant" means,a person who travels from one place to another, usually to work for a short period. Example: He lived as an itinerant, earning or begging his bread as he went. Vagrant, roving, and nomadic are synonyms of itinerant. **Settled** is the antonym of itinerant.

77. (c) "Malicious" means, showing a desire to cause harm to someone. Example:**"He complained that he'd been receiving malicious phone calls."** Pernicious, spiteful, and vindictive are similar-meaning words for malicious. Benevolent means kind or generous.Benevolent is an antonym of malicious.

78. (a) "Perpetuate" means to cause something to continue for a long time. Example: "He perpetuates the myth that his house is haunted." Conserve, sustain, maintain are synonyms of perpetuate. Ceaseis the antonym of perpetuate.

79. (d) "Redoubtable" means (of a person) honorable, maybe even intimidatingly so.Example: "Tonight he faces the most redoubtable opponent of his boxing career." Formidable, awe-inspiring, and fearsome are synonyms of redoubtable. **Unimpressive** is the antonym of redoubtable.

80. (c) "Fusion" means combination or amalgamation (an occasion when two or more things join or are combined). **Separation** is the antonym of fusion.

81. (a) The blank needs a word that refers to, in respect to, and the word that represents the same is **"in regards to".**
In regards to:'with respect to or in relation to someone or something'

82. (c) The blank requires a word that shows contrast because the previous part and the latter part show contradiction. The word that smoothes this transition is **"but".**

83. (b) This space needs the word positivity because it refers to the influence of positive things that make nations believe that their victory is of great importance to humanity.The only positive word in the given options is **"patriotism."**
Patriotism: Patriotism is the feeling of love, devotion, and sense of attachment to one's country.

84. (d) The last part of the sentence mentions two ideas about the state in war (victory is certain and very important), so the blank can be filled with **"both".**

85. (a) The blank needs a word in the present tense because the whole sentence is in the simple present tense,so the blank can be filled with **"is held".**

86. (c) The blank requires a positive word, because the word before "and" is a positive word. The only positive word in the given options is **"desirable."**
Desirable: wanted, often by many people; worth having.

87. (b) The given sentence refers to the evils of war in general. A simple present tense word is required,so the blank can be filled with **"is held"**(onlyin the simple present tense).

88. (c) The blank can be filled with the word "victorious" because the sentence states that whichever side becomes victorious, it is bound to forget the evils of a war.
Victorious: 'having achieved a victory'

89. (a) Since the entire sentence is in the present tense, a word in the present tense is necessary to maintain the tense consistency. So the blank can be filled with "to judge".

90. (a) You can see that the latter half of the sentence has "or", so it is clear that the blank can be filled with "whether."This is so because the correct co-relative conjunction is 'whether-or'.

91. (c) As a preposition of time "by" that means "on or before".
For illustration, we will send you the documents by Saturday. Use "by" when you refer to a deadline.
"Until" means "up to a particular time".
For illustration, we have until Saturday to send out the documents. Use "until" when you refer to the period of time before a deadline.
The sentence addresses about a point in time until the person is away.
So, the correct answer is "until."

92. (b) We consistently use "on' with dates anddays.

93. (a) The sentence indicates a point where one has to write one's name, we will use "at."
For a point in time or position, we use "at."

94. (b) When we talk about university, we say "at university," that (British) means "attending college or graduate school."

95. (d) A preposition is a word or group of words that shows the relationship between a noun or pronoun and another word in a sentence. It typically indicates location, direction, time, manner, or other relationships. Prepositions are used to provide additional information and to connect different parts of a sentence.
In this sentence, 'to' is used with indebted to show that one person owes something to another.

96. (a) The word "responsible" is usually followed by the preposition "for."
When the adjective responsible is used to describe a person or thing that caused something or has the job of managing something, it is followed by the preposition for.

97. (d) A pier is a platform on pillars projecting from the shore into the sea, typically incorporating entertainment arcades and places to eat.
The pier, if it is used for a bridge, is always under the bridge.
So, the correct word in the blank is "beneath."

98. (c) The correct answer is "the."
Though sugar is an uncountable noun, in this context.
The speaker is asking for sugar that is nearby and not in a general way.
In this case, we will use "the" before sugar.

99. (c) Since the sentence is about a train. The train arrives at a particular platform; it should be preceded by "the."

100. (a) The correct determiner is "some," because children is a countable plural noun, "a," and "much" can't be used before it.
"Any" is negative in connotation.

101. (a) Since the subject is singular: inaugural version. We need a singular verb. Hence, option (c) is incorrect. Option (b) is also grammatically incorrect. Option (d) is in present tense, and the sentence requires past tense. Hence, the correct answer is option (a), which is in past tense.
Correct Sentence: They were informed that the inaugural version of the scheme had three parts.

102. (d) The sentence is in subjunctiveway (hypothetical situation), so the latter part will be in past tense only.
The structure of subjunctive way is, If clause in simple past tense + Clause II (subject +would/could +first form of verb).
Correct Sentence: What would you doif you won a lot of money?

103. (b) The sentence is in subjunctive mood (a hypothetical situation). The structure of subjunctive mood is: If clause in simple past tense + Clause II (subject +would/could +first form of verb).
Correct Sentence: If it stopped raining we could go out.

104. (a) The sentence requires simple present tense. Option (c) is eliminated because with "you," we never use a singular verb. The rest of the options are in past tense. So, they are also ruled out.
Correct Sentence: Let me know if you have any further news.

105. (c) The correct answer is option (C), because the sentence is comparing all the hotels in the town, and we need a superlative adjective. So, "cheapest" is an apt adjective. And superlatives are always preceded by "the." Thus, "the cheapest hotel."
Correct Sentence: We stayed at the cheapest hotel in the town.

106. (b) The correct sentence refers to a particular age when the girl got married. The correct answer will be "when she was 22."
Correct Sentence: Julia got married when she was 22.

107. (d) The correct idiom is 'get to a place.'
Correct Sentence: What time does this train get to London?
'get to a place' me 'to move to or towards the person who is speaking or the place that somebody is talking about.'

108. (a) Get on means to perform or make progress in a specified way. Get along means to have a harmonious or friendly relationship. Get off means to leave a place, usually in order to start a journey. In the context of the given sentence, the best option is: "get on".
Correct Sentence: How are you getting on in your new job?

109. (b) Cut down on means to reduce. Shut down means close. Break down means to stop functioning. Turn down means to refuse. The sentence is about curtailing the habit of drinking coffee; the best phrase is "cut down on."
Correct Sentence: I am trying to cut down on coffee.

110. (c) The sentence is a factual statement, so it will be in simple present tense.
Correct Sentence: Many accidents are caused by careless driving.

111. (a) The paragraph has to do with the ignorance of human civilization. The author is criticizing the fact that our civilization doesn't know what to do with knowledge.

112. (d) The passage says that machines are supposed to help humans, but we end up becoming dependent on the machines. And it's the flaw in our civilization. Hence, the machines failed to bring culture and civilization to humans.

113. (d) From the last sentence of the passage, we can easily conclude that by removing poverty, our civilization could be made better.

114. (c) The passage makes it clear that the machines are very stern masters, if any mistake or carelessness takes place, they stop functioning. 'Inexorable' as used in option (c) means 'impossible to prevent/ relentless'. Therefore, the phrase 'stern masters' validates the statement that machines are inexorable masters.

115. (d) The tone of the passage is critical. The writer is criticising humans' dependence on machines. Hence, the correct answer is 'we use the blessings of science irrationally.'

116. (c) From the first line of the last paragraph, it is easy to deduce that both humans and marine life are affected by plastic.

117. (a) Since this article focuses on marine life, it sheds light on the occurrence of plastics in the deep sea. There is no mention of mountains in this passage.

118. (b) The second line of the passage mentions that plastic has become omnipresent. So, we can say that it has become a pandemic.

119. (d) In the passage, it clearly states that plastics have a wide range of uses and have become an integral part of our lives.

Correct sentence: Plastic is considered an essential commodity because it has multiple uses in our everyday lives.

120. (a) The word 'clogging' as per the context reveals that plastic when stuck in drains, do not allow rainwater to soak into soil, thus creating flood. Thus, 'clogging' means obstruction.

Clog meaning: to become blocked or filled so that movement or activity is slowed or stopped.