CDS Solved Paper 2019

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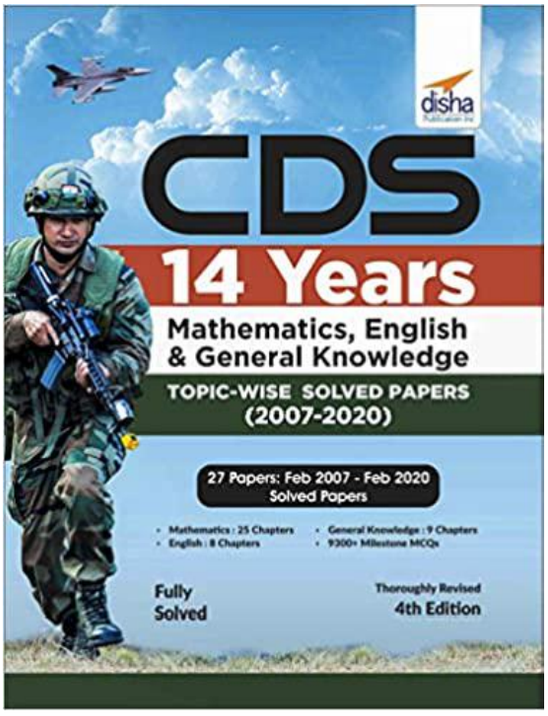

ISBN : 9789389986389

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COMBINED DEFENCE SERVICES (CDS) EXAMINATION SOLVED PAPER 2019-I

(Held in 2019)

MATHEMATICS

1. What is the remainder when $(17^{29} + 19^{29})$ is divided by 18 ?
(a) 6 (b) 2 (c) 1 (d) 0

2. What is the largest value of n such that 10^n divides the product
$2^5 \times 3^3 \times 4^8 \times 5^3 \times 6^7 \times 7^6 \times 8^{12} \times 9^9 \times 10^6 \times 15^{12} \times 20^{14} \times 22^{11} \times 25^{15}$?
(a) 65 (b) 55 (c) 50 (d) 45

3. How many pairs (A, B) are possible in the number 479865AB if the number is divisible by 9 and it is given that the last digit of the number is odd ?
(a) 5 (b) 6 (c) 9 (d) 11

4. Consider the multiplication $999 \times abc = def132$ in decimal notation, where a, b, c, d, e and f are digits. What are the values of a, b, c, d, e and f respectively ?
(a) 6, 6, 8, 6, 8, 7 (b) 8, 6, 8, 6, 7, 8
(c) 6, 8, 8, 7, 8, 6 (d) 8, 6, 8, 8, 6, 7

5. Three cars A, B and C started from a point at 5 p.m., 6 p.m. and 7 p.m. respectively and travelled at uniform speeds of 60 km/hr, 80 km/hr and x km/hr respectively in the same direction. If all the three met at another point at the same instant during their journey, then what is the value of x ?
(a) 120 (b) 110 (c) 105 (d) 100

6. Priya's age was cube of an integral number (different from 1) four years ago and square of an integral number after four years. How long should she wait so that her age becomes square of a number in the previous year and cube of a number in the next year ?
(a) 7 years (b) 12 years
(c) 14 years (d) 21 years

7. Which of the following statements is ***not*** true?
(a) The difference of two prime numbers, both greater than 2, is divisible by 2.
(b) For two different integers m, n and a prime number p, if p divides the product $m \times n$, then p divides either m or n.
(c) If a number is of the form $6n - 1$ (n being a natural number), then it is a prime number.
(d) There is only one set of three prime numbers such that there is a gap of 2 between two adjacent prime numbers.

8. For $x > 0$, what is the minimum value of $x + \frac{x+2}{2x}$?
(a) 1 (b) 2
(c) $2\frac{1}{2}$ (d) Cannot be determined

9. If $\frac{1+px}{1-px}\sqrt{\frac{1-qx}{1+qx}} = 1$, then what are the non-zero solutions of x ?
(a) $\pm \frac{1}{p}\sqrt{\frac{2p-q}{q}}, 2p \neq q$ (b) $\pm \frac{1}{pq}\sqrt{p-q}, p \neq q$
(c) $\pm \frac{p}{q}\sqrt{p-q}, p \neq q$ (d) $\pm \frac{q}{p}\sqrt{2p-q}, 2p \neq q$

10. In a hostel the rent per room is increased by 20%. If number of rooms in the hostel is also increased by 20% and the hostel is always full, then what is the percentage change in the total collection at the cash counter ?
(a) 30% (b) 40% (c) 44% (d) 48%

11. Radha and Hema are neighbours and study in the same school. Both of them use bicycles to go to the school. Radha's speed is 8 km/hr whereas Hema's speed is 10 km/hr. Hema takes 9 minutes less than Radha to reach the school. How far is the school from the locality of Radha and Hema ?
(a) 5 km (b) 5.5 km (c) 6 km (d) 6.5 km

12. Which of the following pair of numbers is the solution of the equation $3^{x+2} + 3^{-x} = 10$?
(a) 0, 2 (b) 0, –2 (c) 1, –1 (d) 1, 2

13. It is given that $\log_{10} 2 = 0.301$ and $\log_{10} 3 = 0.477$. How many digits are there in $(108)^{10}$?
(a) 19 (b) 20 (c) 21 (d) 22

14. The sum of three prime numbers is 100. If one of them exceeds another by 36, then one of the numbers is
(a) 17 (b) 29
(c) 43 (d) None of the above

15. If a, b and c are positive integers such that $\frac{1}{a+\frac{1}{b+\frac{1}{c+\frac{1}{2}}}} = \frac{16}{23}$, then what is the mean of a, b and c ?
(a) 1 (b) 2 (c) 1.33 (d) 2.33

Consider the following for the next three (03) items :

In a certain town of population size 1,00,000 three types of newspapers (I, II and III) are available. The percentages of the people in the town who read these papers are as follows :

Newspaper	*Proportion of readers*
I	10%
II	30%
III	5%
Both I and II	8%
Both II and III	4%
Both I and III	2%
All the three (I, II and III)	1%

16. What is the number of people who read only one newspaper ?
(a) 20,000 (b) 25,000 (c) 30,000 (d) 35,000

17. What is the number of people who read at least two newspapers ?
(a) 12,000 (b) 13,000 (c) 14,000 (d) 15,000

18. What is the number of people who do ***not*** read any of these three newspapers ?
(a) 62,000 (b) 64,000 (c) 66,000 (d) 68,000

19. What is the unit place digit in the expansion of 7^{73} ?
(a) 1 (b) 3 (c) 7 (d) 9

20. Suppose n is a positive integer such that $(n^2 + 48)$ is a perfect square. What is the number of such n ?
(a) One (b) Two (c) Three (d) Four

21. For $x = \frac{4\sqrt{6}}{\sqrt{2}+\sqrt{3}}$, what is the value of

$$\frac{x+2\sqrt{2}}{x-2\sqrt{2}} + \frac{x+2\sqrt{3}}{x-2\sqrt{3}} ?$$

(a) 1 (d) $\sqrt{2}$ (c) $\sqrt{3}$ (d) 2

22. x, y and z are three numbers such that x is 30% of z and y is 40% of z. If x is p% of y, then what is the value of p ?
(a) 45 (b) 55 (c) 65 (d) 75

23. A plane is going in circles around an airport. The plane takes 3 minutes to complete one round. The angle of elevation of the plane from a point P on the ground at time t seconds is equal to that at time $(t + 30)$ seconds. At time $(t + x)$ seconds, the plane flies vertically above the point P. What is x equal to ?
(a) 75 seconds (b) 90 seconds
(c) 105 seconds (d) 135 seconds

24. Consider the following statements in respect of two integers p and q (both > 1) which are relatively prime :
1. Both p and q may be prime numbers.
2. Both p and q may be composite numbers.
3. One of p and q may be prime and the other composite.
Which of the above statements are correct ?
(a) 1 and 2 only (b) 2 and 3 only
(c) 1 and 3 only (d) 1, 2 and 3

25. In a class of 100 students, the average weight is 30 kg. If the average weight of the girls is 24 kg and that of the boys is 32 kg, then what is the number of girls in the class ?
(a) 25 (b) 26 (c) 27 (d) 28

26. For any two real numbers a and b,

$\sqrt{(a-b)^2} + \sqrt{(b-a)^2}$ is
(a) always zero (b) never zero
(c) positive only if $a \neq b$ (d) positive if and only if $a > b$

27. If $a : b = c : d = 1 : 6$, then what is the value of $\frac{a^2+c^2}{b^2+d^2}$?
(a) $\frac{1}{600}$ (b) $\frac{1}{60}$ (c) $\frac{1}{36}$ (d) $\frac{1}{6}$

28. What is $0.\overline{53} + 0.\overline{53}$ equal to ?
(a) $1.0\overline{68}$ (b) $1.06\overline{8}$ (c) $1.\overline{068}$ (d) 1.068

29. The inequality $3^N > N^3$ holds when
(a) N is any natural number
(b) N is a natural number greater than 2
(c) N is a natural number greater than 3
(d) N is a natural number except 3

30. Which one of the following is an irrational number ?
(a) $\sqrt{59049}$
(b) $\frac{231}{593}$
(c) 0.45454545...
(d) 0.12112211122211112222...

31. A race has three parts. The speed and time required to complete the individual parts for a runner is displayed on the following chart:

	Part I	Part II	Part III
Speed (kmph)	9	8	7.5
Time (minutes)	50	80	100

What is the average speed of this runner ?
(a) 8.17 kmph (b) 8.00 kmph
(c) 7.80 kmph (d) 7.77 kmph

32. If $\frac{a}{b+d} = \frac{b}{c+a} = \frac{c}{a+b}$, then which one of the following statements is correct ?
(a) Each fraction is equal to 1 or –1,
(b) Each fraction is equal to $\frac{1}{2}$ or 1.
(c) Each fraction is equal to $\frac{1}{2}$ or –1.
(d) Each fraction is equal to $\frac{1}{2}$ only.

33. The number 3^{521} is divided by 8. What is the remainder ?
(a) 1 (b) 3 (c) 7 (d) 9

34. A prime number contains the digit X at unit's place. How many such digits of X are possible ?
(a) 3 (b) 4 (c) 5 (d) 6

35. If an article is sold at a gain of 6% instead of a loss of 6%, the seller gets ₹ 6 more. What is the cost price of the article?
(a) ₹ 18 (b) ₹ 36 (c) ₹ 42 (d) ₹ 50

36. A field can be reaped by 12 men or 18 women in 14 days. In how many days can 8 men and 16 women reap it ?
(a) 26 days (b) 24 days (c) 9 days (d) 8 days

37. If $3^x = 4^y = 12^z$, then z is equal to

(a) xy (b) $x+y$ (c) $\frac{xy}{x+y}$ (d) $4x+3y$

38. If $(4a+7b)(4c-7d) = (4a-7b)(4c+7d)$, then which one of the following is correct ?

(a) $\frac{a}{b}=\frac{c}{d}$ (b) $\frac{a}{d}=\frac{c}{b}$ (d) $\frac{a}{b}=\frac{d}{c}$ (d) $\frac{4a}{7b}=\frac{c}{d}$

39. Given that the polynomial $(x^2 + ax + b)$ leaves the same remainder when divided by $(x-1)$ or $(x+1)$. What are the values of a and b respectively ?

(a) 4 and 0 (b) 0 and 3
(c) 3 and 0 (d) 0 and any integer

40. Tushar takes 6 hours to complete a piece of work, while Amar completes the same work in 10 hours. If both of them work together, then what is the time required to complete the work ?

(a) 3 hours (b) 3 hours 15 minutes
(c) 3 hours 30 minutes (d) 3 hours 45 minutes

41. What is the value of $2+\sqrt{2+\sqrt{2+\sqrt{.....}}}$?

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

42. In an examination, 52% candidates failed in English and 42% failed in Mathematics. If 17% failed in both the subjects, then what percent passed in both the subjects ?

(a) 77 (b) 58 (c) 48 (d) 23

43. A man who recently died left a sum of ₹ 3,90,000 to be divided among his wife, five sons and four daughters. He directed that each son should receive 3 times as much as each daughter receives and that each daughter should receive twice as much as their mother receives. What was the wife's share?

(a) ₹ 14, 000 (b) ₹ 12, 000
(c) ₹ 10, 000 (d) ₹ 9, 000

44. What is the least number of complete years in which a sum of money put out at 40% annual compound interest will be more than trebled ?

(a) 3 (b) 4 (c) 5 (d) 6

45. A person divided a sum of ₹ 17, 200 into three parts and invested at 5%, 6% and 9% per annum simple interest. At the end of two years, he got the same interest on each part of money. What is the money invested at 9% ?

(a) ₹ 3, 200 (b) ₹ 4, 000 (c) ₹ 4, 800 (d) ₹ 5, 000

46. What is $\frac{(x-y)^3+(y-z)^3+(z-x)^3}{3(x-y)(y-z)(z-x)}$ equal to?

(a) 1 (b) 0 (c) $\frac{1}{3}$ (d) 3

47. If $a^x = b^y = c^z$ and $b^2 = ac$, then what is $\frac{1}{x}+\frac{1}{z}$ equal to ?

(a) $\frac{1}{y}$ (b) $-\frac{1}{y}$ (c) $\frac{2}{y}$ (d) $-\frac{2}{y}$

48. If p and q are the roots of the equation $x^2 - 15x + r = 0$ and $p - q = 1$, then what is the value of r ?

(a) 55 (b) 56 (c) 60 (d) 64

49. For the inequation $x^2 - 7x + 12 > 0$, which one of the following is correct ?

(a) $3 < x < 4$
(b) $-\infty < x < 3$ only
(c) $4 < x < \infty$ only
(d) $-\infty < x < 3$ or $4 < x < \infty$

50. The expression $5^{2n} - 2^{3n}$ has a factor

(a) 3 (b) 7
(c) 17 (d) None of the above

51. If $\tan x = 1$, $0 < x < 90°$, then what is the value of $2 \sin x \cos x$?

(a) $\frac{1}{2}$ (b) 1 (c) $\frac{\sqrt{3}}{2}$ (d) $\sqrt{3}$

52. What is the value of
$\sin 46° \cos 44° + \cos 46° \sin 44°$?

(a) $\sin 2°$ (b) 0 (c) 1 (d) 2

53. Suppose $0 < \theta < 90°$, then for every θ, $4 \sin^2 \theta + 1$ is greater than or equal to

(a) 2 (b) $4 \sin \theta$ (c) $4 \cos \theta$ (d) $4 \tan \theta$

54. Consider a regular hexagon ABCDEF. Two towers are situated at B and C. The angle of elevation from A to the top of the tower at B is 30° and the angle of elevation to the top of the tower at C is 45°. What is the ratio of the height of towers at B and C ?

(a) $1 : \sqrt{3}$ (b) 1 : 3 (c) 1 : 2 (d) $1 : 2\sqrt{3}$

55. What is the value of
$\tan 1° \tan 2° \tan 3° ..... \tan 89°$?

(a) 0 (b) 1 (c) 2 (d) ∞

56. There are two parallel streets each directed North to South. A person in the first street travelling from South to North wishes to take the second street which is on his right side. At some place, he makes a 150° turn to the right and he travels for 15 minutes at the speed of 20 km/hr. After that he takes a left turn of 60° and travels for 20 minutes at the speed of 30 km/hr in order to meet the second street. What is the distance between the two streets ?

(a) 7.5 km (b) 10.5 km (c) 12.5 km (d) 15 km

57. If $3 \tan \theta = \cot \theta$ where $0 \le \theta \le \frac{\pi}{2}$, then what is the value of θ?

(a) $\frac{\pi}{6}$ (b) $\frac{\pi}{4}$

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

58. What is the value of $\sin^2 25° + \sin^2 65°$?

(a) 0 (b) 1 (c) 2 (d) 4

59. What is the value of
$\sin^6 \theta + \cos^6 \theta + 3 \sin^2 \theta \cos^2 \theta - 1$?

(a) 0 (b) 1 (c) 2 (d) 4

60. Consider the following for real numbers α, β, γ and δ :

1. $\sec \alpha = 1/4$ 2. $\tan \beta = 20$
3. $\text{cosec } \gamma = 1/2$ 4. $\cos \delta = 2$

How many of the above statements are ***not*** possible ?

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

61. Consider the following grouped frequency distribution :

x	f
0 – 10	8
10 – 20	12
20 – 30	10
30 – 40	p
40 – 50	9

If the mean of the above data is 25. 2, then what is the value of p ?
(a) 9 (b) 10 (c) 11 (d) 12

62. Consider the following frequency distribution :

x	f
8	6
5	4
6	5
10	8
9	9
4	6
7	4

What is the median for the distribution ?
(a) 6 (b) 7 (c) 8 (d) 9

63. The average of 50 consecutive natural numbers is x. What will be the new average when the next four natural numbers are also included ?
(a) $x+1$ (b) $x+2$ (c) $x+4$ (d) $x+(x/54)$

64. Consider two-digit numbers which remain the same when the digits interchange their positions. What is the average of such two-digit numbers ?
(a) 33 (b) 44 (c) 55 (d) 66

65. Diagrammatic representation of data includes which of the following ?
1. Bar diagram 2. Pie-diagram 3. Pictogram
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

66. The data collected from which one of the following methods is ***not*** a primary data ?
(a) By direct personal interviews
(b) By indirect personal interviews
(c) By schedules sent through enumerators
(d) From published thesis

67. The monthly expenditure of a person is ₹ 6, 000. The distribution of expenditure on various items is as follows :

	Item of expenditure	*Amount (in* ₹*)*
1.	Food	2, 000
2.	Clothing	660
3.	Fuel and rent	1, 200
4.	Education	480
5.	Miscellaneous	1, 660

If the above data is represented by a percentage bar diagram of height 15 cm, then what are the lengths of the two segments of the bar diagram corresponding to education and miscellaneous respectively ?
(a) 1.25 cm and 5 cm (b) 1.2 cm and 4. 15 cm
(c) 1.2 cm and 3.5 cm (d) 4.15 cm and 6 cm

68. If the mean of m observations out of n observations is n and the mean of remaining observations is m, then what is the mean of all n observations ?
(a) $2m-\frac{m^2}{n}$ (b) $2m+\frac{m^2}{n}$
(c) $m-\frac{m^2}{n}$ (d) $m+\frac{m^2}{n}$

69. Which one of the following pairs is correctly matched ?
(a) Median – Graphical location
(b) Mean – Graphical location
(c) Geometric mean – Ogive
(d) Mode – Ogive

70. The following pairs relate to frequency distribution of a discrete variable and its frequency polygon. Which one of the following pairs is ***not*** correctly matched ?
(a) Base line of the polygon – X-axis
(b) Ordinates of the vertices of the polygon – Class frequencies
(c) Abscissa of the vertices of the polygon – Class marks of the frequency distribution
(d) Area of the polygon – Total frequency of the distribution

71. In a rectangle, length is three times its breadth. If the length and the breadth of the rectangle are increased by 30% and 10% respectively, then its perimeter increases by
(a) $\frac{40}{3}\%$ (b) 20% (c) 25% (d) 27%

72. What is the percentage decrease in the area of a triangle if its each side is halved ?
(a) 75% (b) 50% (c) 25% (d) No change

73. The volume of a spherical balloon is increased by 700%. What is the percentage increase in its surface area ?
(a) 300% (b) 400% (c) 450% (d) 500%

74. If the lengths of two parallel chords in a circle of radius 10 cm are 12 cm and 16 cm, then what is the distance between these two chords ?
(a) 1 cm or 7 cm (b) 2 cm or 14 cm
(c) 3 cm or 21 cm (d) 4 cm or 28 cm

75. Considering two opposite vertices of a square of side 'a' as centres, two circular arcs are drawn within the square joining the other two vertices, thus forming two sectors. What is the common area in these two sectors ?
(a) $a^2\left(\pi+\frac{1}{2}\right)$ (b) $a^2\left(\pi-\frac{1}{2}\right)$
(c) $a^2\left(\frac{\pi}{2}-1\right)$ (d) $a^2\left(\frac{\pi}{2}+1\right)$

76. The corners of a square of side 'a' are cut away so as to form a regular octagon. What is the side of the octagon ?
(a) $a\left(\sqrt{2}-1\right)$ (b) $a\left(\sqrt{3}-1\right)$
(c) $\frac{a}{\sqrt{2}+2}$ (d) $\frac{a}{3}$

77. Three consecutive integers form the lengths of a right-angled triangle. How many sets of such three consecutive integers is/are possible ?
(a) Only one (b) Only two
(c) Only three (d) Infinitely many

78. Two circles are drawn with the same centre. The circumference of the smaller circle is 44 cm and that of the

bigger circle is double the smaller one. What is the area between these two circles ?
(a) 154 square cm (b) 308 square cm
(c) 462 square cm (d) 616 square cm

79. A rectangular red carpet of size 6 ft × 12 ft has a dark red border 6 inches wide. What is the area of the dark red border?
(a) 9 square feet (b) 15 square feet
(c) 17 square feet (d) 18 square feet

80. The perimeter of a right-angled triangle is k times the shortest side. If the ratio of the other side to hypotenuse is 4 : 5, then what is the value of k ?
(a) 2 (b) 3 (c) 4 (d) 5

81. A 12 m long wire is cut into two pieces, one of which is bent into a circle and the other into a square enclosing the circle. What is the radius of the circle ?
(a) $\frac{12}{\pi+4}$ (b) $\frac{6}{\pi+4}$ (c) $\frac{3}{\pi+4}$ (d) $\frac{6}{\pi+2\sqrt{2}}$

82. The angles of a triangle are in the ratio 1 : 1 : 4. If the perimeter of the triangle is k times its largest side, then what is the value of k ?
(a) $1+\frac{2}{\sqrt{3}}$ (b) $1-\frac{2}{\sqrt{3}}$ (c) $2+\frac{2}{\sqrt{3}}$ (d) 2

83. The hypotenuse of a right-angled triangle is 10 cm and its area is 24 cm^2. If the shorter side is halved and the longer side is doubled, the new hypotenuse becomes
(a) $\sqrt{245}$ cm (b) $\sqrt{255}$ cm (c) $\sqrt{265}$ cm (d) $\sqrt{275}$ cm

84. In a circle of radius 8 cm, AB and AC are two chords such that $AB = AC = 12$ cm. What is the length of chord BC ?
(a) $2\sqrt{6}$ cm (b) $3\sqrt{6}$ cm (c) $3\sqrt{7}$ cm (d) $6\sqrt{7}$ cm

85. Consider the following statements :
1. An isosceles trapezium is always cyclic,
2. Any cyclic parallelogram is a rectangle.
Which of the above statements is/are correct ?
(a) 1 only (b) 2 only
(c) Both 1 and 2 (d) Neither 1 nor 2

86. A ladder is resting against a vertical wall and its bottom is 2.5 m away from the wall. If it slips 0.8 m down the wall, then its bottom will move away from the wall by 1.4 m. What is the length of the ladder ?
(a) 6.2 m (b) 6.5 m (c) 6.8 m (d) 7.5 m

87. Two equal circles intersect such that each passes through the centre of the other. If the length of the common chord of the circles is $10\sqrt{3}$ cm, then what is the diameter of the circle ?
(a) 10 cm (b) 15 cm (c) 20 cm (d) 30 cm

88. Consider the following statements :
1. The number of circles that can be drawn through three non-collinear points is infinity.
2. Angle formed in minor segment of a circle is acute.
Which of the above statements is/are correct ?
(a) 1 only (b) 2 only
(c) Both 1 and 2 (d) Neither 1 nor 2

89. Consider the following inequalities in respect of any triangle ABC:
1. $AC - AB < BC$ 2. $BC - AC < AB$ 3. $AB - BC < AC$
Which of the above are correct ?
(a) 1 and 2 only (b) 2 and 3 only
(c) 1 and 3 only (d) 1, 2 and 3

90. Consider the following statements :
1. The perimeter of a triangle is greater than the sum of its three medians.
2. In any triangle ABC, if D is any point on BC, then $AB + BC + CA > 2AD$.
Which of the above statements is/are correct ?
(a) 1 only (b) 2 only
(c) Both 1 and 2 (d) Neither 1 nor 2

Consider the following for the next three (03) items:
A cube is inscribed in a sphere. A right circular cylinder is within the cube touching all the vertical faces. A right circular cone is inside the cylinder. Their heights are same and the diameter of the cone is equal to that of the cylinder.

91. What is the ratio of the volume of the sphere to that of the cone?
(a) $6\sqrt{3}:1$ (b) 7 : 2 (c) $3\sqrt{3}:1$ (d) $5\sqrt{3}:1$

92. What is the ratio of the volume of the cube to that of the cylinder ?
(a) 4 : 3 (b) 21 : 16 (c) 14 : 11 (d) 45 : 32

93. Consider the following statements :
1. The surface area of the sphere is $\sqrt{5}$ times the curved surface area of the cone.
2. The surface area of the cube is equal to the curved surface area of the cylinder.
Which of the above statements is/are correct ?
(a) 1 only (b) 2 only
(c) Both 1 and 2 (d) Neither 1 nor 2

Consider the following for the next three (03) items :
$ABCD$ is a quadrilateral with $AB = 9$ cm, $BC = 40$ cm, $CD = 28$ cm, $DA = 15$ cm and angle ABC is a right-angle.

94. What is the area of triangle ADC ?
(a) 126 cm^2 (b) 124 cm^2
(c) 122 cm^2 (d) 120 cm^2

95. What is the area of quadrilateral $ABCD$?
(a) 300 cm^2 (b) 306 cm^2
(c) 312 cm^2 (d) 316 cm^2

96. What is the difference between perimeter of triangle ABC and perimeter of triangle ADC ?
(a) 4 cm (b) 5 cm (c) 6 cm (d) 7 cm

Consider the following for the next two (02) items:
An equilateral triangle ABC is inscribed in a circle of radius $20\sqrt{3}$ cm.

97. What is the length of the side of the triangle ?
(a) 30 cm (b) 40 cm (c) 50 cm (d) 60 cm

98. The centroid of the triangle ABC is at a distanced from the vertex A. What is d equal to ?
(a) 15 cm (b) 20 cm
(c) $20\sqrt{3}$ cm (d) $30\sqrt{3}$ cm

Consider the following for the next two (02) items:
The sum of length, breadth and height of a cuboid is 22 cm and the length of its diagonal is 14 cm.

99. What is the surface area of the cuboid ?
(a) 288 cm^2
(b) 216 cm^2
(c) 144 cm^2
(d) Cannot be determined due to insufficient data

100. If S is the sum of the cubes of the dimensions of the cuboid and V is its volume, then what is (S – 3V) equal to ?
(a) 572 cm^3 (b) 728 cm^3
(c) 1144 cm^3 (d) None of the above

ENGLISH

FILL IN THE BLANK

DIRECTIONS: Each of the following sentences in this section has a blank space and four words or group of words are given after the sentence. Select the word or group of words you consider the most **appropriate** for the blank space and indicate your response on the Answer Sheet accordingly.

1. How we _____ to ageing is a choice we must make wisely.
   (a) respond (b) absolve
   (c) discharge (d) overlook
2. Complementary medicine _____ fewer risks, since it is used along with standard remedies, often to lessen side-effects and enhance feelings of well-being.
   (a) reacts (b) releases
   (c) ejects (d) carries
3. Stress may _____ fertility in men and women.
   (a) engage (b) reduce
   (c) inject (d) deduce
4. The football match had to be ____ because of the weather.
   (a) called on (b) called off
   (c) called out (d) called over
5. Nobody believed Ram at first but he _____ to be right
   (a) came out (b) carried out
   (c) worked out (d) turned out
6. How are you _____ in your new job? Are you enjoying it?
   (a) keeping on (b) going on
   (c) getting on (d) carrying on
7. We live _____ a tower block. Our apartment is on the fifteenth floor.
   (a) at (b) in
   (c) over (d) above
8. You were going to apply for the job, and then you decided not to. So what _____?
   (a) put you off (b) put you out
   (c) turned you off (d) turned you away
9. _____ it was raining, he went out without a raincoat.
   (a) Even (b) Since
   (c) Unless (d) Although
10. I parked my car in a no-parking zone, but I _____ it.
   (a) came up with
   (b) got away with
   (c) made off with
   (d) got on with

SYNONYMS

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

11. A provocative message had been doing rounds on social media to instigate the mob against migrants.
   (a) dexterous (b) inflammatory
   (c) valiant (d) prudent
12. The differences include increase in mean temperature and heavy precipitation in several regions.
   (a) drought (b) oasis
   (c) rainfall (d) snowing
13. The portal will help victims and complainants to anonymously report cyber crime.
   (a) incognito (b) directly
   (c) unfailingly (d) in situ
14. He is suffering from a terminal disease.
   (a) sublunary (b) terrific
   (c) chronic (d) incurable
15. Doctors are reluctant to take rural postings despite big salary offers.
   (a) disinclined (b) eager
   (c) fervent (d) unrepentant
16. The authorities have reprimanded the subordinate officer for violating the protocol.
   (a) extolled (b) purpoted
   (c) admonished (d) required an apology
17. For Gandhiji, India's religious and linguistic diversity was as asset, not a liability.
   (a) obligatin (b) advantage
   (c) attribute (d) reinforcement
18. How hysterical he is !
   (a) berserk (b) inconsistent
   (c) duplicitous (d) insincere
19. Mahesh is mostly prejudiced in his political opinion.
   (a) objectionable (b) predatory
   (c) jaundiced (d) intimate
20. Do not indulge in tautology.
   (a) truth telling (b) prolixity
   (c) foretelling (d) telepathic conversation

ANTONYMS

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

21. His religious views are rather fanatical.
   (a) bigoted (b) rabid
   (c) moderate (d) militant
22. Religious fundamentalists often consider the followers of other religions to be heretics.
   (a) dissenter (b) believer
   (c) renegade (d) apostate
23. according to G B Shaw, men have become inert. Therefore, life force has chosen women to perform its functions.
   (a) lively (b) quiescent
   (c) dormant (d) apathetic
24. Some of the men are highly misanthropic.
   (a) anti-social. (b) philosophic
   (c) atrophic (d) philanthropic
25. The teacher was a very profound man.
   (a) sincere (b) erudite
   (c) scholarly (d) superficial
26. His hand-writing is readable.
   (a) well-written (b) decipherable
   (c) illegible (d) comprehensible

27. Mohan is his steadfast friend.
(a) committed (b) unwavering
(c) unfaltering (d) unreliable

28. Radha often goes tempestuous while debating.
(a) calm (b) violent
(c) fierce (d) vehement

29. The thief had very vital information to pass on to the police.
(a) crucial (b) inessential
(c) indispensable (d) fundamental

30. His lectures are often wordy and pointless.
(a) diffuse (b) concise
(c) garrulous (d) voluble

ORDERING OF WORDS IN A SENTENCE

DIRECTIONS: Each of the following items in this section consists of a sentence, the parts of which have been jumbled. These parts have been labelled as P, Q, R and S. Given below each sentence are four sequences namely (a), (b), (c) and (d). You are required to re-arrange the jumbled parts of the sentence and mark your response accordingly.

31. the prize money (P) for refusing her (Q)
Pepsico was ordered (R) to compensate the woman (S)
(a) RSQP (b) SPQR
(c) RPSQ (d) QRSP

32. trade operating from a colony (P) held a meeting (Q)
demanding a probe into the illegal drug (R)
the residents of the city (S)
(a) QRSP (b) SPQR
(c) SQRP (d) RSQP

33. the university authorities cancelled the ongoing students' union election and (P)
following students' unrest on campus (Q)
closed till further orders (R)
declared the institution (S)
(a) QRSP (b) QPSR
(c) SQRP (d) RSQP

34. brushed past the latter's pet dog (P)
stabbed to death by a man (Q)
after his vehicle accidentally (R)
a cargo van driver was allegedly (S)
(a) QRSP (b) QPSR
(c) SQRP (d) SQPR

35. an earthquake and tsunami (P)
the disaster mitigation agency (Q)
said that the death toll from (R)
in Indonesia has crossed 1500 (S)
(a) PQSR (b) RPSQ
(c) SQRP (d) QRPS

36. scientists say they have developed a new (P)
illnesses such as heart disease and cancer (Q)
DNA tool that uses machine learning to accurately (R)
predict people's height and assess their risk for serious (S)
(a) PRSQ (b) RPSQ
(c) PSRQ (d) QRPS

37. a rare evergreen tree in the Southern Western Ghats (P)
researchers have found that (Q)
common white-footed ants are the best pollinators of (R)
bees might be the best known pollinators but (S)
(a) PRSQ (b) SQRP
(c) QSRP (d) PQRS

38. say from their forties onwards (P)
it is thus a good idea (Q)
and continue to exercise early enough (R)
for senior citizens to start (S)
(a) PRSQ (b) QRSP
(c) QSRP (d) PQRS

39. scientists have determined (P)
injury in animals and humans (Q)
that is linked to the severity of spinal cord (R)
a gene signature (S)
(a) PSRQ (b) QRPS
(c) QSPR (d) PQRS

40. like a muscle and repeating the process (P)
and stable reading circuit (Q)
helps the child build a strong (R)
the brain works (S)
(a) QSRP (b) SPRQ
(c) QSPR (d) RQPS

ORDERING OF SENTENCES

DIRECTIONS: In this section each item consists of six sentences of a passage. The first and sixth sentences are given in the begining as S1 and S6. The middle four sentences in each have been jumbled up and labelled as P, Q, R and S. Your are required to find the proper sequence of the four sentences and mark your response accordingly on the Answer Sheet.

41. S1: He is no longer dreamed of storms, nor of women, nor of great occurences, nor of great fish, nor fights, nor contests of strength, nor of his wife.
S6: He urinated outside the shack and then went up the road to wake the boy.
P: He never dreamed about the boy.
Q: He only dreamed of a places and of the lions on the beach now.
R: He simply woke, looked out through the open door at the moon and unrolled his trousers and put them on.
S: They played like young cats in the dusk and he loved them as he loved the boy.
The correct sequence should be
(a) RQPS (b) SRQP
(c) QSPR (d) PRSQ

42. S1: We do not know, after 60 years of education, how to protect ourselves against epidemics like cholera and plague.
S6: This is the disastrous result of the system under which we are educated.
P: If our doctors could have started learning medicine at an earlier age, they would not make such a poor show as they do.
Q: I have seen hundreds of homes. I cannot say that I have found any evidence in them of knowledge of hygiene.
R: I consider it a very serious blot on the state of our education that our doctors have not found it possible to eradicate these diseases.
S: I have the greatest doubt whether our graduates know what one should do in case one is bitten by a snake.
The correct sequence should be
(a) RQSP (b) PRQS
(c) QRPS (d) PQSR

43. S1: The weak have no place here, in this life or in any other life. Weakness leads to slavery.
S6: This is the great fact: strength is life, weakness is death. Strength is felicity, life eternal, immortal; weakness is constant strain and misery: weakness is death.
P: They dare not approach us, they have no power to get a hold on us, until the mind is weakened.
Q: Weakness leads to all kinds of misery, physical and mental. Wekness is death.
R: But they cannot harm us unless we become weak, until the body is ready and predisposed to receive them.
S: There are hundreds of thousands of microbes surrounding us.
The correct sequence should be
(a) PQRS (b) PRQS
(c) QRSP (d) QSRP

44. S1: The Nobel Prize for Economics in 2018 was awarded to Paul Romer and William Nordhaus for their work in two separate areas: economic growth and environmental economics respectively.
S6: Among recent winners of Nobel Prize in Economics, It's hard to think of one issue which is more topical and relevant to India.
P: But there is a common thread in their work.
Q: In economic jagon it's termed as externality.
R: Productive activity often has spillovers, meaning that it can impact an unrelated party.
S: Romer and Nordhaus both studied the impact of externalities and came up with profound insights and economic models.
The correct sequence should be
(a) PQRS (b) PRQS
(c) QSPR (d) QSRP

45. S1: India's museums tend to be dreary experiences.
S6: Becase it's better to attract crowds than dust.
P: Even the Louvre that attracted an eye-popping 8.1 million visitors last year comparted to India's 10.18 million foreign tourists, has hooked up with Beyonce and Jay-Z for promotion, where they take a selfie with Mona Lisa.
Q: Our museums need to get cool too.
R: A change of approach is clearly called for.
S: Troops of restless schoolchildren are often the most frequent visitors, endlessly being told to lower their voices and not touch the art.
The correct sequence should be
(a) PQRS (b) PRSQ
(c) SRPQ (d) QSRP

46. S1: A decade ago UN recognised that rape can constitute a war crime and a constitutive act of genocide.
S6: The fact that these two peace laureates come from two different nations underlines that this problem has been widespread, from Rwanda to Myanmar.
P: This year's Nobel peace prize has been awarded to two exceptional individuals for their fight to end the use of sexual violence as a weapon of war.
Q: Denis Mukwege is a doctor who has spent decades treating rape survivors in the Democratic Republic of Congo, where a long civil war has repeatedly witnessed the horror of mass rapes.
R: Nadia Murad is herself a survivor of sexual war crimes, perpetuated by IS against the Yazidis.
S: Today she campaigns tirelessly to put those IS leaders in the dock in international cours.
The correct sequence should be
(a) PQRS (b) PRQS
(c) SRQP (d) QRSP

47. S1: Few scientists manage to break down the walls of the so-called ivory tower of academia and touch and inspire people who may not othersise be interested in science.
S6: Not many would have survived this, let alone excelled in the manner he did.
P: Stephen Hawking was one of these few.

Q: Around this time he was diagnosed with Amyotrophic Laternal Sclerosis, an incurable motor beuron disease, and given two years to live.
R: Judging by the odds he faced as a young graduate student of physics at Cambridge University, nothing could have been a more remote possibility.
S: When he was about 20 years old, he got the shattering news that he could not work with the great Fred Hoyle for his PhD, as he had aspired to.

The correct sequence should be
(a) P Q R S (b) P R Q S
(c) S R P Q (d) P R S Q

48. S1: The climate question presents a leapfrog era for India's development paradigm.
S6: This presents a good template for India, building on its existing plans to introduce electirc mobility through buses first, and cars by 2030.
P: It is aimed at achieving a shift to sustainable fuels, getting cities to commit to eco-friendly mobility and delivering more walkable communities, all of which will imporove the quality of urban life.
Q: At the Bonn conference, a new Transport Decarbonisation Alliance has been declared.
R: This has to be resolutely pursued, breaking down the barriers to wider adoption of rooftop solar energy at every level and implementing net metering systems for all categories of consumers.
S: Already, the country has chalked out an amitious policy on renewable energy, hoping to generate 175 gigawatts of power from green sources by 2022.

The correct sequence should be
(a) S R Q P (b) S P R Q
(c) P R S Q (d) Q R S P

49. S1: The dawn of the information age opened up great opportunities for the beneficial use of data.
S6: To some, in this era of Big Data analytics and automated, algorithm-based processing of zettabytes of information, the fear that their personal data may be unprotected may conjure up visions of dystopian world in which individual liberties are compromised.
P: But it is the conflict between the massive scope for progress provided by the digital era and the fear of loss of individual autonomy that is foregrounded in any debates about data protection laws.
R: It is against this backdrop that the White Paper made public to elicit views from the public on the shape and substance of a comprehensive data protection law assumes significance.
S: Unauthorised leaks, hacking and other cyber crimes have rendered data bases vulnerable.

The correct sequence should be
(a) S Q R P (b) Q P R S
(c) S R P Q (d) Q S P R

50. S1: In a globalised world, no country can hope to impose tariffs without affecting its own economic intersts.
S6: The ongoing trade war also threatens the rules-based global trade order which has managed to amicably handle trade disputes between countries for decades.
P: So both the U.S. and China, which have blamed each other for the ongoing trade war, are doing no good to their won economic fortunes by engaging in this tit-for-at tariff battle.
Q. Apart from disadvantaging its consumers, who will have to pay higher prices for certain goods, tariffs will also disrupt the supply chain of producers who rely on foreign imports.
R: China, which is fighting an economic slowdown, will be equally affected.
S: The minutes of the U.S. Federal Reserve June policy meeting show that economic uncertainty due to the trade war is already affecting private investment in the U.S., with many investors deciding to scale back or delay their investment plants.

The correct sequence should be
(a) S Q P R (b) Q P S R
(c) Q R P S (d) P S R Q

COMPREHENSION

DIRECTIONS: In this section you have few 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 opinion of the author only.

Passage - 1

From 1600 to 1757 the East India Company's role in India was that of a trading corporation which brought goods or precious metals into India and exchanged them for Indian goods like textiles and spices, which it sold abroad. Its profits came primarily from the sale of Indian goods abroad. Naturally, it tried constantly to open new markets for Indian goods in Britain and other countries. Thereby, it increased the export of Indian manufacturers, and thus encouraged their production. This is the reason why Indian rulers tolerated and even encouraged the establishment of the Company's factories in India. But, from the very beginning, the British manufacturers were jealous of the popularity that India textiles enjoyed in Britain. All of a sudden, dress fashions changed and light cotton textiles began to replace the coarse woolens of the English. Before, the author of the famous novel, *Robinson Crusoe*, complained that Indian cloth had "crept into our houses, our closets and bed chambers; curtains, cushions, chairs, and at last beds themselves were nothing but calicos or India stuffs". The British manufactureres, put pressure on their government to restrict and prohibit the sale of Indian goods in England. By 1720, laws had been passed forbidding the wear or use of printed or dyed cotton cloth. In 1760 a lady had to pay a fine of 200 for possessing an imported handkerchief ! Moreover, heavy duties were imposed on the import of plain cloth. Other European countries, except Holland, also either prohibited the import of Indian cloth or imposed heavy import duties. In spite of these laws, however, Indian silk and cotton textiles still held their own in foreign markets, util the middle of the eighteenth century when the English textile industry began to develop on the basis of new and advanced technology.

51. The East India Company was encouraging the export of Indian manufacturers because
    (a) it was a philanthropic trading corporation
    (b) it wanted Indian manufacturers to prosper in trade and commerce
    (c) it profited from the sale of Indian goods in foreign markets
    (d) it feared Indian Kings who would not permit them trade in India
52. The people of England used Indian cloths because
    (a) they loved foreign and imported clothes
    (b) the Indian textile was light cotton
    (c) the Indian cloths were cheaper
    (d) the Indian cloths could be easily transported
53. What died the British manufacturer do to compete with the Indian manufacturers?
    (a) They pressurized the government to levy heavy duties on export of Indian clothes
    (b) They pressurized the government to levy heavy duties on import of Indian clothes
    (c) They requested people to change their fashion preferences
    (d) They lowered the prices of the Britain made textile.
54. Which source is cited by the author to argue that Indian textile was in huge demand in 18th century England?
    (a) The archival source
    (b) The scientific source
    (c) The journalistic source
    (d) The literary source
55. "New and advanced technology" in the paragraph refers to
    (a) the French Revolution
    (b) the Glorious Revolution of England
    (c) the Industrial Revolution
    (d) the beginning of colonialism

Passage - 2

Zimbabwe's prolonged political crisis reached the boiling point earlier this month when President Robert Mugabe dismissed the Vice-President, Emmerson Mnangagwa. A battle to succeed the 93-year-old liberation hero-turned President had already been brewing withing the ruling Zimbabwe African National Union-Patriotic Front (Zanu-PF), with the old guard backing Mr. Mnangagwa, himself a freedom fighter, and 'Generation 40', a grouping of younger leaders supporting Mr. Mugabe's 52-years-old- wife, Grace. Ms. Mugabe, Known for her extravagant lifestyle and interfering ways, has been vocal in recent months about her political ambitions. Mr. Mugabe was seen to have endorsed her when on November 6 he dismissed Mr. Mnangagwa. But Mr. Mugabe, who has ruled Zimbabwe since its independance in 1980, erred on two counts: he underestimated his own power in a system he has helped shape. In the good old days, Mr. Mugabe was able to rule with an iron grip. But those days are gone. Age and health problems have weakened his hold on power, while there is a groundwell of anger among the public over economic mismanagement. So when he turnede against a man long seen by the establishment as his successor, Mr. Mugabe left little doubt that he was acting from a position of political weakness. This gave the security forces the confidence to turn against him and make it clear they didn't want a Mugabe dynasty. The military doesn't want to call its actin a coup d' etat, for abvious reasons. A coup would attract international condemnation, even sanctions. But it is certain that the army chief, Gen. Constantino Chiwenga, is in charge. His plan, as it emerges, is to force Mr. Mugabe to resign and install a transitional government, perhaps under Mr. Mnangagwa, until elections are held.

56. In the paragraph, who has been called liberation hero?
    (a) Constantino Chiwenga
    (b) Emmerson Mnangagwa
    (c) Robert Mugabe
    (d) Army Chief
57. Mrs. Mugabe is supported by
    (a) Mr. Mnangagwa
    (b) Mr. Mugabe
    (c) Generation 40
    (d) Zanu-PF
58. Mr. Mugabe's political weakness became apparent when
    (a) he endorsed his wife
    (b) he turned against the army
    (c) he suffered from health issues
    (d) he dismissed Mr. Mnangagwa
59. The security forces of Zimbabwe staged a coup against the President because
    (a) they wanted Mrs. Mugabe as the President
    (b) they were aware of Mugabe's failing wealth
    (c) they disliked Mugabe's extravagent lifestyle
    (d) they did not want a Mugabe dynasty
60. Why does the military not want to call it a coup d'etat?
    (a) Because coup is immoral
    (b) Because coup is illegal
    (c) Because coup would lead to international censure and sanctions
    (d) Because it would make the public revolt

Passage - 3

Over-eating is one of the most wonderful practices among those who think that they can afford it. In fact, authorities say that nearly all who can get a much as they desire, over-eat to their disadvantage. This class of people could save a great more food than they can save by missing one meal per week and at the same time they could improve their health. A heavy meal at night, the so-called "dinner", is the fashion with many and often is taken shortly before retring. It is unnecesary and could be forgone, not only once a week but daily without loss of strength. From three to five hourse are needed to digest food. While sleeping, this food not being required to give energy for work, is in many cases converted into excess fat giving rise to over-weight. The evening meal should be light, taken three or four hours before retiring. This prevents over-eating, conserves energy and reduces the cost of food.

61. Why should those who over-eat refrain from doing so?
    (a) Because over-eating leads to loss of wealth
    (b) Because over-eating is bad for health
    (c) Because over-eating conserves food
    (d) Because over-eating is immoral and unhealthy

62. Over-eating is more prevalent among
(a) the rich (b) the poor
(c) everybody (d) the bourgeoisie
63. The writer is asking the readers
(a) to skip the heavy dinner and take light evening meal instead
(b) to stop eating anything at night
(c) to take food only during the day
(d) to eat food before the sunset
64. What is the most appropriate time for having evening meal?
(a) An hour after the sunset
(b) Three or four hours before sleeping
(c) Before the sunset
(d) Just before sleeping
65. According to the passage, how many times a day should we have food?
(a) Three times (b) Two times
(c) Once (d) Has not been specified
66. According to the passage, people overeat
(a) because they can afford to
(b) because they are hungry
(c) because they have to work more
(d) because they have to conserve energy

Passage - 4

Much has been said of the common ground of religious unity. I am not going just now to venture my own theory. But if anyone here hopes that this unity will come by the triumph of any one of the religions and the destruction of the others, to him I say, "Brother , yours is an impossible hope." Do I wish that the Christian would become Hindu? God forbid. Do I wish that the Hindu or Buddhist would become Christian? God forbid.

The seed is put in the ground, and earth and air and water are placed around it. Does the seed become the earth, or the air, or the water? No. It becomes a plant. It develops after the law of its own growth, assimilates the air, the earth, and the water, converts them into plant substance, and grows into a plant.

Similar is the case with religion. The Christian is not to become a Hindu or a Buddhist, nor a Hindu or a Buddhist to become a Christian. But each must assimilate the spirit of the others and yet preserve his individuality and grow according to his own law of growth.

If the Parliament of Religions has shown anything to the world, it is this: it has proved to the world that holiness, purity and charity are not the exclusive possessions of any church in the world, and that every system has produced men and women of the most exalted character. In the face of this evidence, if anybody dreams of the exclusive survival of his own religion and destruction of the others, I pity him from the bottom of my heart, and point out to him that upon the banner of every religion will soon be written in spite of resistance: : "Help and not fight," "Assimilation and not Destruction," "Harmony and Peace and not Dissension."

67. According to the author of the passage, people should
(a) change their religions
(b) follow their religions and persuade others to follow it
(c) follow their own religions and respect other religions
(d) disrespect other religions
68. The Parliament of Religions is
(a) A Christian organisation
(b) a Buddhist organisation
(c) a Hindu organisation
(d) a platform for discussion about every religion of the world
69. What does the author think about those who dream about the exclusive survival of their own religions and the destruction of the others?
(a) He hates them
(b) He desires to imprison them
(c) He pities them
(d) He praises them
70. According to the passage, what is "impossible hope"?
(a) One day, all the people of the world will follow only one religion
(b) One day, there will be no religion
(c) Purity and charity are the exclusive possessions
(d) Banner of every religion will soon be written

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), (b) and (c). If you find no error, your response should be indicated as (d).

71. Except for few days (a) in a year during the monsoon (b) the river cannot flow on its own (c) No error (d)
72. Being apprised with our approach, (a) the whole neighbourhood (b) came out to meet the minister (c) No error (d)
73. The celebrated grammarian Patanjali (a) Was (b) a contemporary to Pushyamitra Sunga (c) No error (d)
74. His appeal for funds (a) met (b) a poor response (c) No error (d)
75. Buddhism teaches that (a) freedom from desires (b) will lead to escape suffering (c) No error (d)
76. This hardly won liberty (a) was not to be (b) lightly abandoned (c) No error (d)
77. My friend said (a) he never remembered (b) having read a more enjoyable book (c) No error (d)

78. With a population of over one billion (a)
India is second most populous country (b)
in the world after China (c) No error (d)

79. There are hundred of superstitions (a) which survive (b)
in the various parts of the country (c) No error (d)

80. It is (a) in the temperate countries of northern Europe (b)
that the beneficial effects of cold is most manifest (c)
No error (d)

81. The effects of female employment (a) on gender equality (b)
now appear to be trickling at the next generation (c)
No error (d)

82. Since the 15 minutes that she drives, (a)
she confesses that she feels like (b)
a woman with wings (c) No error (d)

83. India won (a) by an innings (b) and three runs. (c) No errors (d)

84. Each one (a) of these chairs (b) are broken. (c) No errors (d)

85. Few creature (a) outwit (b) the fox in Aesop's Fables (c)
No errors (d)

86. Anywhere in the world (a) when there is conflict (b)
women and children suffer the most. (c) No errors (d)

87. The man is (a) the foundational director (b) of this company (c)
No errors (d)

88. Parents of LGBT community members (a) are coming in (b)
with a little help from NGOs (c) No errors (d)

89. To love one art form is great (a)
but to be able to appreciate another (b)
and find lateral connections are priceless (c) No errors (d)

90. Female literacy rate has gone up by 11% (a)
in the past decade as opposed to (b)
a 3% increase in male literacy (c) No errors (d)

CLOZE COMPREHENSION

DIRECTIONS: Each of the following sentences in this section has a blank space with four words or group of words given. Select whichever word or group of words you consider most appropriate for the blank space and indicate your response on the Answer Sheet accordingly.

CLOZE COMPREHENSION - I

91. The question whether war is ever justified, and if so under what circumstances, is one which has been forcing itself _____
(a) upon the attention of all thoghtful men.
(b) on
(c) at
(d) over

92. On this question I find myself in the somewhat _____ a position of
(a) delightful
(b) painful
(c) pleasant
(d) lovely

93. holding that no single one of the combatants is justified in the present war, while not taking the extreme Tolstoyan view that war is under all circumstances a _____
(a) duty (b) obligation
(c) responsibility (d) crime.

Opinions on such a subject as war are the outcome of _____
94. (a) feeling
(b) sentiment
(c) reason
(d) patriotism

95. rather than of thought: given a man's emotional temperament, his convictions, _____
(a) however on war in general, and on any particular war which
(b) as well as
(c) both
(d) despite

96. may occur during his lifetime, can be _____ with tolerable certainty
(a) thought
(b) intimated
(c) suggested
(d) held

97. The arguments used will be mere reinforcements to convictions otherwise reached. The fundamental facts in this as in all ethical _____ are feelings; all that
(a) questions
(b) answers
(c) statements
(d) experiences

98. thought can do is to clarify and systematize the expression of those feelings, and it is such clarifying and systematizing of my own feelings that I wish to _____
(a) engage
(b) praise
(c) attempt
(d) commend

99. in the present article. In fact, the question of rights and wrongs of a particular war is generally _____ from a juridical or quasi-juridical
(a) considered
(b) observed
(c) transferred
(d) opined

100. _____
(a) possibility
(b) formula
(c) force
(d) standpoint

CLOZE COMPREHENSION - II

101. The Nobel Prize for Chemistry this year is a tribute to the power of _____.
(a) evolution (b) devolution
(c) revolution (d) involution

102. The laureates harnessed evolution and used it in the _____ with amazing results. Frances H. Arnold, an American who
(a) microscope (b) field
(c) market (d) laboratory

103. was given one-half of the prize, used 'directed evolution' to _____
(a) inhibit (b) synthesize
(c) hamper (d) hold back

104. variants of naturally occuring anzymes that could be used to _____.
(a) constitute (b) sink
(c) manufacture (d) resolve

105. biofuels and pharmaceuticals. The other half went to George P. Smith, also of the U.S., and Sir Gregory P. Winter, from the U.K., who evolved antibodies to _____ autoimmune diseases and even metastatic cancer through a process called phase display
(a) combat (b) support
(c) observe (d) invite

IDIOMS AND PHRASES

DIRECTIONS : Given below are some idioms / phrases followed by four alternative meanings to each. Choose the response (a), (b), (c) and (d) which is the most appropriate expression.

106. A match made in heaven
(a) a marriage that is solemnized formally
(b) a marriage that is unsuccessful
(c) a marriage that is likely to be happy and successful
(d) a marriage of convenience

107. A culture vulture
(a) someone who is very keen to experience art and literature
(b) someone who wants to defend ancient culture
(c) someone who is ashamed of one's own culture
(d) someone who looks at her/his culture critically

108. A death blow
(a) to be nearly dead
(b) to be deeply afraid of death
(c) to beat someone to death
(d) an action or event which causes something to end or fail.

109. The jewel in the crown
(a) someone who has many skills
(b) something that one wants
(c) the most valuable thing in a group of things
(d) the jewel in the crown of the king

110. To live in a fool's paradise
(a) to live a life that is dishonest
(b) to be happy because you will not accept how bad a situation really is
(c) to believe that things you want will happen
(d) to enjoy yourself by spending a lot of money

111. A rotten apple
(a) to remove something which is rotten
(b) one bad person in a group of good people
(c) a loving and kind person
(d) a disorganized person with bad habits

112. To vote with your feet
(a) to show that you do not support something
(b) to replace somethng important
(c) to change something you must do
(d) to express a particular opinion

113. Verbal diarrhoea
(a) to be sick
(b) to talk too much
(c) to be in a difficult situation
(d) to be a good orator

114. To sail close to the wind
(a) to pretend to be something that you are not
(b) to be in some unpleasant situation
(c) to be destroyed by a belief
(d) to do something that is dangerous

115. A double entendre
(a) to look at someone or something twice
(b) a situation in which you cannot succeed
(c) a word which has two meanings
(d) something that causes both advantages and problems

116. To cut your own throat
(a) to stop doing something
(b) to do something because you are angry
(c) to behave in a relaxed manner
(d) to allow someone to do something

117. Cook the books
(a) to record false information in the accounts of an organization
(b) to do something that spoils someone's plan
(c) to tell a false story
(d) to be very angry

118. Change your tune
(a) to listen to good music
(b) to do things that your are not willing to
(c) to change your opinion completely because it will bring you an advantage
(d) to pretend to be very friendly

119. Blue Blood
(a) to swallow poison
(b) to be overly interested in someone
(c) to suddenly become jealous
(d) to belong to a family of the highest social class

120. Cut the crap
(a) an impolite way of telling someone stop saying things that are not true
(b) to stop needing someone else to look after you
(c) to talk about something important
(d) to upset someone by criticizing them

GENERAL KNOWLEDGE

1. Henry T. Colebrooke was a Professor of Sanskrit in which one of the following institutions?
(a) Fort William College
(b) Serampore Mission
(c) Kashi Vidyapith
(d) Asiatic Society
2. The Deccan Agriculturalists' Relief Act of 1879 was enacted with which one of the following objectives?
(a) Restore lands to the dispossessed peasants
(b) Ensure financial assistance to peasants during social and religious occasions
(c) Restrict the sale of land for indebtedness to outsiders
(d) Give legal aid to insolvent peasants
3. The Damin-i-Koh was created by the British Government to settle which one of the following communities?
(a) Santals (b) Mundas
(c) Oraons (d) Saoras
4. The Limitation Law, which was passed by the British in 1859, addressed which one of the following issues?
(a) Loan bonds would not have any legal validity.
(b) Loan bonds signed between moneylender and Ryots would have validity only for three years.
(c) Land bonds could not be excuted by moneylenders.
(d) Loan bonds would have validity for ten years.
5. Who among the following was known during the days of the Revolt of 1857 as 'Danka Shah'?
(a) Shah Mal
(b) Maulavi Ahmadullah Shah
(c) Nana Sahib
(d) Tantia Tope
6. The Summary Settlement of 1856 was based on which one of the following assumptions?
(a) The Talukdars were the rightful owners of the land.
(b) The Talukdars were interlopers with no permanent stakes in the land.
(c) The Talukdars could evict the peasants from the lands.
(d) The Talukdars would take portion of the revenue which flowed to the State.
7. The Inter-State Council was seet up in 1990 on the recommendation of
(a) Punchhi Commission
(b) Sarkaria Commission
(c) Rajamannar Commission
(d) Mungerilal Commission
8. Which among the following writs is issued to quash the order of a Court or Tribunal?
(a) Mandamus (b) Prohibition
(c) Quo Warranto (d) Certiorari
9. Which among the following statements about the power to change the basic structure of the Constitution of India is/ are correct?
1 It falls outside the scope of the amending powers of the Parliament.
2 It can be excercised by the people through representatives in a Constituent Assembly.
3 It falls within the consitituent powers of the Parliament.
Select the correct answer using the code below.
(a) 1 and 3 (b) 1 and 2
(c) 1 only (d) 2 and 3
10. When a Proclamation of Emergency is in operation, the right to move a Court for the enforcement of all Fundamental Rights remains suspended, except
(a) Article 20 and Article 21
(b) Article 21 and Article 22
(c) Article 19 and Article 20
(d) Article 15 and Article 16
11. Which one of the following Articles of the Constitution of India lays down that no citizen can be denied the use of wells, tanks and bathing Ghats maintained out of State funds?
(a) Article 14 (b) Article 15
(c) Article 16 (d) Article 17
12. Who amongst the following organized the All India Scheduled Castes Federation?
(a) Jyotiba Phule (b) Periyar
(c) B.R. Ambedkar (d) M.K. Karunanidhi
13. Paul Allen, who died in October 2018, was the co-founder of
(a) Oracle (b) IBM
(c) Microsoft (d) SAP
14. The mobile app 'cVIGIL' is helpful in
(a) conducting free and fair e-tendering process in government offices
(b) fighting against corruption in public services
(c) removing garbage from the municipal areas
(d) reporting violation of model code of conduct in election-bound States
15. 'Prahaar' is
(a) a battle tank
(b) a surface-to-surface missile
(c) an aircraft carrier
(d) a submarine
16. Who among the following is/are the recipient/recipients of Rajiv Gandhi Khel Ratna Award, 2018?
(a) Virat Kohli
(b) S. Mirabai Chanu and Virat Kohli
(c) Neeraj Chopra
(d) Hima Das and Neeraj Chopra
17. Pakyong Airport is located in
(a) Sikkim (b) Jammu and Kashmir
(c) Arunachal Pradesh (d) Mizoram
18. The United Nations has been observing International Day of Rural Women on
(a) 15th July (b) 15th August
(c) 15th September (d) 15th October

19. Who among the following is the first Indian to win Pulitzer Prize?
(a) Arundhati Roy (b) Gobind Behari Lal
(c) Vijay Seshadri (d) Jhumpa Lahiri

20. Saurabh Chaudhary excels in which one of the following sports?
(a) Archery (b) Shooting
(c) Boxing (d) Judo

21. Which one of the following is not an assumption in the law of demand?
(a) There are no changes in the taste and preferences of consumers.
(b) Income of consumers remains constant.
(c) Consumers are affected by demonstration effect.
(d) There are no changes in the price of substitute goods.

22. Which one of the following statements is not correct.
(a) When total utility is maximum, marginal utility is zero.
(b) When total utility is decreasing marginal utility is negative
(c) When total utility is increasing, marginal utility is positive.
(d) When total utility is maximum, marginal and average utility are equal to each other.

23. Consider the following statements about indifference curves:
1 Indifference curves are convex to the origin.
2 Higher indifference curves represents higher level of satisfaction.
3 Two indifference curves cut each other.
Which of the statements given above is/are correct?
(a) 1 only (b) 1 and 2
(c) 2 and 3 (d) 3 only

24. Consider the following statements about a joint-stock company:
1 It has a legal existence.
2 There is limited liability of shareholders
3 It has a democratic management
4 It has a collective ownership.
Which of the statements given above is/are correct?
(a) 1 and 2 only (b) 1, 2 and 3 only
(c) 3 and 4 only (d) 1, 2, 3 and 4

25. When some goods or productive factors are completely fixed in amount, regardless of price, the supply curve is
(a) horizontal
(b) downward sloping to the right
(c) vertical
(d) upward sloping to the right

26. Who designed the Bombay Secretariat in the 1870s?
(a) H. St. Clair Wilkins
(b) Sir Cowasjee Jehangir Readymoney
(c) Purushottamdas Thakurdas
(d) Nusserwanji Tata

27. Who was the founder of Mahakali Pathshala in Calcutta?
(a) Her Holiness Mataji Maharani Tapaswini
(b) Sister Nivedita
(c) Madame Blavatsky
(d) Sarojini Naidu

28. Which European ruler has observed, "Bear in mind that the commerce of India is the commerce of the world... he who can exclusively command it is the dictator of Europe"?
(a) Queen Victoria (b) Peter the Great of Russia
(c) Napoleon Bonaparte (d) Gustav II Adolf

29. Which European traveller had observed, "A Hindu woman can go anywhere alone, even in the most crowded places, and she need never fear the impertinent looks and jokes of idle loungers"?
(a) Francois Bernier (b) Jean-Baptiste Tavernier
(c) Thomas Roe (d) Abbe J.A. Dubois

30. Who was the author of the book, Plagues and Peoples?
(a) W.L. Thomas (b) Rachel Carson
(c) David Cannadine (d) William H. McNeill

31. Which Indian social theorist had argued that the idea of a homogenized Hinduism was constructed through the 'cultural arrogance of postenlightenment Europe'?
(a) Ashis Nandy (b) Partha Chatterjee
(c) T.K. Oommen (d) Rajni Kothari

32. 'Sub-prime crisis' is a term associated with which one of the following events?
(a) Economic recession
(b) Political instability
(c) Structural adjustment programmes
(d) Growing social inequality

33. Which one of the following is not a change brought about by the Indian Independence Act of 1947?
(a) The Government of India Act, 1935 was amended to provide an interim Constitution.
(b) India ceased to be a dependency.
(c) The Crown was the source of authority till new Constitution was framed.
(d) The Governor-General was the constitutional head of Indian Dominion.

34. Which one of the following is not a correct statement regarding the provision of Legislative Council in the State Legislature?
(a) The States of Bihar and Telangana have Legislative Councils.
(b) The total number of members in the Legislative Council of a State shall not exceed one-third of the total number of members in the Legislative Assembly.
(c) One-twelfth of all members shall be elected by electorates consisting of local bodies and authorities.
(d) One-twelfth of all members shall be elected by graduates residing in the State.

35. Which one of the following is not correct about the Panchayats as laid down in Part IX of the Constitution of India?
(a) The Chairperson of a Panchayat needs to be directly elected by people in order to exercise the right to vote in the Panchayat meetings.
(b) The State Legislature has the right to decide whether or not offices of the Chairpersons in the Panchayats are reserved for SCs, STs or women.
(c) Unless dissolved earlier, every Panchayat continues for a period of five years.
(d) The State Legislature may by law make provisions for audit of accounts of the Panchayats.

36. Which one of the following is not correct about Administrative Tribunals?
(a) The Parliament may by law constitute Administrative Tribunals both at the Union and State levels.
(b) Tribunals may look into disputes and complaints with respect to recruitment and conditions of service of persons appointed to public services.
(c) Tribunals established by a law of the Parliament can exclude the jurisdiction of all Courts to allow for special leave to appeal.
(d) The law establishing the Tribunals may provide for procedures including rules of evidence to be followed.

37. A market situation when many firms sell similar but not identical products is termed as
(a) perfect competition
(b) imperfect competition
(c) monopolistic competition
(d) oligopoly

38. Consider the following statements:
1. Inflation in India continued to be moderate during 2017-18.
2. There was significant reduction in food inflation, particularly pulses and vegetables during the period.
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

39. Which one of the following hypotheses postulates that individual's consumption in any time period depends upon resources available to the individual, rate of return on his capital and age of the individual?
(a) Absolute Income Hypothesis
(b) Relative Income Hypothesis
(c) Life Cycle Hypothesis
(d) Permanent Income Hypothesis

40. According to John Maynard Keynes, employment depends upon
(a) aggregate demand (b) aggregate supply
(c) effective demand (d) rate of interest

41. Which one of the following canons of taxation was not advocated by Adam Smith?
(a) Canon of equality
(b) Canon of certainty
(c) Canon of convenience
(d) Canon of fiscal adequacy

42. Which Arab scientist could be given the credit of christening the mathematical discipline of algorithm?
(a) Al-Khwarizmi (b) Ibn al-Haytham
(c) Ibn Rushd (d) Ibn Sina

43. Which one of the following developments took place because of the Kansas-Nebraska Act of 1854?
(a) The Missouri Compromise was repealed and people of Kansas and Nebraska were allowed to determine whether they should own slaves or not.
(b) The Act did not permit the territories the right to vote over the question of slavery.
(c) The voice of the majority in regards to the issue of slavery was muzzled.
(d) The Federal Government to decide on slavery.

44. Which one of the following issues was included in the Indo-US Nuclear Agreement of 2007?
(a) India has 'advance right to reprocess' US-origin safeguarded spent fuel.
(b) India did not have the right to build a strategic fuel reserve with the help of the other supplier countries.
(c) India should not test a nuclear device.
(d) The US will impede the growth of India's nuclear weapons programme.

45. Which of the following statements about Alladi Krishnaswami Ayyar, as a drafting member of the Constitution of India, are correct?
1. He favoured the role of the supreme court in tasking important decision related to the interpretation of the constitution of India..
2. He felt that the Supreme Court had to draw the line between liberty and social control.
3. He believed in the dominance of the executive over the Judiciary.
4. He favoured a dictatorial form of governance.
Select the correct answer using the code below.
(a) 1 and 2 only (b) 1, 2 and 3
(c) 3 and 4 (d) 1, 2 and 4

46. Which of the following are the core functions of the United Nations multidimensional peacekeeping operations?
1. Stabilization
2. Peace consolidation
3. To extend support to a losing State in a war
Select the correct answer using the code given below.
(a) 1, 2 and 3 (b) 2 and 3 only
(c) 1 and 3 only (d) 1 and 2 only

47. The South China Sea Dispute involves which of the following countries?
1. China 2. Vietnam
3. Malaysia 4. Indonesia
Select the correct answer using the code given below.
(a) 1 and 4 (b) 1 and 2 only
(c) 1,2 and 3 (d) 2, 3 and 4

48. 'The 'Kyoto Protocol' is an international treaty that commits State parties to reduction in
(a) poverty
(b) greenhouse gases emission
(c) nuclear armaments
(d) agricultural subsidy

49. The 'Beijing Declaration' is concerned with which one of the following issues?
(a) Rights of children
(b) Rights of women
(c) Right to development
(d) Reduction of tariffs

50. The 'Gujral Doctrine' relates to which one of the following issues?
(a) Build trust between India and its neighbours
(b) Initiate dialogue with all insurgent groups in India
(c) Undertake develpment activities in Naxal-dominated areas
(d) Ensure food security

51. Match List-I with List-II and select the correct answer using the code given below the Lists:

List-I (Compound/Molecule)	List-II (Shape of Molecule)
(a) CH_3F	1. Trigonal planar
(b) HCHO	2. Tetrahedral
(c) HCN	3. Trigonal pyramidal
(d) NH_3	4. Linear

Code:

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

52. Very small insoluble particles in a liquid may be separated from it by using
(a) crystallization (b) fractional distillation
(c) centrifugation (d) decantation

53. Which one of the following elements cannot be detected by "Lassaigne's test"?
(a) I (b) Cl
(c) S (d) F

54. In which of the following functional group isomerism is not possible?
(a) Alcohols (b) Aldehydes
(c) Alkyl halides (d) Cyanides

55. Which one of the following statements is not correct?
(a) Fishcher projection represents the molecule in an eclipsed conformation.
(b) Newman projection can be represented in aneclipsed, staggered and skew conformations.
(c) Fischer projection of the molecule is its most stable conformation.
(d) In Sawhorse projections, the lines are inclined at an angle of 120° to each other.

56. The monomer / monomers used for the synthesis of Nylon 6 is / are
(a) hexamethylenediamine and adipic acid
(b) caprolactam
(c) urea and formaldehyde
(d) phenol and formaldehyde

57. Which one among the following stars is nearest to the earth?
(a) Sirius (b) Arcturus
(c) Spica (d) Proxima Centauri

58. Which of the following planets of our solar system has least mass?
(a) Neptune (b) Jupiter
(c) Mars (d) Mercury

59. Two identical solid pieces, one of gold and other of silver, when immersed completely in water exhibit equal weights. When weighed in air (given that density of gold is greater than that of silver)
(a) the gold piece will weigh more
(b) the silver piece will weigh more
(c) both silver and gold pieces weigh equal
(d) weighing will depend on their masses

60. If the wavelengths corresponding to ultraviolet, visible and infrared radiations are given as λ_{UV}, λ_{VIS} and λ_{IR} respectively, then which one of the following gives the correct relationship among these wavelengths?
(a) $\lambda_{UV} < \lambda_{IR} < \lambda_{VIS}$ (b) $\lambda_{UV} > \lambda_{VIS} > \lambda_{IR}$
(c) $\lambda_{UV} > \lambda_{IR} > \lambda_{VIS}$ (d) $\lambda_{UV} < \lambda_{VIS} < \lambda_{IR}$

61. An electron and a proton starting from rest get accelerated through potential difference of 100 kV. The final speeds of the electron and the proton are V_e and V_p respectively. Which one of the following relations is correct?
(a) $V_e > V_P$ (b) $V_e < V_P$
(c) $V_e = V_P$ (d) Cannot be determined

62. If two vectors $\vec{A}$ and $\vec{B}$ are at an angle then
(a) $|\vec{A}|+|\vec{B}|=|\vec{A}+\vec{B}|$ (b) $|\vec{A}|+|\vec{B}|>|\vec{A}+\vec{B}|$
(c) $|\vec{A}|+|\vec{B}|<|\vec{A}+\vec{B}|$ (d) $|\vec{A}|+|\vec{B}|=|\vec{A}-\vec{B}|$

63. Which one of the following functions is not carried out by smooth endoplasmic reticulum?
(a) Transport of materials
(b) Synthesis of lipid
(c) Synthesis of protein
(d) Synthesis of steroid hormone

64. Which one of the following cell organelles mainly functions as storehouse of digestive enzymes?
(a) Desmosome (b) Ribosome
(c) Lysosome (d) Vacuoles

65. Which one of the following tissues is responsible for increase of girth in the stem of a plant?
(a) Tracheid (b) Pericycle
(c) Intercalary meristem (d) Lateral meristem

66. Which one of the following organisms is dependent on saprophytic mode of nutrition?
(a) Agaricus (b) Ulothrix
(c) Riccia (d) Cladophora

67. Which one of the following has a bilateral symmetry in its body organization?
(a) Asterias (b) Sea anemone
(c) Nereis (d) Echinus

68. Which one of the following pairs of animals is warm-blooded?
(a) Crocodile and Ostrich (b) Hagfish and Dogfish
(c) Tortoise and Ostrich (d) Peacock and Camel

69. Which one of the following States of India is not covered by Flood Forecasting Stations set up by the Central Water Commission?
(a) Rajasthan (b) Jammu and Kashmir
(c) Tripura (d) Himachal Pradesh

70. The city of Cartagena, which is famous for Protocol on Biosafety, is located in
(a) Colombia (b) Venezuela
(c) Brazil (d) Guyana

71. Which one among the following is the most populated State in India as per Census 2011?
(a) Goa (b) Mizoram
(c) Meghalaya (d) Sikkim

72. Which among the following countries of South America does the Tropic of Capricorn not pass through?
(a) Chile (b) Bolivia
(c) Paraguay (d) Brazil

73. Which one of the following is not correct about Sargasso Sea?
(a) It is characterized with anticyclonic circulation of ocean currents.
(b) It records the highest salinity in Atlantic Ocean.
(c) It is located west of Gulf Stream and cast of Canary Current.
(d) It confined in gyre of calm and motionless water.

74. Match List-I with List-II and select the correct answer using the code given below the Lists:

List-I (City)	**List-II (Product)**
(a) Detroit	1. Motorcar
(b) Antwerp	2. Diamond cutting
(c) Tokyo	3. Steel
(d) Harbin	4. Shipbuilding

Code:

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

75. Which one of the following is not situated on Varanasi-Kanyakumari National Highway?
(a) Satna (b) Rewa
(c) Katni (d) Jabalpur

76. Which one of the following methods is not suitable for urban rainwater harvesting?
(a) Rooftop recharge pit (b) Recharge wells
(c) Gully plug (d) Rechargte trench

77. If one plots the tank irrigation in India and superimposes it with map of well irrigation, one may find that the two are negatively related. Which one of the following statements explain the phenomenon?
1. Tank irrigation predates well irrigation.
2. Tank irrigation is in the areas with impervious surface layers.
3. Well irrigation requires sufficient groundwater reserves.
4. Other forms of irrigation are not available.
Select the correct answer using the code given below.
(a) 1, 2 and 3 (b) 2 and 3 only
(c) 3 and 4 (d) 1 and 4

78. When hot water is placed into an empty water bottle, the bottle keeps its shape and does not soften. What type of plastic is the water bottle made from?
(a) Thermoplastic (b) PVC
(c) Polyurethane (d) Thermosetting

79. Which one of the following methods is/are state function/ functions?
1. q + w 2. q
3. w 4. H - TS
Select the correct answer using the code given below.
(a) 1 and 4 only (b) 1 , 2 and 4
(c) 2, 3 and 4 (d) 1 only

80. For a certain reaction, $\Delta G^{\theta} = -45$ kJ/mol and $\Delta H^{\theta} = -90$ kJ / mol at 0°C. What is the minimum temperature at which the reaction will become spontaneous, assuming that ΔH^{θ} and ΔS^{θ} are independent of temperture?
(a) 273 K (b) 298 K
(c) 546 K (d) 596 K

81. The PCl_5 molecule has trigonal bipyramidal structure. Therefore, the hybridization of p orbitals should be
(a) sp^2 (b) sp^3
(c) dsp^2 (d) dsp^3

82. In spherical polar coordinates (γ, θ, α), θ denotes the polar angle around z-axis and α denotes the azimuthal angle raised from x-axis. Then the y-component of $\vec{P}$ is given by
(a) P sin θ sinα (b) P sin θ cos α
(c) P cos θ sin α (d) P cos θ cos α

83. For an ideal gas, which one of the following statements does not hold true?
(a) The speed of all gas molecules is same.
(b) The kinetic energies of all gas molecules are not same.
(c) The potential energy of the gas molecules is zero.
(d) There is no interactive force between the molecules.

84. What is a constellation?
(a) A particular pattern of equidistant stars from the earth in the sky
(b) A particular pattern of stars that may not be equidistant from the earth in the sky
(c) A particular pattern of planets of our solar system in the sky
(d) A particular pattern of stars, planets and satellites in the sky due to their position in the space

85. The Hooke's law is valid for
(a) only proportional region of the stress-strain curve
(b) entire sress-strain curve
(c) entire elastic region of the stress-strain curve
(d) elastic as well as plastic region of the stress-strain curve

86. Which one of the following statements regarding histone proteins is correct?
(a) Histones are proteins that are present in mitochondrial membrane.
(b) Histones are proteins that are present in nucleus in association with DNA.
(c) Histones are proteins associated with lipids in the cytosol.
(d) Histones are proteins associated with carbohydrates in the cytosol.

87. Which one of the following statements regarding haemoglobin is correct?
(a) Haemoglobin present in RBC can carry only oxygen but not carbon dioxide.
(b) Haemoglobin of RBC can carry both oxygen and carbon dioxide.
(c) Haemoglobin of RBC can carry only carbon dioxide.
(d) Haemoglobin is only used for blood clotting and not for carrying gases.

88. Which one of the following is the correct sequence of passage of light in a compound microscope?
(a) Condenser - Objective lens-Eye-piece - Body tube
(b) Objective lens - Condenser-Body tube-Eyepiece
(c) Condenser-Objective lens-Body tube-Eyepiece
(d) Eyepiece-Objective lens-Body tube-Mirror

89. Which one of the following statements is correct?
(a) Urea is produced in liver.
(b) Urea is produced in blood.
(c) Urea is produced from digestion of starch.
(d) Urea is produced in lung and kidney.

90. Which one of the following river valleys of India is under the influence of intensive gully erosion?
(a) Kosi (b) Chambal
(c) Damodar (d) Brahmaputra

91. Which one of the following may be the true characteristic of cyclones?
(a) Temperate cyclones move from west to east with westerlies whereas tropical cyclones follow trade winds.
(b) The front side of cyclone is known as the 'eye of cyclone'.
(c) Cyclones possess a centre of high pressure surrounded by closed isobars.
(d) Hurricanes are well-known tropical cyclones which develop over mid-latitudes.

92. The Headquarters of the International Tropical Timber Organization is located at
(a) New Delhi (b) Yokohama
(c) Madrid (d) Jakarta

93. Atmospheric conditions are well-governed by humidity. Which one among the following may best define humidity?
(a) Form of suspended water droplets caused by condensation
(b) Deposition of atmospheric moisture
(c) Almost microscopically small drops of water condensed from and suspended in air
(d) The moisture content of the atmosphere at a particular time and place

94. The Shompens are the vulnerable tribal group of
(a) Jharkhand
(b) Odisha
(c) West Bengal
(d) Andaman and Nicobar Islands

95. Which one of the following cities was not included in the list of smart cities in India?
(a) Silvassa (b) Jorhat
(c) Itanagar (d) Kavaratti

96. Find the correct arrangement of the following urban agglomerations in descending order as per their population size according to Census 2011.
(a) Delhi-Mumbai-Kolkata-Chennai
(b) Mumbai-Delhi-Kolkata-Chennai
(c) Mumbai-Kolkata-Delhi-Chennai
(d) Kolkata-Chennai-Mumbai-Delhi

97. Match List-I with List-II and select the correct answer using the code given below the Lists:

List-I (Type of Lake)	**List-II (Example)**
A. Tectonic	1. Lonar Lake
B. Crater	2. Gangabal Lake
C. Glacial	3. Purbasthali Lake
D. Fluvial	4. Bhimtal Lake

Code:

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

98. The Andaman group of islands and the Nicobar group of islands are separated by which one of the following latitudes?
(a) 8° N latitude (b) 10° N latitude
(c) 12° N latitude (d) 13° N latitude

99. Damanganga Reservoir Project with about 115 km of minor canals and distributaries is located in
(a) NCT (b) Dadra and Nagar Haveli
(c) Puducherry (d) Goa

100. Consider the following statements relating to Coal India Limited:
1. It is designated as a 'Maha Ratna' company under the Ministry of Coal.
2. It is the single largest coal-producing company in the world.
3. The headquarters of Coal India Limited is located at Ranchi, Jharkhand.
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

101. Afro-Asian solidarity as a central element of India's foreign policy was initiated by which of the following Prime Ministers?
(a) Narendra Modi (b) I. K. Gujral
(c) J. L. Nehru (d) Manmohan Singh

102. The Prime Minister's National Relief Fund is operated by which one of the following bodies?
(a) The Prime Minister's Office (PMO)
(b) The National Disaster Management Authority
(c) The Ministry of Finance
(d) The National Development Council (NDC)

103. Which one of the following statements with regard to India's surgical strike mission inside Pakistan Occupied Kashmir is correct?
(a) It was conducted in the year 2018.
(b) It was led by the Indian Air Force.
(c) It was not given any name.
(d) It was sanctioned by the United Nations.

104. Which one of the following statements about the National Green Tribunal is ***not*** correct?
(a) It was set up in the year 2010.
(b) It is involved in effective and expeditious disposal of cases relating to environmental protection and conservation of forests.
(c) It may consider giving relief and compensation for damages to persons and property.
(d) It is bound by the procedures laid down under the Code of Civil Procedure, 1908.

105. Which one of the following statements about the provisions of the Constitution of India with regard to the State of Jammu and Kashmir is not correct?
(a) The Directive Principles of State Policy do not apply.
(b) Article 35A gives some special rights to the permanent residents of the State with regard to employment, settlement and property.
(c) Article 19(1)(f) has been omitted.
(d) Article 368 is not applicable for the amendment of Constitution of the State.

106. In 1921, during which one of the following tours, Gandhiji shaved his head and began wearing loincloth in order to identify with the poor?
(a) Ahmaedabad (b) Champaran
(c) Chauri Chaura (d) South India

107. Simla was founded as a hill station to use as strategic place for billeting troops, guarding frontier and launching campaign during the course of
(a) Anglo-Maratha War (b) Anglo-Burmese War
(c) Anglo-Gurkha War (d) Anglo-Afghan War

108. Which politician in British India had opposed to a Pakistan that would mean "Muslim Raj he re and Hindu Raj elsewhere"?
(a) Khan Abdul Ghaffar Khan
(b) Sikandar Hayat Khan
(c) Maulana Abul Kalam Azad
(d) Rafi Ahmed Kidwai

109. Match List-I with List-II and select the correct answer using the code given below the Lists:

List-I (Author)	**List-II (Book)**
A. Sekhar Bandyopadhyay	1. Jawaharlal Nehru: A Biography, Vol-I, 1889-1947
B. Sarvepalli Gopal	2. From Plassey to Partition: A History of Modern India
C. David Hardiman	3. The Ascendancy of the Congress in Uttar Pradesh, 1926-1934
D. Gyanendra Pandey	4. Gandhi in His Time and Ours

Code:

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

110. Eight States have achieved more than 99% household electrification prior to the launch of 'Saubhagya Scheme'. Which one of the following is ***not*** among them?
(a) Kerala (b) Punjab
(c) Himachal Pradesh (d) Madhya Pradesh

111. In October 2018, India was elected as a member to the United Nations Human Rights Council for a period of
(a) five years (b) four years
(c) three years (d) two years

112. Consider the following statements about the Bureau of Pharma PSUs of India (BPPI) :
1. It is the implementing agency of Pradhan Mantri Bhartiya Janaushadhi Pariyojana (PMBJP).
2. It has been registered as an independent society under the Societies Registration Act, 1860.
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

113. Consider the following statements about a scheme launched by the Government of India:
It was launched to provide social security during old age and to protect elderly persons aged 60 years and above against a future fall in their interest income due to uncertain market conditions. The scheme enables old age income security for senior citizens through provision of assured pension/return linked to the subscription amount based on government guarantee to Life Insurance Corporation of India (LICI)
Identify the scheme.
(a) Pradhan Mantri Swasthya Suraksha Yojana
(b) Pradhan Mantri Vaya Vandana Yojana
(c) Liveability Index Programme
(d) Rashtriya Vayoshri Yojana

114. Who among the following won India's first ever gold medal in the International Youth Olympic Games (2018) held in Argentina?
(a) Neeraj Chopra (b) Praveen Chitravel
(c) Jeremy Lalrinnunga (d) Suraj Panwar

115. E. K. Janaki Ammal National Award on Taxonomy is administered by the
(a) Ministry of Agriculture and Farmers Welfare
(b) Ministry of New and Renewable Energy
(c) Ministry of Health and Family Welfare
(d) Ministry of Environment, Forest and Climate Change

116. Which one of the following pairs of military training institute of India and location is ***not*** correctly matched?
(a) Army war college : Mhow
(b) High Altitude Warfare School : Gulmarg
(c) Army Air Defence College : Pune
(d) Rashtriya Indian Military College : Dehradun

117. Which one of the following viruses is responsible for the recent death of lions in Gir National Park?
(a) Canine Distemper Virus
(b) Nipah Virus
(c) Hendra Virus
(d) Foot-and-Mouth Disease Virus

118. Till 2018, which of the following countries have legalized the possession and use of recreational cannabis?
(1) America (2) Canada
(3) Nigeria (4) Uruguay
Select the correct answer using the code given below.
(a) 1 , 2 and 3 (b) 2 and 4 only
(c) 1 and 4 only (d) 1 , 2 and 4

119. Which one of the following are the benefits of the Pradhan Mantri Jan Arogya Yojana (PMJAY)?
1. Free treatment available at all public and empanelled private hospitals in times of need
2. Cashless and paperless access to quality health-care services
3. Government provides health insurance cover of up to ₹5,00,000 per family per year
4. Pre-existing diseases are not covered
Select the correct answer using the code given below.
(a) 1 and 3 only (b) 1 , 2 and 3
(c) 2 and 4 only (d) 2, 3 and 4

120. The 11th BRICS Summit in 2019 will be hosted by
(a) China (b) Russia
(c) Brazil (d) India

HINTS & EXPLANATIONS

MATHEMATICS

1. (d) The number $17^{29} = (18-1)^{29}$ when divided by 18 leaves the remainder $(-1)^{29} = 18 - 1 = 17$
The number $19^{29} = (18+1)^{29}$ when divided by 18 leaves the remainder $(1)^{29} = 1$
Then after adding these two the remainder will be 17 + 1=18 which is divisible by 18 Hence the remainder will be 0

2. (a) For the number to be divisible by 10, it must contain the same powers for 2 and 5
Power of $2 = 2^{(5+16+7+36+6+28+11)} = 2^{109}$
Power of $5 = 5^{(3+6+12+14+30)} = 5^{(65)}$
Hence maximum possible power of 10 can be 65 only.

3. (a) If the number is divisible by 9 the sum of all its digit is divisible by 9
4 + 7 + 9 + 8 + 6 + 5 + A + B = 39 + A + B is divisible by 9
Possible values of B are 1, 3, 5, 7, 9 as it is given that last digit is odd
For B = 1, A = 5
For B = 3, A = 3
For B = 5, A = 1
For B = 7, A = 8
For B = 9, A = 6

4. (d) 999 × abc = def132
We can write the above equation as
(1000 – 1) × abc = def132
abc000 – abc = def 000 + 132 = (def + 1) × 1000 – 868
on comparing the LHS and RHS, we get
a = 8, b = 6, and c = 8 and d = a = 8
Now, 999 × 868 = 867132 ∴ d = 8, e = 6, f = 7

5. (a) Distance covered by A till 6pm = 60 km
Distance covered by A till 7pm = 120 km
Time taken by B to catch A = 60/(80 – 60) = 3 hrs
So A and B will meet at 6pm + 3 hrs = 9pm
Since we know that all three met at the some time
The time taken by C to cover 120 km difference will be = 9pm – 7pm = 2hrs
Therefore, $(x-60) \times 2 = 120$
$\Rightarrow 2x - 120 = 120$
$2x = 240$
$\therefore x = 120$ km/hr.

6. (c) Let present age of Priya be x
$x - 4 = n^3$
$x + 4 = (b)^2$
since n is a no > 1 on putting n = 2 we get $x = 12$
So $x + 4 = 16$ which is square of an integral number thus, consistent with given information after how many years her age becomes such that age before one year is a square and age after one year is a cube
Using option if we add 14 years to current age, we get age = 26 years
Here 25 is a square and 27 is a cube thus making 14 the correct answer.

7. (c) Option C is incorrect as 6n – 1 form can be a prime number but it is not necessarily true.

8. (c) $x + (x+2)/2x = x + ½ + 1/x$
So we have to find the minimum of $x + 1/x$ and add ½ to it
As AM > GM, So $(x + 1/x)/2 > \sqrt{(x \times 1/x)}$
Or $x + 1/x > 2$
So min of $x + (x+2)/2x = 2 + 1/2 = 5/2$

9. (a) $\dfrac{1+px}{1-px}\sqrt{\dfrac{1-qx}{1+qx}} = 1$
On squaring and cross multiplying we get

$$\left(\frac{1+px}{1-px}\right)^2 = \left(\sqrt{\frac{1+qx}{1-qx}}\right)^2$$

$$\frac{1+p^2x^2+2px}{1+p^2x^2-2px} = \frac{1+qx}{1-qx}$$

On applying componendo and dividendo

$$\frac{1+p^2x^2+2px+1+p^2x^2-2px}{1+p^2x^2+2px-1-p^2x^2+2px} = \frac{1+qx+1-qx}{1+qx-1+qx}$$

$$\frac{2(1+p^2x^2)}{4px} = \frac{2}{2qx}$$

$$\frac{1+p^2x^2}{2p} = \frac{1}{q} \Rightarrow q + p^2x^2q = 2p$$

$$\Rightarrow \therefore x = \pm\frac{1}{p}\sqrt{\frac{2p-q}{q}}$$

10. (c) Let initial rent be ₹ 100 and initial rooms be 100
So initial collection = 100 × 100 = ₹10000
Now new rent = 100 × 20% = 120
New no of rooms = 100 × 20% = 120
So new collection = 120 × 120 = 14400
% change in collection

$$= \frac{(14400-10000)}{10000} \times 100 = \frac{4400}{10000} \times 100 = 44\%$$

11. (c) Let the distance between be D km
Time taken by Radha – Time taken by Hema = 9 mins
So D/8 – D/10 = 9/60 hrs

$$\frac{10D-8D}{80} = \frac{9}{60} \Rightarrow \frac{2D}{80} = \frac{9}{60}$$

$$D = \frac{9 \times 80}{2 \times 60} = 6\text{km}$$

12. (b) $3^{x+2} + 3^{-x} = 10$
$3^2 + 3^0 = 10$
$x + 2 = 0$
$x = -2$ solution is consistent
Or $x + 2 = 2$
$x = 0$ solution is consistent
Thus $x = 0, -2$ are the solutions
Alternatively, we can put values from the options and check

13. (c) $\log(108)^{10} = 10\log 108 = 10\log(2^2 \times 3^3) = 10(2\log 2 + 3\log 3)$
$= 10(2 \times 0.301 + 3 \times 0.477) = 10(.602 + 1.431)$
$= 10 \times 2.033 = 20.33$
integral part = 20
No. of digits = 20 + 1 = 21

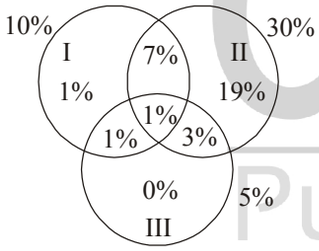
14. (d) Let the three prime numbers be $x, y, y+36$
$x + y + y + 36 = 100 \Rightarrow x + 2y = 64$
$2y$ is an even number always
We know that
Even + even = even or odd + odd = even
So x has to be even to satisfy $x + 2y = 64$
The only even prime on is 2
Put $x = 2 \Rightarrow 2y = 62 \Rightarrow$ Or $y = 31$
So the numbers are 2, 31, 67

15. (b) $$\frac{16}{23} = \frac{1}{\frac{23}{16}} = \frac{1}{1+\frac{7}{16}} = \frac{1}{1+\left(\frac{1}{\frac{16}{7}}\right)} = \frac{1}{1+\frac{1}{2+\left(\frac{2}{7}\right)}}$$

$$= \frac{1}{1+\left(\frac{1}{2+\left(\frac{1}{\frac{7}{2}}\right)}\right)} = \frac{1}{1+\left(\frac{1}{2+\left(\frac{1}{3+\frac{1}{2}}\right)}\right)}$$

On comparing equations we get a = 1, b = 2 and c = 3
Mean = a + b + c/3 = 6/3 = 2

16. (a)



The number of people who read only 1, only II and only II are
1% + 19% + 0% = 20% of total population = 20/100 × 100000 = 20000

17. (a) As we can see from the above venn diagram the number of people who read two or more newspapers are 1% + 1% + 3% + 7% = 12% = 12/100 × 100000 = 12000

18. (d) Number of people who do not read any of these newspaper = total population – number of people who read atleast one of these newspapers.
number of people who read atleast one of these newspapers = 1% + 1% + 3% + 1% + 7% + 19% = 32% of total population = 32000
required number of people = 100000 – 32000 = 68000

19. (c)

	Repitition values of unit digits according to their power								
Power	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
1	1	2	3	4	5	6	7	8	9
2	1	4	9	6	5	6	9	4	1
3	1	8	7	4	5	6	3	2	9
4	1	6	1	6	5	6	1	6	1

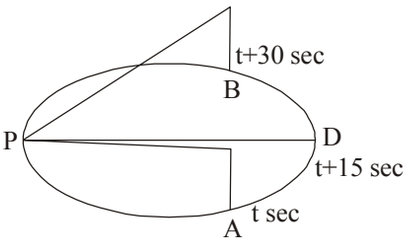
From the above table we can see that the power 73 is of the form 4x + 1
Therefore the unit digit in $7^{73} = 7$

20. (c) $(n^2 + 48) = x^2$
$48 = x^2 - n^2$
$48 = (x-n)(x+n)$
So the possible number of pairs of $(x-n)$ and $(x+n)$ are (1,48), (2,24), (3,16), (4,12), (6,8)
On solving the above pairs for $(x-n)$ and $(x+n)$, we get the integer values of n and x as
$n = 1, x = 7$
$n = 4, x = 8$
$n = 11, x = 13$
So, the total possible values of n are 3.

21. (d) $$x = \frac{4\sqrt{6}}{\sqrt{2}+\sqrt{3}}$$
on rationalizing.
$$x = \frac{4\sqrt{6}}{\sqrt{3}+\sqrt{2}} \times \frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}-\sqrt{2}}$$
$$x = 12\sqrt{2} - 8\sqrt{3}$$
putting the value of x in the equation
$$\frac{14\sqrt{2}-8\sqrt{3}}{10\sqrt{2}-8\sqrt{3}} + \frac{12\sqrt{2}-6\sqrt{3}}{12\sqrt{2}-10\sqrt{3}}$$
$$= \frac{7\sqrt{2}-4\sqrt{3}}{5\sqrt{2}-4\sqrt{3}} + \frac{6\sqrt{2}-3\sqrt{3}}{6\sqrt{2}-5\sqrt{3}}$$
$$\frac{2\sqrt{2}}{5\sqrt{2}-4\sqrt{3}} + 1 + 1 + \frac{2\sqrt{3}}{6\sqrt{2}-5\sqrt{3}}$$
$$2 + \frac{2\sqrt{2}(6\sqrt{2}-5\sqrt{3}) + 2\sqrt{3}(5\sqrt{2}-4\sqrt{3})}{(5\sqrt{2}-4\sqrt{3})(6\sqrt{2}-5\sqrt{3})}$$
$$2 + \frac{24 - 10\sqrt{6} + 10\sqrt{6} - 24}{(5\sqrt{2}-4\sqrt{3})(6\sqrt{2}-5\sqrt{3})} = 2 + 0 = 2$$

22. (d) $x = 30\%$ of $z = 30z/100 = 3z/10$
$y = 40\%$ of $z = 40z/100 = 4z/10$
According to the question,
$$x = p\% \times y \Rightarrow p = \frac{x}{y} \times 100 = \frac{\frac{3z}{10}}{\frac{4z}{100}} \times 100 = \frac{3z}{4z} \times 100$$
$$= \frac{3}{4} \times 100 = 75\%$$

23. (c)



Let the plane be at point A at t seconds and at point B after t + 30 seconds

Since the motion is uniform, we can say that at time t + 15 seconds, the plane is above the point is diametrically opposite to the point P from where the angle is same.
Now since the time taken to cover the full circle is 3 minutes (180 seconds), the time taken by the plane to reach the diametrically opposite point will be 90 seconds.
So the time after which the plane reaches the point P will be = t + 15 + 90 seconds = (t + 105) seconds

24. (d) All the given statements are true. The following are the examples for all the statements
Statement 1: Both p and q may be prime numbers.
Ex – 7 and 11
Statement 2: Both p and q may be composite numbers.
Ex – 8 and 12
Statement 3: One of p and q may be prime and the other composite.
Ex. 13 and 16

25. (a) By alligation,

girls		**boys**
24		32
	30	
2	:	6
1	:	3

So the number of girls will be $= \frac{1}{4} \times 100 = 25$

26. (c) For the equation, $\sqrt{(a-b)}2 + \sqrt{(b-a)}2$
Where a and b are real numbers,
The roots of any square number is always positive and hence it can be zero only at $a = b$
So the above equation is positive only when $a \neq b$

27. (c) $\frac{a}{b} = \frac{c}{d} = \frac{1}{6}$
$a = c = 1$
$b = d = 6$
$\frac{a^2 + c^2}{b^2 + d^2} = \frac{1+1}{36+36} = \frac{2}{72} = \frac{1}{36}$

28. (a) $.\overline{53} + 0.5\overline{3}$
$= 0.5353535353....+0.5333333333$
$= 1.068686868 = 1.0\overline{68}$

29. (d) $3^N > N^3$ holds for all the natural numbers except N = 3 at which $3^N = N^3 \Rightarrow 3^3 = 3^3$

30. (d) A number that cannot be represented in the form p/q where p and q are two integers, is known as lrrational number $\sqrt{59049} = 243$. Hence it is rational
231593 is already in the form of rational number
0.4545454545..... can be represented in the form of p/q as 5/9
0.121122111222111122222.....cannot be represented in the form of p/q.
So that is an irrational number.

31. (b) Average speed = Total Distance / Total time
$$= \frac{9\frac{50}{60} + 8\frac{80}{60} + 7.5\frac{100}{60}}{\frac{50}{60} + \frac{80}{60} + \frac{100}{60}}$$
$= (45 + 64 + 75) / 23 = 184/23$
$= 8$ kmph

32. (c) $a/(b+c) = b/(c+a) = c/(a+b)$
Taking reciprocal and adding 1 to each ratio we get;
$(b+c)/a + 1 = b/(c+a) + 1 = c/(a+b) + 1$
or $(a+b+c)/a = (a+b+c)/b = (a+b+c)/c$
So this can only be equal when $a = b = c$ or $a + b + c = 0$
When $a = b = c$ we get $a/(b+c) = ½$
When $a + b + c = 0$ we get $b + c = -a$
So $a/(b+c) = -1$
So the ratios are ½ or – 1

33. (b) $3^{521} = 3^{130 \times 4 + 1}$
As we know $3^1 = 3$ will leave remainder = 3 when divided by 8

34. (d) For prime no units place cannot be occupied by even number except for 2
Thus no of digits occupying unit digit of prime numbers = 6 (1, 2, 3, 5, 7, 9)

35. (d) Let C.P be ₹100x
$\therefore 106x - 94x = 6$
$\Rightarrow 12x = 6$
$x = \frac{1}{2}$
$\therefore 100x = 100 \times \frac{1}{2} = ₹50$

36. (c) 12 men = 18 women
$\therefore$ 1men = 18/12 = 1.5 women
8 men + 16 women = 12 women + 16 women = 28 women
18 women completes in 14 days
1 woman completes in 14 × 18 days
28 women completes in (14 × 18)/28 days = 9 days

37. (c) $3^x = 4^y = 12^z$
Taking log of all 3 we get
$x \log 3 = y \log 4 = z \log 12 = k$
$z = \frac{k}{log12} = \frac{k}{log(3\times4)}$
$= \frac{k}{log3 + log\ 4} = \frac{k}{\frac{k}{x} + \frac{k}{y}} = \frac{xy}{(x+y)}$

38. (a) $(4a + 7b)(4c - 7d) = (4a - 7b)(4c + 7d)$
$(4a + 7b)/(4a - 7b) = (4c + 7d)/(4c - 7d)$
Using componendo and dividendo
$\{(4a + 7b) + (4a - 7b)\} / \{(4a + 7b) - (4a - 7b)\}$
$= \{(4c + 7d) + (4c - 7d)\} / \{(4c + 7d) - (4c - 7d)\}$
$8a / 14b = 8c / 14d$
$a/b = c/d$

39. (d) Since $x^2 + ax + b$ when divided by $x - 1$ or $x + 1$ leaves the same remainder
So on putting $x = 1$ and $x = -1$ we get the same value
$1 + a + b = 1 - a + b$
$2a = 0$
$a = 0$
Hence b can take any integer value

40. (d) Let both of then take x hours working together
$1/x = 1/10 + 1/6 = 8/30$
$x = 30/8$ hours = 3 hours 45 minutes

41. (d) $2 + \sqrt{2 + \sqrt{2 + \sqrt{2 + ...}}} = x$
$\Rightarrow \sqrt{2 + \sqrt{2 + \sqrt{2 + ...}}} = x - 2$

Squaring both side

$2+\sqrt{2+\sqrt{2+\sqrt{2+}}}\ldots=(x-2)^2$

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

$\Rightarrow x^2-5x+4=0$

$\Rightarrow x^2-4x-x+4=0$

$\Rightarrow x(x-4)-1(x+4)=0$

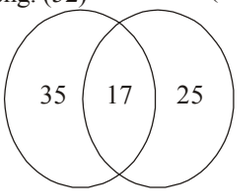
$\Rightarrow (x-1)(x-4)=0$

$\therefore x=1,4$

As x always take greater than 2

$\therefore x=4$

42. (d) eng. (52) maths. (52)



venn diagram of no. of failed students

No. of students failed in English only = 52 – 17 = 35

No. of students failed in maths only = 42 – 17 = 25

Total no. of failed students in either of the subjects = 35 + 17 + 25 = 77

No. of passed student in both subjects = 100 – 77 = 23

43. (c) Let his wife get a share of ₹ x

Each of the 4 daughters get = ₹ $2x$

Each of the 5 sons get share = ₹ $6x$

So $x+4\times 2x+5\times 6x=390000$

So $39x=390000$

$x=10000$

$\therefore$ wifes share = ₹10000

44. (b) $A=P(1+R/100)\text{^}t$

$3P<P(1+40/100)\text{^}t$

$3<(1.4)\text{^}t$

When $t=3$; 1.4^3 = 2.744

And when $t=4$; 1.4^4 = 3.8416

T = 4

45. (b) Let sum invested 5% be P1, 6% be P2 then 9% = 17200 (P1 + P2)

So according to question

$P1\times 5\times 2/100=P2\times 6\times 2/100$ or $P1=(6/5)P2$

Also $P2\times 6\times 2/100=[17200-(P1+P2)]\times 9\times 2/100$

or $2P2=[17200-(11/5)P2]\times 3$

or $(2+33/5)P2=17200\times 3$

$P2=17200\times 3\times 5/43=6000$

So $P1=6/5\ P2=7200$

So Sum invested at 9% = 17200 – (6000 + 7200) = ₹4000

46. (a) We know that when $a+b+c=0$, then

$a^3+b^3+c^3=3abc$

In the above question,

$(x-y)+(y-z)+(z-x)=0$

Therefore,

$(x-y)^3+(y-z)^3+(z-x)^3=3(x-y)(y-z)(z-x)$

$$\frac{(x-y)^3+(y-z)^3+(z-x)^3}{3(x-y)(y-z)(z-x)}$$

$$=\frac{3(x-y)(y-z)(z-x)}{3(x-y)(y-z)(z-x)}=1$$

47. (c) $a^x=b^y=c^z=k$

$a=k^{1/x}$

$b=k^{1/y}$

$c=k^{1/z}$

given $b^2=ac$, putting the above values of a, b, c in the equation we get

$k^{2/y}=k^{1/x}\times k^{1/z}$

$2/y=1/x+1/z$

48. (b) Given equation

$x^2-15x+r=0$

Sum of roots = 15

$p+q=15$ ...(i)

and $p-q=1$ ...(ii)

From equation (i) and (ii) we have

$p=8, q=7$

Now, $p^2-15p+r=0$

$(8)^2-15(8)+r=0$

$\therefore r=56$

49. (d) Root of the equation

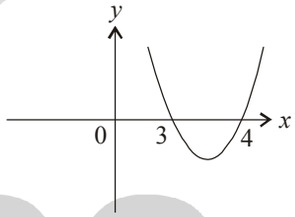
$x^2-7x+12=0$

$(x-3)(x-4)=0$

$\therefore x=3$ and 4

For, $x^2-7x+12>0$

$x=(-\infty,3)\cup(4,\infty)$.



As we can see from the graph of the quadratic equation, that the value of the equation is greater than zero for the values of $x<3$ and $x>4$

50. (c) Given expression

$5^{2n}-2^{3n}=(5^2)^n-(2^3)^n=(25)^n-(8)^n$

We know that a^n-b^n always have a common factor $(a-b)$

Therefore one of the factor is 25 – 8 = 17

51. (b) $\tan x=1=\tan 45^\circ$

$\therefore x=45^\circ$

$2\sin x.\cos x=2\sin(45^\circ).\cos(45^\circ)$

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

52. (c) From $\sin(90-\theta)=\cos\theta$

$\sin 46^\circ.\cos 44^\circ+\cos 46^\circ.\sin 44^\circ$

$\Rightarrow \sin 46^\circ.\sin(90-44)^\circ+\cos 46^\circ.\cos(90-44)^\circ$

$=\sin^2 46^\circ+\cos^2 46^\circ=1$

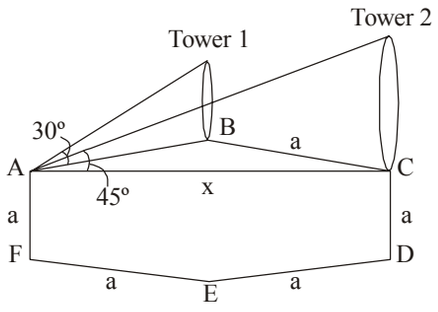
53. (b) Let $4\sin^2\theta+1\geq 4\sin\theta$

$4\sin^2\theta-4\sin\theta+1\geq 0$

$(2\sin\theta-1)^2\geq 0$

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

54. (b)



Let the side of regular hexagon be 'a'

Let height of the tower 1 be h_1 and tower 2 be h_2
Height of tower 1= h1 = (distance between A and B)*

$(\tan 30^\circ) = a.\frac{1}{\sqrt{3}}$

Distance between A and C $= \frac{2\sqrt{3}a}{2} = \sqrt{3}a$

Height of tower 2 = h2 = (distance between A and C)*

$(\tan 45^\circ) = \sqrt{3}a.1 = \sqrt{3}a$

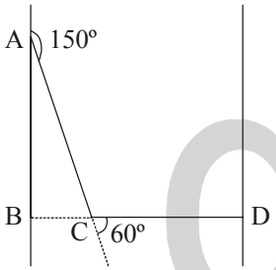
Ratio of height of towers at B and C respectively

$= \frac{\frac{a}{\sqrt{3}}}{\sqrt{3}a} = \frac{1}{3}$

55. (b) $\tan 1^\circ.\tan 2^\circ.\tan 3^\circ....\tan 87^\circ.\tan 88^\circ, \tan 89^\circ$
$\tan 1^\circ.\tan 2^\circ.\tan 3^\circ....\tan(90^\circ - 3^\circ).\tan(90^\circ - 2^\circ).\tan(90^\circ - 1^\circ)$
$\tan 1^\circ.\tan 2^\circ.\tan 3^\circ .... \cot 3^\circ.\cot 1^\circ$

$\tan 1^\circ.\tan 2^\circ.\tan 3^\circ..... \frac{1}{\tan 3^\circ}.\frac{1}{\tan 2^\circ}.\frac{1}{\tan 1^\circ} = 1$

56. (c)



Initially person is travelling from street BA and at point A took 150° turn toward his right and after 15 min. reached at point C.

So, distance $AC = \frac{15}{60} \times 20 = 5\text{km}$

From point C person took 60° turn to word his left and after walking for 20 min. reached at point D.

$\therefore\ CD = \frac{20}{60} \times 30 = 10\text{km}$

From, $\Delta ABC, BC = AC.\cos 60^\circ$

$= 5 \times \frac{1}{2} = 2.5\text{km}$

Distance between two road = 10 + 2.5
= 12.5 km.

57. (a) From question, we have
$3\tan\theta = \cot\theta$
$3\tan\theta = 1/\tan\theta$
$\tan^2\theta = 1/3$
$\tan\theta = 1\sqrt{3}$
$\theta = \pi/6$

58. (b) $\sin^2 25^\circ + \sin^2 65^\circ = \sin^2 25^\circ + \sin^2(90-25)^\circ = \sin^2 25^\circ + \cos^2 25^\circ = 1$

59. (a) $\sin^6\theta + \cos^6\theta + 3\sin^2\theta, \cos^2\theta - 1$
$(\sin^2\theta)^3 + (\cos^2\theta)^3 + 3\sin^2\theta.\cos^2\theta - 1$
$(\sin^2\theta + \cos^2\theta)^3 - 1$
$1 - 1 = 0$

60. (c) 1. As, $\sec\propto = (-\infty, -1] \cup [1, \infty)$
$\therefore \sec\propto \neq \pm\frac{1}{4}$
2. $\tan\beta = (-\infty, \infty)\ \tan\beta = 20$
3. As, $\text{cosec}\propto = (-\infty, -1] \cup [1, \infty)$
$\therefore \text{cosec}\propto \neq \pm\frac{1}{2}$
4. As $\cos\delta = [-1, 1]$
$\therefore$ cas $\delta \neq \pm 2$.

61. (c) Mean = (sum of ∞) / (sum of f) = (5*5 + 12*15 + 10*25 + p*35 + 9*45) / (8 + 12 + 10 + P + 9) = 25.2 (875 + 35P) / (39 + P) = 25.2 $\Rightarrow$ P = 11

62. (c) Summation of frequencies = 6 + 4 + 5 + 8 + 9 + 6 + 4 = 42
Median = mid value = average of 21st and 22nd value
Arranging data in increasing order we get

x	*f*
4	6
5	4
6	5
7	4
8	6
9	9
10	8

So mid value i.e 21st and 22nd value = 8

63. (b) Sum of n consecutive natural numbers = n (n + 1)/2
Average of n consecutive natural numbers = (n + 1)/2
For first 50 average = 51/2 = *x*
When next 4 natural numbers are included.

Then, average of 54 continuons natural number $= \frac{55}{2}$

$= \frac{51}{2} + \frac{4}{2} = \boxed{x+2}$

64. (c) All such 2 digt numbers whose digits are same, 11, 22, 33, 44 .... upto 99

Average = sum/9 = $\frac{(11 + 22 + 33 + ... + 99)}{9} = 55$

65. (d) All three are types of data representation
Pictogram uses pictures so show different identities with different numbers

66. (d) Primary data is information that you collect specifically for the **purpose** of your research project. An advantage of primary data is that it is specifically tailored to your research needs. A disadvantage is that it is expensive to obtain.

67. (b) 15 cm corresponds to ₹6000
Education = 480/6000 * 15 cm = 1.2 cm
Miscellaneous = 1660/6000 * 15cm = 4.15 cm

68. (a) Mean of *m* observations out of *n* observation is *n*
$\therefore$ Sum of *m* observation = *m.n*
Number of remaining observation = $(n - m)$
Mean of remaining observation = *m*
$\therefore$ Sum of remaining observation $= (n-m).m$
$= mn - m^2$

Sum of all *n* observations
$= mn + mn - m^2 = 2mn - m^2$
$\therefore$ Mean of all *n* observation

$= \frac{2mn - m^2}{n} = 2m - \frac{m^2}{n}$

69. (a) Median can be traced using frequency polygon curve. It has a graphical location on the curve. Ogive is a graph showing a situation such as the number of hour students study. It is a cumulative frequency curve. Data values are shown on the x-axis while cumulative frequency are shown on y-axis. Thus, Ogive does not show mean or mode. Hence option (a) is correct.

70 (d) Area of the polygon gives sum of $f_i x_i$ not sum of frequency distribution (f_i).

71. (c) Let length and breadth of the rectangle are l and b; According to the question $l = 3b$.

then, perimeter $P = 2(l + b) = 2(3b + b) = 8b$

Changed length $l' = l + \frac{30l}{100} = 1.3l = 3.9b$

breadth $b' = b + \frac{10b}{100} = 1.1b$

New perimeter $P' = 2(l' + b')$

$= 2(3.9b + 1.1b) = 10b$

Percent increase in perimeter

$= \left(\frac{P' - P}{P}\right) \times 100 = \left(\frac{10b - 8b}{8b}\right) \times 100 = 25\%$

72. (a) Let ΔABC is a equilateral triangle with side l.

Then, Area (A) $= \frac{\sqrt{3}}{4}(l)^2$

When, $l' = \frac{l}{2}$

Then area $(A') = \frac{\sqrt{3}}{4}(l')^2 = \frac{\sqrt{3}}{4}\left(\frac{l}{2}\right)^2$

Percent decrease in area $= \left(\frac{A - A'}{A}\right) \times 100$

$= \left\{\frac{\frac{\sqrt{3}}{4}l^2 - \frac{\sqrt{3}}{4}\left(\frac{l}{2}\right)^2}{\frac{\sqrt{3}}{4}l^2}\right\} \times 100$

$= \left(1 - \frac{1}{4}\right) \times 100 = 75\%$

73. (a) Let radius of the sphere is r then, volume $V = \frac{4}{3}\pi r^3$

When, volume increases by 700%

New volume $V' = V + \frac{700}{100} \times V = 8V$

Let changed radius is r'.

$\therefore \; V' = \frac{4}{3}\pi(r')^3$

$8V = \frac{4}{3}\pi(r')^3$

$\therefore 8\left(\frac{4}{3}\pi r^3\right) = \frac{4}{3}\pi(r')^3$

or $r' = (8r^3)^{\frac{1}{3}} = 2r$

Percent change in surface area $= \left(\frac{S' - S}{S}\right) \times 100$

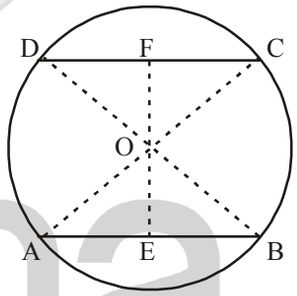
$= \frac{4\pi\{(r')^2 - r^2\}}{4\pi r^2} \times 100$

$= \left(\frac{(r')^2 - r^2}{r^2}\right) \times 100 = \left(\frac{(2r)^2 - r^2}{r^2}\right) \times 100$

$= 300\%$

74. (b) **Case-I :** When chords are on opposite site of Center

Let AB and CD are two parallel chords of length 16 cm and 12 cm



OE and OF are $\perp$ on chord AB and CD from center 'O'.

Then $AE = EB = \frac{AB}{2} = 8\text{cm}$

and $CF = DF = \frac{CD}{2} = 6\text{cm}$

$OB = OC =$ radius of the circle $= 10$ cm

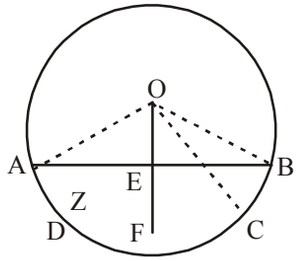
From $\Delta BOE, OE = \sqrt{(OB)^2 - (BE)^2} = \sqrt{(10)^2 - (8)^2} = 6$

$OF = \sqrt{(OC)^2 - (CF)^2} = \sqrt{(10)^2 - (6)^2} = 8$

Distance between two parallel chord

$EF = OE + OF = 6 + 8 = 14$ cm.

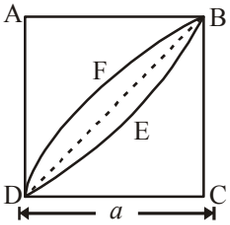
Case-II : When two chord are on same side of center.



Based on calculation in case I.

Distance between two chords $EF = OF - OE = 8 - 6 = 2$ cm.

75. (c) Let arc BED of a circle with center A and arc BFD is of a circle of centre C.

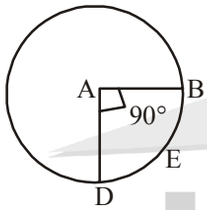


Side length of the square $CD = a$

BD is a diagonal of square $ABCD$ of side length $= a$.

Then, Area of $\Delta ABD = \frac{1}{2} \times a \times a = \frac{a^2}{2}$

Now, Area of sector $ABED = \frac{\pi}{4} \times (AB)^2 = \frac{\pi}{4}(a)^2$

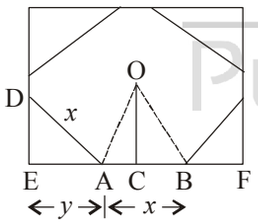


Area of BDEB $= \frac{\pi}{4}a^2 - \frac{a^2}{2} = \frac{(\pi - 2)a^2}{4}$

$\therefore$ Area of $BEDFB = 2 \times \frac{(\pi - 2)a^2}{4} = a^2\left(\frac{\pi}{2} - 1\right)$

76. (a) Let side of octagon $= x$ cm.

For regular octagon, each internal angle



$= \frac{2(8-2) \times 90°}{8} = \frac{6 \times 90°}{4} = 135°$

$\therefore \angle BAD = 135°$

then, $\angle DAE = 45°$

In ΔAED, $AE = DE$

$\therefore x^2 = (AE)^2 + (DE)^2 \Rightarrow AE = \frac{x}{\sqrt{2}}$

$\Rightarrow y = \frac{x}{\sqrt{2}}$

By symmetry $AE = BF = y$

Now, $EA + AB + BF = a$ (Side of square)

$y + x + y = a$

$2y + x = a$

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

$(\sqrt{2} + 1)x = a$

$x = \frac{a}{(\sqrt{2}+1)} = a(\sqrt{2} - 1)$

77. (a) Let three consecutive integers are n, $(n+1)$ and $(n+2)$.

Then, from pythagorus rule,

$(n+2)^2 = (n)^2 + (n+1)^2$

$n^2 + 4n + 4 = 2n^2 + 2n + 1$

$(n^2 - 2n + 1) = 4$

$(n-1)^2 = 4$

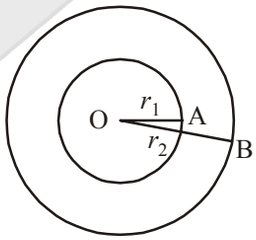
$(n-1) = \pm 2$

$\therefore n = 3$ or -1. (But negative value is not valid)

$\therefore n = 3, (n+1) = 4, (n+2) = 5$.

Hence, set of integer $= (3, 4, 5)$

78. (c) Let radius of smaller and bigger circles are r_1 and r_2 cm



Perimeter of bigger circle $= 2 \times 44 = 88$ cm

Now, $44 = 2 \times \frac{22}{7} \times r_1 \Rightarrow r_1 = 7$ cm

$88 = 2 \times \frac{22}{7} \times r_2 \Rightarrow r_2 = 14$ cm

Area between two circle $= \pi\left(r_2^2 - r_1^2\right)$

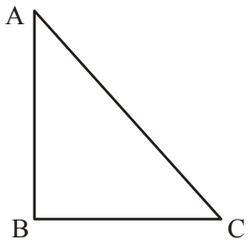
$= \frac{22}{7}(14^2 - 7^2) = 462$ sq.cm

79. (c) Width of border $= 6$ inches $= \frac{6}{12}$ feets $= 0.5$ feet

Area of border $= 2(12 \times 0.5) + (6-1) \times 0.5 \times 2$

$= 12 + 5 = 17$ square feet.

80. (c) Let BC is shortest side in right angle triangle ΔABC, such that $AB : AC = 4 : 5$.



$\therefore$ BC $= \sqrt{(AC)^2 - (AB)^2}$

$= \sqrt{(5x)^2 - (4x)^2} = 3x$

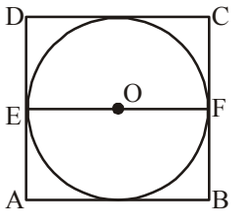
Perimeter $= AB + BC + AC = 4x + 3x + 5x = 12x$

According to the question

$12x = k(3x)$

$\therefore k = \frac{12x}{3x} = 4$

81. (b) Let $ABCD$ is a square that inclose a circle with center 'O'.
Diameter of the circle (EF)
= Side of the square (AB) = a (let)



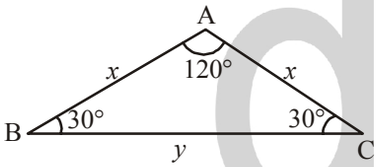
According to the question,
Perimeter of square + perimeter of circle = 12 m
$4 \times a + \pi.a = 12$
$\Rightarrow (4+\pi)\,.\,a = 12$

$$a = \frac{12}{(4+\pi)}$$

$$\text{Radius of the circle} = \frac{a}{2} = \frac{6}{(4+\pi)}$$

82. (a) We know that, sum of angles of any triangle = 180°
$x + x + 4x = 180°$

$$x = \frac{180°}{6} = 30°.$$



So, angle of triangles are 30°, 30°, 120°.
Let side of the triangles ABC are x, x and y
From cosine formula,

$$\cos(120°) = \frac{AB^2 + AC^2 - BC^2}{2.AB.AC} = \frac{x^2 + x^2 - y^2}{2.x.x}$$

$$\frac{-1}{2} = \frac{2x^2 - y^2}{2x^2} \Rightarrow y^2 = 3x^2$$

$$y = \sqrt{3}x$$

Perimeter of the triangle = $(x + x + y) = k(y)$ (given)

$$\left(\frac{2}{\sqrt{3}}y + y\right) = K.y.$$

$$\therefore K = 1 + \frac{2}{\sqrt{3}}$$

83. (c) Let shorter and longer side of right angle triangle are x and y cm respectively.

Then, $x^2 + y^2 = (10)^2 \Rightarrow x^2 + y^2 = 100$ ...(i)

and Area $= \frac{1}{2}xy = 24 \Rightarrow x = \frac{48}{y}$

Plug. in $x = \frac{48}{y}$ into equation (i), we get

$$\left(\frac{48}{y}\right)^2 + y^2 = 100$$

$(48)^2 + y^4 = 100\,y^2$
$y^4 - 100y^2 + (48)^2 = 0$
On solving, we get $y = 6$ or 8
$\therefore x = 6, y = 8$
when, x becomes half and y becomes double then,
$x' = 3, y' = 16$

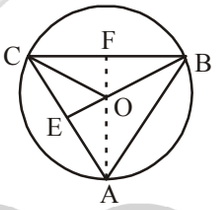
Hypotenuse $= \sqrt{(x)^2 + (y')^2}$

$$= \sqrt{3^2 + (16)^2} = \sqrt{265}\ \text{cm}$$

84. (d) OB = OC = 8 cm radius

From ΔAOE, $OA = AE = \frac{12}{2} = 6$ cm

$$OE = \sqrt{(OA)^2 - (AE)^2} = \sqrt{(8)^2 - (6)^2} = \sqrt{28}\,\text{cm}$$

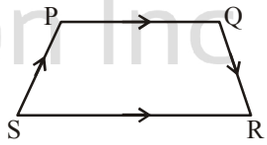


Now, $\Delta AEO \sim \Delta AFC$,

$$\therefore \frac{AO}{AC} = \frac{OE}{CF} \Rightarrow CF = \frac{OE \times AC}{AO} = \frac{\sqrt{28} \times 12}{8}$$

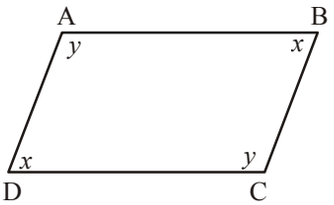
$= 3\sqrt{7}$ cm
$\therefore BC = 2 \times CF = 6\sqrt{7}$ cm

85. (c) I. Let $PQRS$ is a trapezium,



So $\angle R = \angle S = x$ (let)
$\therefore \angle P = 180° - \angle S = 180° - x$ $\{\because PQ \| RS\}$
$\angle Q = 180° - x$
$\therefore \angle P + \angle R = 180° - x + x = 180°$
Thus, $PQRS$ is cyclic.

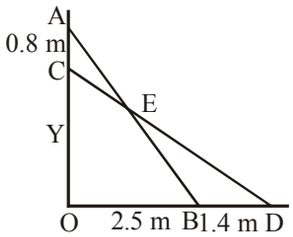
II. $ABCD$ is cyclic parallelogram with $AB \| CD$ and $AD \| BC$.



Considering angles
$A = C = y$ (Property of parallelogram) and
$B = D = x$
Also since it is cyclic

$A + C = B + D = 180$ degrees
So $x = y = 90$ degrees
And also opposite sides are equal in a parallelogram
Thus $ABCD$ is a rectangle.
Hence, both statement I and II are correct.

86. (b) Let the length of the Ladder is x cm
then AB = CD = x cm.



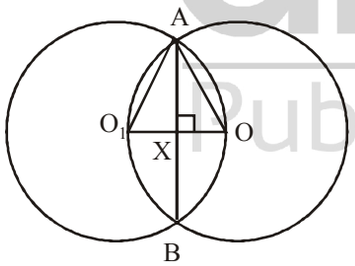
And, $OC = y$ m
From ΔOCD,
$y^2 + 3.9^2 = x^2$ ...(i)
From ΔAOB
$(y + 0.8)^2 + 2.5^2 = x^2$ ...(ii)
From (i) and (ii)
$y^2 + 3.9^2 = (y + 0.8)^2 + 2.5^2$
$\therefore y = 5.2$ m

$x = \sqrt{(5.2^2 + 3.9^2)}$

$x = 6.5$ m

87. (c) Let two circles with center O and O' intersect each other at point A and B, such that AB is a common chord.

Then $AB = 10\sqrt{3}$ cm (Given)



Since both passes through the center of each other as shown in figure
So, O_1O is the radius of both circle
Let $O_1O = r = AO_1 = AO$
$AX = AB/2 = 5\sqrt{3}$ cm
(Since OX is perpendicular to chord AB, so bisects it)
AOO_1 forms an equilateral triangle with side = radius = r

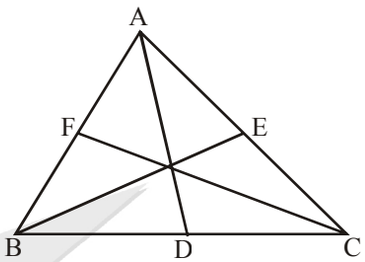
$$\sin 60 = \frac{\sqrt{3}}{2} = \frac{AX}{AO} = \frac{5\sqrt{3}}{r}$$

$\Rightarrow$ So $r = 10$ cm
$\Rightarrow$ diameter = 20 cm

88. (d) I. Number of circle that can be drawn from three non-collinear poitns is only one and if three points are collinear, then number of circle that can be drawn from these three points is zero.
II. Angle formed in a minor segment is obtuse and angle formed in major segment is always acute.
Hence, both statements are false.

89. (d) In any triangle, sum of two sides is always greater than third side.
I. $AC - AB < BC \Rightarrow AC < BC + AB$ {True}
II. $BC - AC < AB \Rightarrow BC < AB + AC$ {True}
III. $AB - BC < AC \Rightarrow AB < AC + BC$ {True}

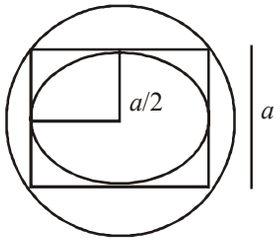
90. (c) 1. Perimeter of triangle is greater than the sum of 3 medians



Let ABC be the triangle and D, E and F are midpoints of BC, CA and AB respectively.
Recall that the sum of two sides of a traingle is greater than twice the median bisecting the third side, (Theorem)
Hence in ΔABD, AD is a median
$\Rightarrow AB + AC > 2(AD)$
Similarly, we get
$BC + AC > 2CF$
$BC + AB > 2BE$
On adding the above inequations, we get
$(AB + AC) + (BC + AC) + (BC + AB) > 2AD + 2CD + BE$
$2(AB + BC + AC) > 2(AD + BE + CF)$
$\therefore AB + BC + AC > AD + BE + CF$

2. In triangle ABD, $AB + BD > AD$ [because, the sum of any two sides of a triangle is always greater than the third side] ...(1)
Similarly,
In triangle ADC, $AC + DC > AD$ ...(2)
Adding 1 and 2 we get,
$AB + BD + AC + DC > AD + AD$
$\Rightarrow AB + (BD + DC) + AC > 2AD$
$\Rightarrow AB + BC + AC > 2AD$
Hence, both statements 1 and 2 are true.

Sol. (91-93):
The top view of the given assembly will look like the figure.



Outermost is the sphere. Inside that there is a cube and within that there is a cone and cylinder with same radius.
Here side of cube = a

Diameter of sphere = Diagonal of the cube = $\sqrt{3}\,a$

Radius of sphere $= \frac{\sqrt{3}a}{2} = r1$ (let)

Height of Cylinder = Height of cone
= side of cube = $a = h$

Radius of cylinder = Radius of cone

$= \text{side of cube}/2 = \frac{a}{2} = r_2$ (let).

91. (a) Required ratio

$$= \frac{\text{Volume of sphere}}{\text{Volume of cone}} = \frac{\frac{4}{3}\pi(r_1)^3}{\frac{1}{3}\pi(r_2)^2 \times h} = \frac{6\sqrt{3}}{1}$$

92. (c) Required ratio $= \frac{\text{Volume of cube}}{\text{Volume of cylinder}} = \frac{a^3}{\pi(r_2)^2 h}$

$$= \frac{a^3}{\pi\left(\frac{a^2}{4}\right)a} = \frac{14}{11}$$

93. (d) Surface area of the sphere $= 4\pi(r_1)^2$

$$= 4\pi\left(\frac{\sqrt{3}a}{2}\right)^2 = 3\pi a^2.$$

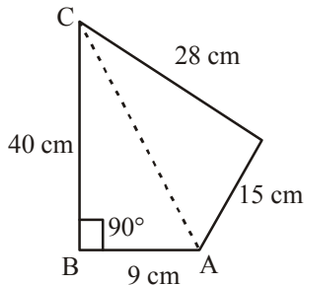
Curved surface area of cone

$$= \pi r_2 .l = \pi.r_2(h^2 + r_2^2)^{\frac{1}{2}}$$

$$= \sqrt{5}\pi\frac{a^2}{4}$$

Surface area of cube $= 6a^2$
Curved surface area of the cylinder $= 2\pi r_2.h = \pi.a^2$
Hence, neither statement 1 nor 2 are true.

Sol. (94-96):



In right triangle ABC,

$AC = \sqrt{(AB)^2 + (BC)^2} = \sqrt{(40)^2 + (9)^2} = 41$ cm

94. (a) In ΔACD, $AC = 41$ cm, $AD = 15$ cm, $CD = 28$ cm

Area of $\Delta ACD = \sqrt{S(S-a)(S-b)(S-c)}$

Where $S = \frac{a+b+c}{2} = \frac{15+28+41}{2} = 42$ cm

$\therefore$ Area of $\Delta ACD = \sqrt{42(42-41)(42-28)(42-15)}$

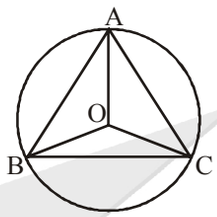
$= \sqrt{42 \times 1 \times 14 \times 27} = 2 \times 3 \times 3 \times 7$
$= 126$ cm^2.

95. (b) Area of $\Delta ABC = \frac{1}{2} \times 9 \times 40 = 180$ cm^2

$\therefore$ Area of quadrilateral $ABCD$
$= 126 + 180 = 306$ cm^2

96. (c) Difference = Perimeter of ΔABC – Perimeter of ΔADC
$= (40 + 9 + 41) - (28 + 15 + 41) = 6$ cm

97. (d)



Here, radius $OA = OB = OC = r = 20\sqrt{3}$ cm

We know that, side of equilateral triangle

$= \sqrt{3} \times$ radius of circumcircle

$= \sqrt{3} \times 20\sqrt{3} = 60$ cm

98. (c) For equilateral triangle circumcenter and centroid are the same points.

So distance from vertex = radius of circumcircle $= 20\sqrt{3}$

Sol. (99-100):

99. (a) Let lengths, breadth and height of cuboid be l, b and h respectively

According to question

$$l + b + h = 22 \text{ cm} \quad \text{...(i)}$$

and $\sqrt{l^2 + b^2 + h^2} = 14$ ...(ii)

Surface area of cuboid $= 2(lb + bh + lh)$
Squaring eq. (i) gives
$l^2 + b^2 + h^2 + 2(lb + bh + lh) = 484$
Substituting $l^2 + b^2 + h^2$ from eq (i)
$2(lb + bh + lh) = 484 - 196 = 288$ cm^2

100. (c) $S = l^3 + b^3 + h^3$
and $V = lbh$
Now, $S - 3V = l^3 + b^3 + h^3 - 3lbh$
$= (l + b + h)(l^2 + b^2 + h^2 - (lb + bh + lh))$
$= 22(196 - 144) = 1144$ cm^2

ENGLISH

1. (a) 'Respond' is the correct option contextually. Other options do not fit grammatically or contextually.
2. (d) 'Carries' is the most suitable option to be used before 'fewer risks'.
3. (b) 'reduce' is the most appropriate word. The word 'deduce' means arrive at (a fact or conclusion) by reasoning; drawing a logical conclusion.
4. (b) The phrase 'called off' means to cancel or suspend. Hence, option (b) is the correct option.
5. (c) 'turned out' means prove to be the case; it emerged.
6. (c) 'getting on' means perform or make progress in a specified way; managing.

Other options do not fit correctly in this context. Hence, option 'c' is the right answer.

7. (b) in a preposition is generally used to show bigger places as compared to (at, on) in the given question 'tower block' is a bigger place/area than 'apartment' and hence, option 'b' is the right option.
8. (a) Put off means delaying or stop doing something,
Turned off means to leave one road/path to join another.
Turned away means to refuse admittance or acceptance.
in the given question put off is the most suitable option.
9. (d) 'Although' is the correct option as it is used to show a contrary situation.
10. (b) 'Getaway with' means to escape blame, punishment or undesirable consequences for (an act that is wrong or mistaken)
Other options do not fit correctly in the given context.
11. (b) Provocative means causing anger or another strong reaction among others; inflammatory. Hence option (b) is the right answer.
12. (c) Precipitation means rain, snow, or hail that falls to the ground. Option (a) and (b) get eliminated as these are not form of precipitation. Option (d) is also not correct as snowfall happens at cold places but precipitation at several places indicates rainfall. Hence, the option (c) is the right answer.
13. (a) Anonymously means the way that does not disclose an individual's personal information. Incognito means to hide one's identity. Hence both these words are similar in meanings.
14. (d) Terminal means (of disease) predicted to lead to death; incurable.
Chronic means persisting for a long time; long-standing disease.
Sublunary and terrific words are not related in the given context.
15. (a) 'reluctant' means unwilling to do something or disinclined. Hence option (a) is the right answer. Fervent and eager are nearly opposite in meaning. Unrepentant is not related to the context.
16. (c) Reprimanded means a formal expression of disapproval; admonished. Hence option (c) is the right answer. Extolled means praised; purported means appearing or stated to be true.
17. (b) asset in the given context means an advantage. Other options are not giving proper sense here.
18. (a) Hysterical means affected by or deriving from wildly uncontrolled emotion; berserk. Hence option (a) is the right answer.
19. (c) Prejudice means a preconceived opinion that is not based on reason or actual experience. Jaundiced means affected by bitterness, resentment or cynicism.
Hence, option(c) is the right answer.
20. (b) Tautology means a phrase or expression in which the same thing is said twice in different words. The word 'prolixity' is same in meaning. Hence option (b) is the right answer.
21. (c) Fanatical means filled with excessive and single-minded zeal; bigoted.
Hence, the word 'moderate' is opposite to fanatical.
22. (b) Heretic means one who does not believe in religious rules. Hence option (b) is the right answer. Other options are nearly similar in meaning to the given word.
23. (a) Lively is the opposite word to inert and other options are nearly similar in meaning to the given word.
24. (d) Misanthropic means having or showing a dislike of other people; unsociable.
On the other side philanthropic loves and helps other people; sociable. Hence (d) is the right answer.
25. (d) Profound means (of a state, quality, or emotion) very great or intense.
Hence superficial or mild is opposite in meaning to the given word.
26. (c) Legible means clear enough to be read or readable, hence illegible is just opposite to the word 'readable'. Other options are nearly similar in meaning to the word readable.
27. (d) Steadfast means resolutely or dutifully firm and unwavering; faithful.
Hence the word 'unreliable' is opposite to the given word.
28. (a) Tempestuous means characterized by strong and turbulent or conflicting emotions. Hence, the 'calm' is opposite to the given word. Other options are nearly similar in meaning to the given word.
29. (b) The word 'vital' means necessary; essential.
Hence, inessential is opposite to the word 'vital'. Other options are nearly similar in meaning to the given word.
30. (b) Wordy means using or expressed in rather too many words. Hence 'concise' is opposite to it.
31. (a) The correct sequence is RSQP
32. (c) The correct sequence is SQRP
33. (b) The correct sequence is QPSR
34. (c) The correct sequence is SQRP
35. (d) The correct sequence is QRPS
36. (a) The correct sequence is PRSQ
37. (b) The correct sequence is SQRP
38. (c) The correct sequence is QSRP
39. (a) The correct sequence is PSRQ
40. (b) The correct sequence is SPRQ
41. (c) The correct sequence is QSPR
42. (c) The correct sequence is QRPS
43. (d) The correct sequence is QSRP
44. (a) The correct sequence is PRQS
45. (c) The correct sequence is SRPQ
46. (a) The correct sequence is PQRS
47. (d) The correct sequence is PRSQ
48. (a) The correct sequence is SRQP
49. (d) The correct sequence is QSPR
50. (b) The correct sequence is QPSR
51. (c) It profited from the sale of Indian goods in foreign markets.
52. (b) The Indian textile was a light cotton
53. (b) They pressurized the government to levy heavy duties on import Indian clothes.
54. (d) The literary sources
55. (c) The industrial revolution
56. (c) Robert Mugabe
57. (c) Generation 40
58. (d) He dismissed Mr. Mnangagwa
59. (d) They did not want a Mugabe dynasty
60. (c) Because the coup would lead to international censure and sanctions.
61. (b) Because overeating is bad for health

62. (a) The rich
63. (a) To skip the heavy dinner and take a light evening meal instead.
64. (b) Two or three hours before sleeping
65. (d) has not been specified
66. (a) Because they can afford to
67. (c) Follow their religions and respect other religions
68. (d) A platform for discussion about every religion of the world.
69. (c) He pities them
70. (a) One day, all the people of the world will follow only one religion.
71. (a) 'few' is used to show nothing/negligibility. 'a few' means not a large number but the question talks about days. Hence, 'a few' should be used in the part 'a'.
72. (a) 'Apprised with' should be replaced with 'apprised of' hence, option . (a) is the right answer.
73. (c) In part 'c' the preposition 'to' should be replaced with 'of'. Hence, 'c' is not grammatically correct.
74. (b) 'met' here should be replaced with 'met with'
75. (d)
76. (a) 'hardly won' should be replaced with 'hard won'
77. (b) To make the sentence contextually meaningful 'never' should be replaced with 'did not' as 'never' means not at all.
78. (b) 'second most' should be replaced with 'the second most'
79. (a) In part 'a' 'hundred of' should be replaced with hundreds of as it not about a singular subject.
80. (c) In part 'c' the verb 'is' is used for plural subject 'beneficial effects' which is not correct usage. hence 'is' should be replaced with 'are'.
81. (c) In part 'c' the word 'trickling' is not succeeded with a correct preposition. Hence it should be replaced with 'tricking with'
82. (a) Since-specific point of time For- period of time
In part 'a'15 minutes is a period of time and hence, 'since' should be replaced with 'for'
83. (d) The sentence is grammatically correct.
84. (c) In part 'c' helping verb 'are' is used for 'each one' which is singular in number. Hence, 'are' should be replaced with 'is'.
85. (a) 'few creature' should be replaced with 'few creatures' as 'few' takes plural word after it.
86. (b) 'When' as a conjunction means 'at or during the time that' whereas 'where' is used to show the place. But the context suggests place and hence, 'when' should be replaced with 'where'.
87. (b) 'Foundational director' should be replaced with 'foundation director' as the 'foundational director' is not correct grammatically.
88. (b) 'coming in' means 'to enter' or 'to go to work' which is not correct contextually, it should be 'come out' which means coming forward or in public view
89. (d) The given sentence is grammatically correct.
90. (b) 'as opposed to' is used to show two contrary situations but in 'a' and 'c' part both conditions are similar. Hence, the use of 'as opposed to' is not correct usage.
91. (d) The preposition 'over' is used to show movement, in the given question the word 'forcing' is showing movement/direction. Hence, option . (d) is the most suitable answer.
92. (b) The war is a symbol of worry, sadness, and hence, 'painful' is the most suitable word here contextually. In this way, other options get eliminated.
93. (d) the war is killing one another including innocent people hence it is a type of crime. Duty, obligation, and responsibility are not observed in the war.
94. (a) the revolt takes the form of war when people of a particular place/country feel something absurd or they feel oppressed for longer period of time, the word 'sentiment' is said to be an outcome of feeling and hence, feeling is the right answer here contextually.
95. (c) 'both' and 'and' are used together, hence option (c) is the right answer. Other options do not fit correct grammatically.
96. (b) 'with' preposition is given after the blank, now we have to check options, which will fit correct before it. We generally use thought of/about; suggested to; held on; intimated with. Hence, option (b) is the right answer.
97. (a) 'questions' is the correct answer contextually as further lines of the passage validate the answer.
98. (c) 'Attempt' means trying to show the feelings in the form of action by someone; here the author is trying to admit his feelings. Hence, the option(c) is the right answer.
99. (a) 'considered' means having been thought about carefully; regarded. Hence, option (a) is the most suitable option.
100. (d) 'Standpoint' means a set of beliefs from which opinions are formed. Hence, option (d) is the right answer.
101. (a) 'evolution' is the correct answer as it is mentioned in the latter part of the passage.
102. (d) The word 'laboratory' should be used contextually as enzymes which are mentioned in the later part point towards laboratory and hence option . (d) is the right answer.
103. (b) Synthesize is the correct answer as to where these enzymes are to be used is shown in the later part. the first step is synthesis/production then it is used for some purpose. Hence, synthesis is the right answer.
104. (c) 'Manufacture' is the right answer. It is because biofuels and pharmaceuticals are being produced with the help of enzymes. Hence, the option (c) is the right option.
105. (a) The role of antibodies is to fight like a soldier. The word 'combat' is the synonym of the word 'fight'.
106. (c) 'a match made in heaven' means a marriage that is likely to be happy and successful.
107. (a) The idiom 'a culture vulture' means a person who is very interested in the arts. Hence option (a) is the right answer.
108. (d) A stroke with a hand or weapon that causes death. Hence option (d) is the right answer.
109. (c) The idiom 'jewel in the crown' means something that is the most valuable, important, or admired. Hence option (c) is the right answer.
110. (b) The idiom 'to live in a fool's paradise' means to feel happy, satisfied and believe there are no problems, when in fact this is not true.
111. (b) The idiom 'a rotten apple' means a person whose own words or actions negatively impact an entire group of people.
112. (a) The idiom 'to vote with feet' means to show your opinion by leaving an organization or by no longer supporting or buying something. Hence option (a) is the right answer.

113. (b) Verbal diarrhea means the quality or habit of talking too much.
114. (d) The idiom 'to sail close to the wind' means to be on the verge of doing something illegal or improper.
115. (c) Double entendre means a word having two meanings one of which is usually risqué or indecent.
116. (b) The idiom 'to cut your own thought' means to do something bad for oneself. Hence option (b) is the right answer.
117. (a) Cook the book means manipulating the financial records and accounting records of a business to disguise losses. Hence option (a) is the right answer.
118. (c) The phrase 'change your tune' means to express a very different opinion or behave in a very different way. Hence option (c) is the right answer.
119. (d) The idiom 'blue blood' means a member of a rich class family, an aristocrat.
120. (a) Cut the crap means to get to the point; to state the real situation. Hence option (a) is the right answer.

GENERAL KNOWLEDGE

1. (d) Rightly described as "the first great Sanskrit scholar in Europe", H.T. Colebrooke was one of the founders of the Royal Asiatic Society in Bengal.
2. (b) Deccan Riots Commission was set up in 1878 to look into the causes of the Deccan riots. In 1879, the Agriculturists Relief Act was passed which ensured that the farmers could not be arrested and imprisoned if they were unable to pay their debts.
3. (a) Damin-i-Koh was the land allocated to the Santhals. The Santhals could live on the land and practise plough agriculture, thus helping them to carry out settled agriculture.
4. (b) In 1859, the British passed a Limitation Law that stated that the loan bonds signed between moneylenders and ryots would have validity for only three years.
5. (b) Ahmadullah Shah, famous as Maulavi of Faizabad, was one of the leading figures of the Indian Rebellion of 1857. He was known by other names of Danka Shah and Nakkaar Shah.
6. (b) After annexation, the first British revenue settlement, known as the Summary Set-tlement of 1856, was based on the assumption that the taluqdars were interlopers with no permanent stakes in land: they had established their hold over land through force and fraud.
7. (b) The Inter-State Council is a non-permanent constitutional body set up by a presidential order on the basis of provisions in Article 263 of the Constitution of India. The body was formed by a Presidential Order dated 28 May 1990 on recommendation of Sarkaria Commission. Sarkaria Commission was set up in 1983 by the central government of India.
8. (d) The writ of certiorari can be issued by the Supreme Court or any High Court for quashing the order already passed by an inferior court, tribunal or quasi-judicial author-ity.
9. (c) If the Supreme Court finds any law made by the Parliament inconsistent with the constitution, it has the power to declare that law to be invalid. Thus, to preserve the ideals and philosophy of the original constitution, the Supreme Court has laid down the basic structure doctrine. According to the doctrine, the Parliament cannot destroy or alter the basic structure of the doctrine.
10. (a) Where a Proclamation of Emergency is in operation, the President may by order declare that the right to move any court for the enforcement of such of the rights conferred by Part 3 (fundamental rights) except Art 20 & 21 and all proceedings pending in any Court for the enforcement of the same shall remain suspended for the period during which the proclamation is in force.
11. (b) Article 15 states Prohibition of discrimination on grounds of religion, race, caste, sex or place of birth. No citizen shall, on grounds only of religion, race, caste, sex, place of birth or any of them, be subject to any disability, liability, restriction or condition with regard to- (a) access to shops, public restaurants, hotels and places of public entertainment; or (b) the use of wells, tanks, bathing ghats, roads and places of public resort maintained wholly or partly out of State funds or dedicated to the use of the general public.
12. (c) Scheduled Castes Federation (SCF) was a political party in India. SCF was founded by Dr. Ambedkar in 1942 to fight for the rights of the Dalit community. SCF was the successor organization of the Independent Labour Party led by Ambedkar. SCF later evolved into the Republican Party of India.
13. (c) Paul Allen was the co-founder of Microsoft with Bill Gates in 1975.
14. (d) The Election Commission launched a mobile app, called 'Cvigil,' on July 3, 2018, for citizens to report any violation of the model code of conduct during elections.
15. (b) Prahaar is a solid-fuelled surface-to-surface short-range tactical ballistic missile. It has been indigenously developed by DRDO.
16. (b) The Rajiv Gandhi Khel Ratna Award in Sports and Games is the highest sporting honour of the Republic of India. It was started in 1991-92. The winner of this award gets 7.5 lac rupees. Winners of 2018 Rajiv Gandhi Khel Ratna Award are Mirabai Chanu and Virat Kohli.
17. (a) Pakyong Airport is a Greenfield airport near Gangtok, the state capital of Sikkim, India. Opened in September, 2018, Pakyong Airport is one of the five highest airports in India at 4500 ft.
18. (d) On 15 October, the United Nations commemorates the International Day of Rural Women, under the theme, "Sustainable infrastructure, services and social protection for gender equality and the empowerment of rural women and girls".
19. (b) Gobind Behari Lal: He won the Pulitzer in 1937 in the journalism category. He shared the prize with four other reporters for covering science at the Harvard University.
20. (b) Saurabh Chaudhary is an Indian sport shooter. He won the Gold medal at the 2018 Asian Games in 10 m Air Pistol. He became the youngest Indian gold medallist at the Asian Games.
21. (c) The law of demand is applicable with the following assumptions. (1) No change in price of related commodities. (2) No change in income of the consumer. (3) No change in taste and preferences, customs, habit and fashion of the consumer. (4) No change in size of population. (5) No expectation regarding future change in price.
22. (d) When total utility is maximum, marginal utility is zero and it is not equal to average utility.

23. (b) In economics, an indifference curve connects points on a graph representing different quantities of two goods, points between which a consumer is indifferent. That is, the consumer has no preference for one combination or bundle of goods over a different combination on the same curve. Two indifference curves cannot cut each other.
24. (d) All the statements are correct about a joint-stock company.
25. (a) Some goods or productive factors are completely fixed in amount, regardless of price. There is only one Mona Lisa by da Vinci. Nature's original endowment of land can be taken as fixed in amount. In this case, the supply curve is always horizontal.
26. (a) The Bombay Secretariat was completed in 1874 and designed by Captain Henry St. Clair Wilkins in the Venetian Gothic style.
27. (a) Mataji Maharani Tapaswini was one of the strongest proponents of female education in India. Her greatest contribution came in the form of the Mahakali Pathshala which she set up in Kolkata in 1893.
28. (b) Peter the Great of Russia was led to exclaim: "Bear in mind that the commerce of India is the commerce of the world and … he who can exclusively command it is the dictator of Europe."
29. (d) Abbe J.A. Dubois
30. (d) Plagues and Peoples is a book on epidemiological history by William Hardy McNeill published in New York City in 1976. It was a critical and popular success, offering a radically new interpretation of the extraordinary impact of infectious disease on cultures as a means of enemy attack.
31. (a)
32. (a) A situation starting in 2008 affecting the mortgage industry due to borrowers being approved for loans they could not afford. As a result, a significant rise in foreclosures led to the collapse of many lending institutions and hedge funds. The financial crisis in the mortgage industry also affected the global credit market resulting in higher interest rates and reduced availability of credit. This is known as Subprime crisis.
33. (c) With Indian Independence Act of 1947, the crown was no longer the source of authority.
34. (c) One third are elected by members of local bodies such as municipalities, gram sabhas/gram panchayats, panchayat samitis and Zila Parishads.
35. (a) The chairperson of a panchayat can be elected directly or indirectly, as the legislature may provide.
36. (c) Tribunals established by a law of the Parliament can exclude the jurisdiction of all Courts, except that of a Supreme Court to allow for special leave to appeal.
37. (c) Monopolistic competition is a market structure which combines elements of monopoly and competitive markets. It is a situation when firms sell similar but not identical products.
38. (c) Inflation in the country continued to moderate during 2017-18. Consumer Price Index (CPI) based headline inflation averaged 3.3 per cent during the period which is the lowest in the last six financial years. This has been stated in the Economic Survey 2017-18. There was a significant reduction in food inflation too.
39. (b) Developed by James Duesenberry, the relative income hypothesis states that an individual's attitude to consumption and saving is dictated more by his income in relation to others than by abstract standard of living; the percentage of income consumed by an individual depends on his percentile position within the income distribution. It also depends on the rate of return of his capital and age of the individual.
40. (c) According to Keynes, the volume of employment in a country depends on the level of effective demand of people for goods and services. Unemployment is attributed to the deficiency of effective demand.
41. (d) Adam Smith said taxation should be imposed in proportion to the benefits a taxpayer receives from the state and should be equity, certainty, convenience, and efficiency.
42. (a) Muhammad ibn Musa al-Khwarizmi, formerly Latinized as Algorithmi, was a Persian scholar who produced works in mathematics, astronomy, and geography. He is given the credit of christening the mathematical discipline of algorithm.
43. (a) The Kansas-Nebraska Act was passed by the U.S. Congress on May 30, 1854. It allowed people in the territories of Kansas and Nebraska to decide for them whether or not to allow slavery within their borders. The Act served to repeal the Missouri Compromise of 1820 which prohibited slavery north of latitude 36°30′.
44. (a) The 123 Agreement signed between the United States of America and the Republic of India is known as the U.S.-India Civil Nuclear Agreement or Indo-US nuclear deal. India was given advance rights to reprocess US origin safeguarded spent fuel.
45. (a) Dewan Bahadur Sir Alladi Krishnaswamy Iyer (14 May 1883 - 3 October 1953) was an Indian lawyer and member of the Constituent Assembly of India, which was responsible for framing the Constitution of India. He had ultimate faith in Democratic form of government and was a supporter of separation of executive, legislature and judiciary.
46. (d) United Nations multidimensional peace keeping operations work with the principle of impartiality and hence cannot extend support blindly to any state in a war.
47. (c) The South China Sea disputes involve both island and maritime claims among several sovereign states within the region, namely Brunei, the People's Republic of China (PRC), Republic of China (Taiwan), Malaysia, the Philippines, and Vietnam. Although Indonesia is not part of claims in the South China Sea dispute, after Joko Widodo became President of the country in 2014, he instituted a policy in 2015 that, if any foreign fishermen were caught illegally fishing in Indonesian waters, their vessels would be destroyed.
48. (b) The Kyoto Protocol is an international treaty which extends the 1992 United Nations Framework Convention on Climate Change (UNFCCC) that commits state parties to reduce greenhouse gas emissions, based on the scientific consensus that (part one) global warming is occurring.
49. (b) The 1995 Fourth World Conference on Women in Beijing marked a significant turning point for the global agenda for gender equality. The Beijing Declaration and the Platform for Action, adopted unanimously by 189 countries, is an agenda for women's empowerment and considered the key global policy document on gender equality.

50. (a) The Gujral Doctrine is a set of five principles to guide the conduct of foreign relations with India's immediate neighbours, notably Pakistan, as spelt out by I K Gujral.
51. (b)
52. (d) Decantation is a process of separation of insoluble solids from liquid. The suspension of solid particles in liquid is allowed to stand for some time. The solid particles then settle down at the bottom of the container and clean water goes up.
53. (d) Fluorine does not give Lassaigne›s test because it does not form Precipitate like other halogens (chlorine, Bromine, Iodine).
54. (c) Alkyl halides do not show functional isomerism. Alcohols and ethers; aldehydes and ketones; cyanides and isocyanides are functional isomers. It is because there's only one way to attach a halogen to a carbon chain: via one single bond. Halogens can't form more than one bond in the context of common organic compounds, and can't form multiple bonds to carbon.
55. (c) The most stable conformation of a molecule is in the form of a Newman Projection.
56. (b) Nylon 6 is made from only one kind of monomer, called caprolactam.
57. (d) Proxima Centauri (meaning ‹nearest star of Centaurus'), or Alpha Centauri C, is a red dwarf, a small low-mass star, about 4.244 light-years (1.301 pc) from the Sun in the constellation of Centaurus. It was discovered in 1915 by Robert Innes and is the nearest-known star to the Sun.
58. (d) Mercury has the least mass in our solar system and Jupiter the most.
59. (b) When the two materials were in the water, the less dense material (silver) occupies a greater volume than the more dense gold. So, it has more up thrust from the water and, although they both show the same weight under water, there is more mass of silver present. Hence, out of the water then, the silver would weigh more than the gold.
60. (d)
61. (a)
62. (a)
63. (c) The smooth endoplasmic reticulum (smooth ER) is continuous with the rough ER but has few or no ribosomes on its cytoplasmic surface. Functions of the smooth ER include: Synthesis of carbohydrates, lipids, and steroid hormones.
64. (c) One of the key organelles involved in digestion and waste removal is lysosome. Lysosomes are organelles that contain digestive enzymes.
65. (d) Secondary or lateral meristems, which are found in all woody plants and in some herbaceous ones, consist of the vascular cambium and the cork cambium. They produce secondary tissues from a ring of vascular cambium in stems and roots.
66. (a) Saprophytes live on dead organic matter, including dead wood, dung, and fallen leaves. Most fungi commonly called mushrooms are saprophytes, such as the extremely common Agaricus genus. Perhaps their most important function is the decomposition of organic matter into soil.
67. (c) Nereis is a genus of polychaete worms in the family Nereididae and has a bilateral symmetry in its body organization.
68. (d) Aves (crow, parrot, peacock, sparrow, kiwi etc) and Mammals (man, dog, camel, rat etc) are warm blooded animals.
69. (d)
70. (a) Cartagena is a port city on Colombia's Caribbean coast.
71. (c) Among the following states, Meghalaya is the most populated state in India as per census 2011.
72. (b) The Tropic of Capricorn runs through 10 countries: Namibia, Botswana, South Africa, Mozambique, Madagascar, Australia, Chile, Argentina, Paraguay, and Brazil.
73. (c) The Sargasso Sea is in the North Atlantic is bounded by the Gulf Stream on the west, the North Atlantic Current on the north, the Canary Current on the east, and the North Equatorial Current on the south.
74. (d)
75. (a) Satna is not situated on the Varanasi-Kanyakumari highway (NH-7).
76. (c) Gully plugs are built using local stones, clay and bushes across small gullies and streams running down the hill slopes carrying drainage to tiny catchments during rainy season. It is not suitable for urban rain water harvesting.
77. (b) Tank system does not predate well irrigation in India.
78. (d) Thermoset, or thermosetting, plastics are synthetic materials that strengthen during being heated, but cannot be successfully remolded or reheated after their initial heat-forming. This is in contrast to thermoplastics, which soften when heated and harden and strengthen after cooling.
79. (a)
80. (c)
81. (d)
82. (a)
83. (b) Gas particles are small and the total volume occupied by gas molecules is negligible relative to the total volume of their container. The average kinetic energy of gas particles is proportional to the absolute temperature of the gas, and all gases at the same temperature have the same average kinetic energy.
84. (b) Constellation is a group of stars forming a recognizable pattern that is traditionally named after its apparent form or identified with a mythology.
85. (a) Hooke's law is only really valid up to the proportionality limit, and this is simply because Hooke's law is a proportionality law, i.e. Force is proportional to extension.
86. (b) Histones are a family of basic proteins that associate with DNA in the nucleus and help condense it into chromatin, they are alkaline (basic pH) proteins, and their positive charges allow them to associate with DNA. They are found inside the nucleus of eukaryotic cells.
87. (b) The protein inside red blood cells that carries oxygen to cells and carbon dioxide to the lungs is haemoglobin. Oxygen enters the blood from the lungs and carbon dioxide is expelled out of the blood into the lungs. The blood serves to transport both gases. Oxygen is carried to the cells. Carbon dioxide is carried away from the cells.
88. (c) Correct sequence of passage of light in a compound microscope: light source-condenser-specimen-objective lens-ocular lens-body tube-eyepiece
89. (a) The liver contains a system of carrier molecules and enzymes which quickly coverts the ammonia into urea.

90. (b) The Chambal's lower course is lined by a 10-mile belt of bad land gullies resulting from accelerated soil erosion and is the site of a major project in soil conservation.
91. (d) Hurricane is a storm with a violent wind, in particular a tropical cyclone over the mid-latitude.
92. (b) The International Tropical Timber Organization (ITTO) is an intergovernmental organization that promotes conservation of tropical forest resources and their sustainable management, use and trade. Its headquarters are in Yokohoma, Jjapan.
93. (d) Humidity is the amount of water vapour present in air at a particular place and time.
94. (d) The Shompen or Shom Pen is the indigenous people of the interior of Great Nicobar Island, part of the Indian Union Territory of Andaman and Nicobar Islands. The Shompen are designated vulnerable tribal group.
95. (c) Itanagar
96. (b) Mumbai-Delhi-Kolkata-Chennai
97. (c) Lonar Lake, also known as Lonar crater, is a notified National Geo-heritage Monument saline soda lake located at Lonar in Buldhana district, Maharashtra. The Gangbal Lake also called Gangbal Lake, is a lake situated at the foothills of Mount Haramukh in Ganderbal district, north of Srinagar city in the state of Jammu and Kashmir. It is fed by precipitation, glaciers and springs. Purbasthali is a tectonic lake in Bardhaman district, Kolkata. Bhimtal Lake is a fluvial lake in the town of Bhimtal in the Indian state of Uttarakhand.
98. (b) The two island groups, the Andaman Islands and the Nicobar Islands are separated by the 10 ° N parallel, with the Andamans to the north of this latitude, and the Nicobars to the south.
99. (b) There is an existing major irrigation project on the river called the Damanganga Reservoir Project, which is located near Madhuban village in Dharampur taluka of Valsad district of Gujarat.
100. (b) The headquarters of Coal India Limited is located at ranchi, Jharkhand.
101. (c) Jawahar Lal Nehru declared Afro-Asian solidarity as a central element of India's foreign policy in Bandung Conference.
102. (a) Prime Minister's National Relief Fund is operated by the Prime Minister's Of-fice (PMO).
103. (c) The surgical strike mission in 2016 inside Pakistan Occupied Kashmir was not given any name.
104. (d) The NGT is not bound by the procedure laid down under the Code of Civil Procedure, 1908, but shall be guided by principles of natural justice.
105. (c) Article 19 (1) (f) and 31 (2) have not been abolished for this State and hence, properly still stands guaranteed to the people of Jammu and Kashmir.
106. (d) In 1921, during a tour of South India, Gandhiji shaved his head and began wearing a khadi dhoti, rather than mill-made cloth imported from abroad, in order to identify with the poor. Gandhiji encouraged other nationalist leaders who dressed in western clothes to adopt Indian attire.
107. (c) Hill stations were a distinctive feature of colonial urban development. They became strategic places for billeting troops, guarding frontiers and launching campaigns against enemy rulers. Simla (present day Shimla) was founded during the course of the Gurkha War (1815-16).
108. (b) "A Muslim Raj here and a Hindu Raj elsewhere, if that is what Pakistan means, I will have nothing to do with it." Sikander Hayat Khan was opposed to the partition of India.
109. (b)
110. (d) Eight States which have already achieved more than 99 per cent household electrification prior to launch of Saubhagya scheme are ineligible for participation under the award scheme. These eight states are Andhra Pradesh, Gujarat, Goa, Haryana, Himachal Pradesh, Kerala, Punjab and Tamil Nadu.
111. (c) India was elected to the United Nations' top human rights body on Friday for a period of three years beginning January 1, 2019, getting 188 votes in the Asia-Pacific category, the highest number of votes among all candidates.
112. (c) A Bureau of Pharma PSUs of India (BPPI) has been established on the 1st of De-cember 2008 comprising all the pharma CPSUs under the Department of Pharmaceuticals. The Bureau has been registered as an inde-pendent society under the Societies Registration Act, 1860 as a separate legal entity in April, 2010.
113. (b) Pradhan Mantri Vaya Vandana Yojana (PMVVY) is a Pension Scheme an-nounced by the Government of India exclusively for the senior citizens aged 60 years and above which is available from 4th May, 2017 to 31st March, 2020.
114. (c) Jeremy Lalrinnunga is an Indian weightlifter from Aizawl, Mizoram who represented India in the 2018 Summer Youth Olympics in Bu-enos Aires. He won the gold medal in the Boys' 62kg category weightlifting with a lift of 274kg. It was India's first gold medal in the Youth Olympics Games.
115. (d) In order to encourage work of excellence in taxonomy and also to encourage young students and scholars to work in this science, the Ministry of Environment, Forests and Climate Change (MoEFCC) has instituted a National Award in Taxonomy named after the late Prof. E.K. Janaki Ammal.
116. (c) The Army Air Defence College is the training academy for the Army Air Defence Corps of Indian Army. The college is located in the Gopalpur, Odisha.
117. (a) The Canine Distemper Virus (CDV) that killed 23 lions in Gir, Gujarat belongs to one of the groups of viruses called the morbillivirus. This virus group has some of the deadliest pathogens.
118. (b) After Uruguay, Canada became the second country to have legalized the pos-session and use of recreational cannabis.
119. (b) Pre-existing diseases are covered from the day the policy is issued to the indi-vidual in Pradhan Mantri Jan Arogya Yojana.
120. (c) Russia, India, China and South Africa extend full support to Brazil for its BRICS Chairmanship in 2019 and the hosting of the 11th BRICS Summit.

COMBINED DEFENCE SERVICES (CDS) EXAMINATION SOLVED PAPER 2019-II

(Held on Sept. 2019)

MATHEMATICS

1. if 10^n divides $6^{23} \times 75^9 \times 105^2$, then what is the largest value of n ?
(a) 20 (b) 22 (c) 23 (d) 28

2. What is the digit in the unit's place of the number represented by $3^{98} - 3^{89}$?
(a) 3 (b) 6 (c) 7 (d) 9

3. The sum of the squares of four consecutive natural numbers is 294. What is the sum of the numbers ?
(a) 38 (b) 34 (c) 30 (d) 26

4. The equation $x^2 + px + q = 0$ has roots equal to p and q where $q \neq 0$. What are the values of p and q respectively ?
(a) 1, –2 (b) 1, 2 (c) –1, 2 (d) –1, –2

5. How many pairs of natural numbers are there such that the difference of their squares is 35 ?
(a) 1 (b) 2 (c) 3 (d) 4

6. If $(b - 6)$ is one of the quadratic equation $x^2 - 6x + b = 0$, where b is an integer, then what is the maximum value of b^2 ?
(a) 36 (b) 49 (c) 64 (d) 81

7. If $a = \sqrt{7 + 4\sqrt{3}}$, then what is the value of $a + \frac{1}{a}$?
(a) 2 (b) 3 (c) 4 (d) 7

8. What is the maximum value of the expression $\frac{1}{x^2 + 5x + 10}$?
(a) $\frac{15}{4}$ (b) $\frac{15}{2}$ (c) 1 (d) $\frac{4}{15}$

9. If the ratio of the work done by $(x + 2)$ workers in $(x - 3)$ days to the work done by $(x + 4)$ workers in $(x - 2)$ days is 3 : 4, then what is the value of x ?
(a) 8 (b) 10 (c) 12 (d) 15

10. Which one of the following is ***not*** correct ?
(a) 1 is neither prime nor composite.
(b) 0 is neither positive nor negative.
(c) If $p \times q$ is even, then p and q are always even
(d) $\sqrt{2}$ is an irrational number

11. What is the sum of all integer values of n for which $n^2 + 19n + 92$ is a perfect square ?
(a) 21 (b) 19 (c) 0 (d) –19

12. What is the LCM of the polynomials
$x^3 + 3x^2 + 3x + 1$,
$x^3 + 5x^2 + 5x + 4$ and
$x^2 + 5x + 4$?
(a) $(x + 1)^3(x + 4)(x^2 + x + 1)$
(b) $(x + 4)(x^2 + x + 1)$
(c) $(x + 1)(x^2 + x + 1)$
(d) $(x + 1)^2(x + 4)(x^2 + x + 1)$

13. What is the value of $\frac{(x-y)^3 + (y-z)^3 + (z-x)^3}{9(x-y)(y-z)(z-x)}$?
(a) 0 (b) $\frac{1}{3}$ (c) $\frac{1}{9}$ (d) 1

14. If $X = \{a, \{b\}, c\}$,
$Y = \{\{a\}, b, c\}$ and
$Z = \{a, b, \{c\}\}$,
then $(X \cap Y) \cap Z$ equals to
(a) $\{a, b, c\}$ (b) $\{\{a\}, \{b\}, \{c\}\}$
(c) $\{\Phi\}$ (d) Φ

15. Two numbers p and q are such that the quadratic equation $px^2 + 3x + 2q = 0$ has –6 as the sum and the product of the roots. What is the value of $(p - q)$?
(a) –1 (b) 1 (c) 2 (d) 3

16. If the sum of a real number and its reciprocal is $\frac{26}{5}$, then how many such numbers are possible ?
(a) None (b) One
(c) Two (d) Four

17. Consider the following statements:
1. If p is relatively prime to each of q and r, then p is relatively prime to the product qr.
2. If p divides the product qr and if p divides q, then p must divide r.
Which of the above statements is/are correct ?
(a) 1 only (b) 2 only
(c) Both 1 and 2 (d) Neither 1 nor 2

18. Radha and Rani are sisters. Five years back, the age of Radha was three times that of Rani, but one year back the age of Radha was two times that of Rani. What is the age difference between them ?
(a) 8 (b) 9 (c) 10 (d) 11

19. A person carries ₹500 and wants to buy apples and oranges out of it. If the cost of one apple is ₹5 and the cost of one orange is ₹7, then what is the number of ways in which a person can buy both apples and oranges using total amount?
(a) 10 (b) 14 (c) 15 (d) 17

20. Given y is inversely proportional to $\sqrt{x}$, and $x = 36$ when $y = 36$. What is the value of x when $y = 54$?
(a) 54 (b) 27 (c) 16 (d) 8

21. What is the square root of $16 + 6\sqrt{7}$?.
(a) $4 + \sqrt{7}$ (b) $4 - \sqrt{7}$
(c) $3 + \sqrt{7}$ (d) $3 - \sqrt{7}$

22. What is the number of digits in 7^{25}, 8^{23} and 9^{20} respectively ?
[Given $\log_{10}2 = 0.301$, $\log_{10}3 = 0.477$, $\log_{10}7 = 0.845$]
(a) 21, 20, 19 (b) 20, 19, 18
(c) 22, 21, 20 (d) 22, 20, 21

23. Let x be the smallest positive integer such that when 14 divides x, the remainder is 7; and when 15 divides x, the remainder is 5. Which one of the following is correct ?
(a) $20 < x < 30$ (b) $30 < x < 40$
(c) $40 < x < 50$ (d) $x > 50$

24. Two taps X and Y are fixed to a water tank. If only X is opened, it drains out the full tank of water in 20 minutes. It both X and Y are opened, then they drain out the full tank of water in 15 minutes. If only Y is opened, how long does it take to drain out the full tank of water ?
(a) 30 minutes (b) 45 minutes
(c) 60 minutes (d) 90 minutes

25. Consider the following statements :
1. $\sqrt{75}$ is a rational number.
2. There exists at least a positive integer x such that $-\frac{4x}{5} < -\frac{7}{8}$.
3. $\frac{x-2}{x} < 1$ for all real values of x.
4. 4. 232323..... can be expressed in the form $\frac{p}{q}$ where p and q are integers.
Which of the above statements are correct ?
(a) 1 and 2 (b) 2 and 3 (c) 3 and 4 (d) 2 and 4

26. A library has an average number of 510 visitors on Sunday and 240 on other days. What is the average number of visitors per day in a month of 30 days beginning with Saturday ?
(a) 276 (b) 282 (c) 285 (d) 375

27. If $\frac{36}{11} = 3 + \cfrac{1}{x + \cfrac{1}{y + \cfrac{1}{z}}}$, where x, y and z are natural numbers, then what is $(x + y + z)$ equal to ?
(a) 6 (b) 7 (c) 8 (d) 9

28. A person sells two items each at ₹ 990, one at a profit of 10% and another at a loss of 10%. What is the combined percentage of profit or loss for the two items ?
(a) 1% loss (b) 1% profit
(c) No profit no loss (d) 0.5% profit

29. It takes 11 hours for a 600 km journey if 120 km is done by train and the rest by car. lt takes 40 minutes more If 200 km are covered by train and the rest by car. What is the ratio of speed of the car to that of the train ?
(a) 3 : 2 (b) 2 : 3 (c) 3 : 4 (d) 4 : 3

30. A real number x, such that $(x - x^2)$ is maximum. What is x equal to ?
(a) –1.5 (b) –0.5 (c) 0.5 (d) 1.5

31. Let a and b be two positive real numbers such that $a\sqrt{a} + b\sqrt{b} = 32$ and $a\sqrt{b} + b\sqrt{a} = 31$. What is the value of $\frac{5(a+b)}{7}$?
(a) 5
(b) 7
(c) 9
(d) Cannot be determined

32. If $x = \frac{1+\sqrt{3}}{2}$ and $y = x^3$, then y satisfies which one of the following equations ?
(a) $8y^2 - 20y - 1 = 0$ (b) $8y^2 + 20y - 1 = 0$
(c) $8y^2 + 20y + 1 = 0$ (d) $8y^2 - 20y + 1 = 0$

33. HCF of two numbers is 12. Which one of the following can never be their LCM ?
(a) 80 (b) 60 (c) 36 (d) 24

34. Consider the following statements :
1. Unit digit in 17^{174} is 7.
2. Difference of the squares of any two odd numbers is always divisible by 8.
3. Adding 1 to the product of two consecutive odd numbers makes it a perfect square.
Which of the above statements arc correct ?
(a) 1, 2 and 3 (b) 1 and 2 only
(c) 2 and 3 only (d) 1 and 3 only

35. The rate of interest on two different schemes is the same and it is 20%. But in one of the schemes, the interest is compounded half yearly and in the other the interest is compounded annually. Equal amounts are invested in the schemes. If the difference of the returns after 2 years is ₹482, then what is the principal amount in each scheme ?
(a) ₹10,000 (b) ₹16,000
(c) ₹20,000 (d) ₹24,000

36. For what value of k can the expression $x^3 + kx^2 - 7x + 6$ be resolved into three linear factors ?
(a) 0 (b) 1 (c) 2 (d) 3

37. X, Y and Z start at same point and same time in the same direction to run around a circular stadium. X completes a round in 252 seconds, Y in 308 seconds and Z in 198 seconds. After what time will they meet again at the starting point ?
(a) 26 minutes 18 seconds
(b) 42 minutes 36 seconds
(c) 45 minutes
(d) 46 minutes 12 seconds

38. What is the LCM of $\frac{1}{3}, \frac{5}{6}, \frac{2}{9}, \frac{4}{27}$?
(a) $\frac{5}{18}$ (b) $\frac{1}{27}$
(c) $\frac{10}{27}$ (d) $\frac{20}{3}$

39. If the equations $x^2 + 5x + 6 = 0$ and $x^2 + kx + 1 = 0$ have a common root, then what is the value of k ?

(a) $-\frac{5}{2}$ or $-\frac{10}{3}$ (b) $\frac{5}{2}$ or $\frac{10}{3}$

(c) $\frac{5}{2}$ or $-\frac{10}{3}$ (d) $-\frac{5}{2}$ or $\frac{10}{3}$

40. A lent ₹25000 to B and at the same time lent some amount to C at same 7% simple interest. After 4 years A received ₹11200 as interest from B and C. How much did A lend to C ?
(a) ₹20000 (b) ₹25000 (c) ₹15000 (d) ₹10000

41. A trader sells two computers at the same price, making a profit of 30% on one and a loss of 30% on the other. What is the net loss or profit percentage on the transaction ?
(a) 6% loss (b) 6% gain (c) 9% loss (d) 9% gain

42. The monthly incomes of A and B are in the ratio 4 : 3. Each saves ₹ 600. If their expenditures are in the ratio 3 : 2, then what is the monthly income of A ?
(a) ₹1800 (b) ₹2000 (c) ₹2400 (d) ₹3600

43. The train fare and bus fare between two stations is in the ratio 3 : 4. If the train fare increases by 20% and bus fare increases by 30%, then what is the ratio between revised train fare and revised bus fare ?

(a) $\frac{9}{13}$ (b) $\frac{17}{12}$ (c) $\frac{32}{43}$ (d) $\frac{19}{21}$

44. When N is divided by 17, the quotient is equal to 182. The difference between the quotient and the remainder is 175. What is the value of N ?
(a) 2975 (b) 3094 (c) 3101 (d) 3269

45. A stock of food grains is enough for 240 men for 48 days. How long will the same stock last for 160 men ?
(a) 72 days (b) 64 days (c) 60 days (d) 54 days

46. The quotient when $x^4 - x^2 + 7x + 5$ is divided by $(x + 2)$ is $ax^3 + bx^2 + cx + d$. What are the values of a, b, c and d respectively ?
(a) 1, –2, 3, 1 (b) –1, 2, 3, 1
(c) 1, –2, –3, –1 (d) –1, 2, –3, –1

47. The sides of a triangle are 30 cm, 28 cm and 16 cm respectively. In order to determine its area, the logarithm of which of the quantities are required ?
(a) 37, 11, 28, 16 (b) 21, 30, 28, 7
(c) 37, 21, 11, 9 (d) 37, 21, 9, 7

48. If $\log_{10}1995 = 3.3000$, then what is the value of $(0.001995)^{\frac{1}{8}}$?

(a) $\frac{1}{10^{0.3475}}$ (b) $\frac{1}{10^{0.3375}}$

(c) $\frac{1}{10^{0.3275}}$ (d) $\frac{1}{10^{0.3735}}$

49. What is $(x - a)(x - b)(x - c)$ equal to ?
(a) $x^3 - (a + b + c)x^2 + (bc + ca + ab)\,x - abc$
(b) $x^3 + (a + b + c)x^2 + (bc + ca + ab)\,x + abc$
(c) $x^3 - (bc + ca + ab)\,x^2 + (a + b + c)\,x - abc$
(d) $x^3 + (bc + ca + ab)x^2 - (a + b + c)\,x - abc$

50. Let XYZ be an equilateral triangle in which $XY = 7$ cm. If A denotes the area of the triangle, then what is the value of $\log_{10}A^4$? (Given that $\log_{10}1050 = 3.0212$ and $\log_{10}35 = 1.5441$)
(a) 5.3070 (b) 5.3700 (c) 5.5635 (d) 5.6535

51. A hollow sphere of external and internal diameters 6 cm and 4 cm respectively is melted into a cone of base diameter 8 cm. What is the height of the cone ?
(a) 4.75 cm (b) 5.50 cm (c) 6.25 cm (d) 6.75 cm

52. A solid metallic cylinder of height 10 cm and radius 6 cm is melted to make two cones in the ratio of volume 1 : 2 and of same height as 10 cm. What is the percentage increase in the flat surface area ?
(a) 25% (b) 50% (c) 75% (d) 100%

53. If one side of a right-angled triangle (with all sides integers) is 15 cm, then what is the maximum perimeter of the triangle?
(a) 240 cm (b) 225 cm (c) 113 cm (d) 112 cm

54. A thin rod of length 24 feet is cut into rods of equal size and joined so as to form a skeleton cube. What is the area of one of the faces of the largest cube thus constructed ?
(a) 25 square feet (b) 24 square feet
(c) 9 square feet (d) 4 square feet

55. Consider a trapezium $ABCD$, in which AB is parallel to CD and AD is perpendicular to AB. If the trapezium has an incircle which touches AB at E and CD at F, where $EB = 25$ cm and $FC = 16$ cm, then what is the diameter of the circle ?
(a) 16 cm (b) 25 cm (c) 36 cm (d) 40 cm

56. Three copper spheres of radii 3 cm, 4 cm and 5 cm are melted to form a large sphere. What is its radius ?
(a) 12 cm (b) 10 cm (c) 8 cm (d) 6 cm

57. The volume of a hemisphere is 155232 cm^3. What is the radius of the hemisphere ?
(a) 40 cm (b) 42 cm (c) 38 cm (d) 36 cm

58. A bucket is in the form of a truncated cone. The diameters of the base and top of the bucket are 6 cm and 12 cm respectively. If the height of the bucket is 7 cm, what is the capacity of the bucket ?
(a) 535 cm^3 (b) 462 cm^3 (c) 234 cm^3 (d) 166 cm^3

59. A right circular cone has height 8 cm. If the radius of its base is 6 cm, then what is its total surface area ?
(a) 96π cm^2 (b) 69π cm^2 (c) 54π cm^2 (d) 48π cm^2

60. Six cubes, each with 12 cm edge are joined end to end. What is the surface area of resulting cuboid ?
(a) 3000 cm^2 (b) 3600 cm^2
(c) 3744 cm^2 (d) 3777 cm^2

61. The areas of three adjacent faces of a cuboid are x, y and z. If V is the volume of the cuboid, then which one of the following is correct ?
(a) $V = xyz$ (b) $V^2 = xyz$
(c) $V^3 = xyz$ (d) $V = (xyz)^2$

62. If l is the length of the median of an equilateral triangle, then what is its area ?

(a) $\frac{\sqrt{3}l^2}{3}$ (b) $\frac{\sqrt{3}l^2}{2}$

(c) $\sqrt{3}l^2$ (d) $2l^2$

63. A piece of wire is in the form of a sector of a circle of radius 20 cm, subtending an angle 150° at the centre. If it is bent in the form of a circle, then what will be its radius?

(a) $\frac{19}{3}$ cm (b) 7 cm

(c) 8 cm (d) None of these

64. Suppose P, Q and R are the mid-points of sides of a triangle of area 128 cm^2. If a triangle ABC is drawn by joining the mid-points of sides of triangle PQR, then what is the area of triangle ABC?

(a) 4 cm^2 (b) 8 cm^2 (c) 16 cm^2 (d) 32 cm^2

65. Let two lines p and q be parallel. Consider two points B and C on the line p and two points D and E on the line q. The line through B and E intersects the line through C and D at A in between the two lines p and q. If $AC : AD = 4 : 9$, then what is the ratio of area of triangle ABC to that of triangle ADE ?

(a) 2 : 3 (b) 4 : 9 (c) 16 : 81 (d) 1 : 2

66. An equilateral triangle and a square are constructed using metallic wires of equal length. What is the ratio of area of triangle to that of square ?

(a) 3 : 4 (b) 2 : 3 (c) $4\sqrt{3} : 9$ (d) $2\sqrt{3} : 9$

67. All the four sides of a parallelogram are of equal length. The diagonals are in the ratio 1 : 2. If the sum of the lengths of the diagonals is 12 cm, then what is the area of the parallelogram ?

(a) 9 cm^2 (b) 12 cm^2 (c) 16 cm^2 (d) 25 cm^2

68. ABC is a triangle right angled at B. If $AB = 5$ cm and $BC = 10$ cm, then what is the length of the perpendicular drawn from the vertex B to the hypotenuse ?

(a) 4 cm (b) $2\sqrt{5}$ cm (c) $\frac{4}{\sqrt{5}}$ cm (d) 8 cm

69. Two cylinders of equal volume have their heights in the ratio 2 : 3. What is the ratio of their radii ?

(a) $\sqrt{3} : 1$ (b) $\sqrt{3} : \sqrt{2}$ (c) $2 : \sqrt{3}$ (d) $\sqrt{3} : 2$

70. The length and breadth of a rectangle are increased by 20% and 10% respectively. What is the percentage increase in the area of the rectangle ?

(a) 32% (b) 30% (c) 25% (d) 15%

71. If the length of the hypotenuse of a right angled triangle is 10 cm, then what is the maximum area of such a right angled triangle ?

(a) 100 cm^2 (b) 50 cm^2 (c) 25 cm^2 (d) 10 cm^2

72. A square is drawn such that its vertices are lying on a circle of radius 201 mm. What is the ratio of area of circle to that of square ?

(a) 11 : 7 (b) 7 : 11 (c) 20 : 19 (d) 19 : 20

73. A right circular cylinder has a diameter of 20 cm and its curved surface area is 1000 cm^2. What is the volume of the cylinder ?

(a) 4000 cm^3 (b) 4500 cm^3

(c) 5000 cm^3 (d) 5200 cm^3

74. A piece of wire of length 33 cm is bent into an arc of a circle of radius 14 cm. What is the angle subtended by the arc at the centre of the circle ?

(a) 75° (b) 90° (c) 135° (d) 150°

75. What is the ratio of the area of a square inscribed in a semicircle of radius r to the area of square inscribed in a circle of radius r ?

(a) 1 : 2 (b) 2 : 5 (c) 2 : 3 (d) 3 : 5

76. A hollow right circular cylindrical vessel of volume V whose diameter is equal to its height, is completely filled with water. A heavy sphere of maximum possible volume is then completely immersed in the vessel. What volume of water remains in the vessel ?

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

77. Three parallel lines x, y and z are cut by two transversals m and n. Transversal m cuts the lines x, y, z at P, Q, R respectively; and Transversal n cuts the lines x, y, z at L, M, N respectively. If PQ = 3 cm, QR = 9 cm and MN = 10.5 cm, then what is the length of LM ?

(a) 3 cm (b) 3.5 cm (c) 4 cm (d) 4.5 cm

78. The area of a sector of a circle of radius 4 cm is 25.6 cm^2. What is the radian measure of the arc of the sector ?

(a) 2.3 (b) 3.2 (c) 3.3 (d) 3.4

79. Which one of the following is correct in respect of a right angled triangle ?

(a) Its orthocentre lies inside the triangle
(b) Its orthocentre lies outside the triangle
(c) Its orthocentre lies on the triangle
(d) It has no orthocentre

80. Let the bisector of the angle BAC of a triangle ABC meet BC in X. Which one of the following is correct ?

(a) $AB < BX$ (b) $AB > BX$

(c) $AX = CX$ (d) None of the above

81. What is the value of $\log_{10}(\cos\theta) + \log_{10}(\sin\theta) + \log_{10}(\tan\theta) + \log_{10}(\cot\theta) + \log_{10}(\sec\theta) + \log_{10}(\text{cosec}\,\theta)$?

(a) –1 (b) 0 (c) 0.5 (d) 1

82. If $\cos^2 x + \cos x = 1$, then what is the value of $\sin^{12} x + 3\sin^{10} x + 3\sin^8 x + \sin^6 x$

(a) 1 (b) 2 (c) 4 (d) 8

83. If $0 < \theta < 90°$, $\sin\theta = \frac{3}{5}$ and $x = \cot\theta$, then what is the value of

$1 + 3x + 9x^2 + 27x^3 + 81x^4 + 243x^5$?

(a) 941 (b) 1000 (c) 1220 (d) 1365

84. The angles of elevation of the tops of two pillars of heights h and $2h$ from a point P on the line joining the feet of the two pillars are complementary. If the distances of the foot of the pillars from the point P are x and y respectively, then which one of the following is correct ?

(a) $2h^2 = x^2 y$ (b) $2h^2 = xy^2$

(c) $2h^2 = xy$ (d) $2h^2 = x^2 y^2$

85. What is the value of $\frac{\sin 19°}{\cos 71°} + \frac{\cos 73°}{\sin 17°}$?

(a) 0 (b) 1 (c) 2 (d) 4

86. The perimeter of a triangle is 22 cm. Through each vertex of the triangle, a straight line parallel to the opposite side is drawn. What is the perimeter of triangle formed by these lines ?

(a) 33 cm (b) 44 cm (c) 66 cm (d) 88 cm

87. The sides AD, BC of a trapezium $ABCD$ are parallel and the diagonals AC and BD meet at O. If the area of triangle AOB is $3cm^2$ and the area of triangle BDC is $8cm^2$, then what is the area of triangle AOD ?
(a) $8\,cm^2$ (b) $5\,cm^2$
(c) $3.6\,cm^2$ (d) $1.8\,cm^2$

88. A line segment AB is the diameter of a circle with centre at O having radius 6.5 cm. Point P is in the plane of the circle such that $AP = x$ and $BP = y$. In which one of the following cases the point P does ***not*** lie on the circle ?
(a) $x = 6.5$ cm and $y = 6.5$ cm
(b) $x = 12$ cm and $y = 5$ cm
(c) $x = 5$ cm and $y = 12$ cm
(d) $x = 0$ cm and $y = 13$ cm

89. The perimeters of two similar triangles ABC and PQR are 75 cm and 50 cm respectively. If the length of one side of the triangle PQR is 20 cm, then what is the length of corresponding side of the triangle ABC ?
(a) 25 cm (b) 30 cm
(c) 40 cm (d) 45 cm

90. Let $PQRS$ be a parallelogram whose diagonals PR and QS intersect at O. If triangle QRS is an equilateral triangle having a side of length 10 cm, then what is the length of the diagonal PR ?
(a) $5\sqrt{3}$ cm (b) $10\sqrt{3}$ cm
(c) $15\sqrt{3}$ cm (d) $20\sqrt{3}$ cm

DIRECTIONS: Read the following frequency distribution for two series of observations and answer the ***two*** items that follow :

Class interval	Frequency	
	Series-I	Series-II
10-20	20	4
20-30	15	8
30-40	10	4
40-50	x	2x
50-60	y	y
Total	100	100

91. What is the mean of frequency distribution of Series-I ?
(a) 33.6 (b) 35.6
(c) 37.6 (d) 39.6

92. What is the mode of the frequency distribution of Series-II?
(a) 26 (b) 36
(c) 46 (d) 56

DIRECTIONS: Read the following information and answer the ***four*** items that follow .
Let the distribution of number of scooters of companies X and Y sold by 5 showrooms (A, B, C, D and E) in a certain year be denoted by $S1$ and the distribution of number of scooters of only company X sold by the five showrooms in the same year be denoted by $S2$.

Showroom	A	B	C	D	E	Total number of scooters sold
S1(in%)	19	21	15	33	12	6400
S2 (in %)	24	18	20	30	8	3000

93. Number of scooters of company Y sold by showroom E is what per cent of the number of scooters of both companies sold by showroom C ?
(a) 52 (b) 54
(c) 55 (d) 56

94. Number of scooters of both the companies sold by showroom B is what per cent more than the number of scooters of company X sold by showroom A ?
(a) $78\frac{2}{3}$ (b) $83\frac{1}{3}$
(c) $86\frac{2}{3}$ (d) $88\frac{1}{3}$

95. What is the average number of scooters of company Y sold by the showrooms A, C and E ?
(a) $461\frac{1}{3}$ (b) $431\frac{1}{3}$
(c) $426\frac{1}{3}$ (d) $416\frac{1}{3}$

96. What is the difference between the number of scooters of both companies sold by showroom A and total number of scooters of company X sold by showrooms B and E together?
(a) 416 (b) 426
(c) 432 (d) 436

DIRECTIONS: Read the following information and answer the ***four*** items that follow :
The data shows that Indian roads are turning deadlier over the years.

Year	2014	2015	2016	2017
Number of bikers killed	40957	46070	52750	48746
Number of pedestrians killed	12330	13894	15746	20457
Number of cyclists killed	4037	3125	2585	3559

97. What was the average number of pedestrians killed per day in the year 2017?
(a) 51 (b) 53
(c) 54 (d) 56

98. What is the approximate percentage change in the pedestrians fatalities during the period 2014–17 ?
(a) 66% (b) 68%
(c) 71% (d) 76%

99. What is the average number of bikers killed daily in road accidents in the year 2017 ?
(a) 163 (b) 152
(c) 147 (d) 134

100. What is the average number of cyclists killed daily in road accidents in 2017 ?
(a) 10 (b) 12 (c) 19 (d) 21

ENGLISH

COMPREHENSION

DIRECTIONS: In this section, you have few 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 opinion of the author only.

Passage - I

Mankind's experience of various evolutionary changes from primitive times to the present day has been extensive and varied. However, man's problems were never before as complicated as they seem to be today. Man's economic activity centres primarily around production. Labour is said to be the primary factor of production; its role, therefore, has been given a lot of importance. It should be useful to have an overall view of the economic history of man—from the nomadic times to the modern factory system—and study its relevance to the various labour problems of today.

Initially, man passed through 'the hunting and fishing stage'. During this period, his basic needs were adequately met by Nature. Wild animals, birds and fruits satisfied his hunger, and his thirst was quenched by the waters of springs and rivers. Caves gave him shelter and barks of trees were used as clothing. During this stage of man's progress, labour problems did not exist because of the absence of any economic, political and social systems.

Then came 'the pastoral stage', which was marked by a certain amount of economic activity. The nomadic and migratory nature of man persisted and together with his goats and cattle, he moved on to fresh pastures and meadows. Some conflicts would sometimes take place among herd-owners, for, during this period, the institution of nomial private property ownership was not know.

This stage paves the way for 'the agricultural stage', during which the class system began to develop. There was a small artisan class mostly self-employed; and there were also landed proprietors or Zamindars as well as slaves. Thus, arose the feudal system. During the fourth stage of these developments, 'the handicrafts stage', a number of social and economic changes took place which marked the beginning of the labour problem in the world. The self-sufficient economy of the village underwent a drastic change. The community of traders and merchants emerged.

1. Humanity's evolution from primitive stage to the present has been
   (a) static and smooth (b) huge and diversified
   (c) always violent (d) always peaceful
2. ... "man's problems were never before as complicated as they seem to be today" means
   (a) the present times are the best times of humanity
   (b) the present times are the crucial period for humanity
   (c) the present times pose much more challenges to humans than the previous times
   (d) the present times provide much more facilities than the previous time
3. Why does the author say that labour problems did not exist during 'the hunting and fishing stage'?
   (a) There was no nation existing at that time
   (b) There were no economic, political and social systems
   (c) There was no capitalism and market
   (d) There was no labour law
4. "The pastoral stage was marked by a certain amount of economic activity." How?
   (a) Human started migrating and held goat-herds
   (b) Humans started owning land
   (c) Conflicts started as humans owned goats
   (d) Humans started doing agriculture
5. Which word in the passage means 'surfaced'?
   (a) Quenched (B) Emerged
   (c) Nomadic (a) Adequately

Passage - II

Ever since independence, land reforms have been a major instrument of State policy to promote both equity and agricultural investment. Unfortunately, progress on land reforms has been slow, reflecting the resilience of structures of power that gave rise to the problem in the first place.

The main instrument for realizing more equitable distribution of land is the land ceiling laws. These laws were enacted by several States during the late 1950s and 1960s, and the early 1970s saw more stringent amendments in the laws to plug loopholes in the earlier laws. But the record of implementation has not been satisfactory. Around 3 million hectares of land has been declared surplus so far, which is hardly 2 percent of net sown area in India. About 30 percent of this land has not yet been distributed as it is caught up in the litigations. Besides, a number of Benami and clandestine transactions have resulted in illegal possession of significant amounts of land above ceiling limits. There are widespread reports of allotment of inferior, unproductive, barren and wasteland to landless household, many of whom have been forced to sell it off, in the absence of resources to make it productive. In many instances, lands allotted to the rural poor under the ceiling laws are not in their possession. In some cases, Pattas were issued to the beneficiaries, but possession of land shown in the Pattas was not given or corresponding changes were not made in the records of right.

The balance of power in rural India is so heavily weighed against the landless and the poor that implementing land ceiling laws is difficult. It is clear that without massive mobilization of the rural poor and depending on democratic governance in rural India, very little can be achieved in this direction.

Although half of India's population continues to depend on agriculture as its primary source of livelihood, 83 percent of farmers operate holdings of less than 2 hectares in size, and the average holding size is only 1.23 hectares. This is often in fragments and unirrigated. There are also those who are entirely landless, although agriculture is their main source of livelihood. They have inadequate financial resources to purchase and often depend on leasing in small plots, on insecure terms, for short periods, sometimes only for one season. Hence, many face

insecurity of tenure and the growing threat of land alienation and pressure from urbanization, industrialization and powerful interest.

6. Why does the land reform prove to be slow?
   (a) Because of the disparity in power structure
   (b) Because of the power of the government
   (c) Because States have different laws
   (d) Because of the scarcity of land in the country
7. Which of the following statements is/are correct?
   1 Land ceiling laws have proved to be unsatisfactory.
   2 The democratic structure of the government cannot provide solution to the problem of land reforms.
   3 The owners of land have abundant natural resources.
   4 Identified land for distribution has not been distributed due to court cases against it. Select the correct answer using the code given below.
   (a) 1 and 4 (b) 1 only
   (c) 3 and 4 (d) 2 and 4
8. One of the reasons of selling off the lands by the allottees is that the lands were
   (a) unproductive and barren
   (b) salty, not getting water
   (c) fertile, but uncultivable
   (d) with the powerful people
9. Which word/group of words in the passage means 'lawsuit?
   (a) Amendments (b) Litigations
   (c) Illegal possession (d) Fragments
10. According to the author, what is the primary source of livelihood of majority of India's population?
   (a) Industry (b) Forest
   (c) Agriculture (d) None
11. "There are also those who are entirely landless, although agriculture is their main source of livelihood" means
   (a) they do not have money to buy lands
   (b) they have sold off their lands to others
   (c) most of them are agriculture labourers
   (d) they are migrant labourers from other places

Passage - III

Despite downsizings, workers' overall job satisfaction actually improved between 1988 and 1994. Some reasons, given were improved work flow, better cooperation between departments, and increased fairness in supervision. Many firms today rely on attitude surveys to monitor how employees feel about working in their firms.

The use of employee attitude surveys had grown since 1944 when the National Industrial Conference Board "had difficulty finding fifty companies that had conducted opinion surveys". Today, most companies are aware of the need for employees' anonymity, the impact of both the design of the questions and their sequence, the importance of effective communication, including knowing the purpose of the survey before it is taken and getting feedback to the employees after it is completed. Computerization of surveys can provide anonymity, if there is no audit trail to the user, especially for short answers that are entered rather than written or typed on an identifiable machine.

Survey software packages are available that generate questions for a number of standard topics and can be customized by modifying existing questions or by adding questions. If the survey is computerized, reports can be generated with ease to provide snapshots of a given period of time, trend analysis, and breakdowns according to various demographics. You may be interested in responses by age, sex, job categories, departments, division, functions or geography.

The survey can be conducted by placing microcomputers in several locations convenient for employees' use. Employees are advised where the computers will be, for how long, an when the data will be collected (for instance, daily at 5:00 p.m. for three weeks). The screens should not be viewable to supervisors or passers by. While there may be some risk that employees will take the survey more are comparable risks with other methods too.

Managers may be interested in knowing how they are perceived by their peers and subordinates. Packages are available that can be customized, which allow the manager to complete a self-assessment tool used to compare self-perceptions to the anonymous opinions of others. This comparison may assist in the development of a more effective manager.

12. Which one of the following is not the reason for improved job satisfaction of employees?
   (a) Improved work flow
   (b) Better cooperation between departments
   (c) Supervisors' fairness
   (d) Increased remuneration
13. Companies feel that it is necessary to
   (a) maintain anonymity of the employees and to have effective design and sequence of questions and effective communication
   (b) maintain the fairness of the managers to be part of the survey
   (c) conduct surveys from their employees
   (d) maintain anonymity of the employees and not to have effective design and sequence of questions and effective communication
14. One major benefit of using survey software packages is
   (a) reports can be generated easily
   (b) privacy of a person is exposed to the supervisors
   (c) employees would like to take up the test on computer
   (d) employer can get to know the information immediately
15. Which word in the passage means 'tendency'?
   (a) Trend (b) Breakdowns
   (c) Convenient (d) Perceptions
16. "The screens should not be viewable to supervisors or passers-by." Why?
   (a) To maintain the secrecy of a person
   (b) The main problem is to enable everyone to participate
   (c) The manager has to be fair enough
   (d) To maintain the problems faced by women in job market
17. What does the word 'customized' mean here?
   (a) Adapted
   (b) Take as it is
   (c) Fixed
   (d) Mass produced

ORDERING OF WORDS IN A SENTENCE

DIRECTIONS: Each of the following items in this section consists of a sentence, the parts of which have been jumbled. These parts have been labelled as P, Q, R and S. Given below each sentence are four sequences namely (a), (b), (c) and (d). You are required to rearrange the jumbled parts of the sentence and mark your response on the Answer sheet accordingly.

18. the company are often asked (P) the formal or informal interviews (Q) employees who are leaving (R) for their opinions during (S)

(a) RPSQ (b) RQPS (c) PSQR (d) PQSR

19. a hailstorm activity in the evenings (P) there is a possibility of (Q) while there could be (R) heavy rain towards the weekend (S)

(a) SQPR (b) QSRP (c) QRPS (d) SPRQ

20. has been below normal since last week (P) the minimum temperature (Q) in some part of the city (R) when rain and hailstorm activity recorded (S)

(a) RSPQ (b) SPRQ (c) QPSR (d) PSQR

21. for guest teachers (P) in the department of Biotechnology (Q) was also held (R) a Selection Committee meeting (S)

(a) SPRQ (b) QRSP (c) PRQS (d) RSPQ

22. for contractual assignment at Cultural Centres abroad (P) as Teacher of Indian Culture for two years (Q) applications are invited in a prescribed format (R) from Indian Nationals for deployment (S)

(a) QPRS (b) SRPQ (c) PQRS (d) RSQP

23. while they are small (P) and do the great things (Q) while they are easy (R) do the difficult things (S)

(a) SRQP (b) PSQR (c) SRPQ (d) QPSR

24. then you sure (P) if you can't (Q) don't deserve me at my best (R) handle me at my worst (S)

(a) PRQS (b) QSPR (c) RQSP (d) PSRQ

25. you will be more disappointed (P) than by the ones you did do (Q) by the things you didn't do (R) twenty years from now (S)

(a) PRSQ (b) PRQS (c) PQSR (d) SPRQ

26. man is one who can lay (P) a firm foundation with the bricks (Q) a successful (R) others have thrown at him (S)

(a) PQSR (b) RQSP (c) RPQS (d) QSPR

27. what we may be (P) but we know not (Q) we know (R) what we are (S)
(a) RSQP (b) QPRS (c) QRPS (d) RQPS

28. for the ordinary (P) not willing to risk the unusual (Q) if you are (R) you will have to settle (S)
(a) PRQS (b) SPQR (c) RQSP (d) QSRP

29. as mere stepping stones (P) his major achievements (Q) for the next advance (R) he regarded (S)
(a) SPQR (b) SQPR (c) SPRQ (d) RPQS

30. have a great influence (P) and they often shape our personality (Q) on our adult lives (R) events in our childhood (S)
(a) SPRQ (b) SQRP (c) SRQP (d) PQRS

SPOTTING ERRORS

DIRECTIONS: Each item in this section has a sentence which has multiple parts. Find out the error/ no error and indicate your response from the options (a), (b), (c) and (d) on the Answer Sheet.

31. Experience has shown that the change-over from a closed economy to a mercantile economy has presented in human society innumerable problem.
(a) Experience has shown that
(b) the change-over from a closed economy
(c) to a mercantile economy has presented
(d) in human society innumerable problem

32. A closed economy is identified as a human community which produces all it consumes and consumed all it produces.
(a) A closed economy is identified
(b) as a human community
(c) which produces all it consumes
(d) and consumed all it produces

33. Iron is the most useful against all metals.
(a) Iron is (b) the most useful
(c) against all metals (d) No error

34. Mumbai is largest cotton centre in the country.
(a) Mumbai is (b) largest cotton centre
(c) in the country (d) No error

35. While every care have been taken in preparing the results, the company reserves the right to correct any inadvertent errors at a later stage.
(a) While every care have been taken
(b) in Preparing the results,
(c) the company reserves the right to correct
(d) any inadvertent errors at a later stage

36. My sister and me are planning a trip from Jaipur to Delhi.
(a) My sister and me are
(b) planning a trip
(c) from Jaipur to Delhi
(d) No error

37. Despite the thrill of winning the lottery last week, my neighbour still seems happy.
(a) Despite the thrill of winning
(b) the lottery last week,
(c) my neighbour
(d) still seems happy

38. Children are not allowed to use the swimming pool unless they are with an adult.
(a) Children are not allowed
(b) to use the swimming pool
(c) unless they are with an adult
(d) No error

39. Her knowledge of Indian languages are far beyond the common.
(a) Her knowledge
(b) of Indian languages
(c) are far beyond the common
(d) No error

40. The care, as well as the love of a father, were missing in her life.
(a) The care, as well as the love
(b) of a father,
(c) were missing in her life
(d) No error

41. You look as if you have ran all the way home
(a) You look as if (b) you have ran
(c) all the way home (d) No error

42. The real voyage of discovery consist not in seeking new landscapes, but in having new eyes.
(a) The real voyage of discovery
(b) consist not in seeking new landscapes,
(c) but in having new eyes
(d) No error

43. No struggle can ever succeeded without women participating side by side with men.
(a) No struggle can ever succeeded
(b) without women participating
(c) side by side with men
(d) No error

44. Education is the passport to the future, for tomorrow belong to those who prepare for it today.
(a) Education is the passport to the future
(b) tomorrow belong to those
(c) who prepare for it today
(d) No error

45. There come a time when you have to choose between turning the page and closing the book.
(a) There come a time
(b) when you have to choose
(c) between turning the page
(d) and closing the book

PARTS OF SPEECH

DIRECTION: Given below are a few sentences. Identify the part of speech of the underlined words. Choose the response (a), (b), (c) or (d) which is the most appropriate expression.

46. Rita eats her dinner quickly.
(a) Verb (b) Preposition
(c) Adjective (d) Adverb

47. He thought the movie ended abruptly.
(a) Noun (b) Adverb
(c) Verb (d) Adjective

48. I will meet you in the third week of August.
(a) Pronoun (b) Verb
(c) Preposition (d) Noun

49. Jasmines and roses are my favourite flowers.
(a) Verb (b) preposition
(c) Conjunction (d) Interjection

50. She truthfully answered the detective's questions.
(a) Verb (b) Adjective
(c) Noun (d) Adverb

51. Hurrah! We won the game!
(a) Interjection (b) Conjunction
(c) Noun (d) Pronoun

52. The son writes meaningless letters to his father.
(a) Adverb (b) Verb
(c) Pronoun (d) Adjective

53. The secretary himself visited the affected families.
(a) Verb (b) Noun
(c) Adverb (d) Pronoun

54. The children were walking through the forest.
(a) Verb (b) Adverb
(c) Adjective (d) Preposition

55. The Presiding Officer walked slowly to the dais.
(a) Adverb (b) Adjective
(c) Verb (d) Noun

ANTONYMS

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

56. Beauty lies in the eyes of the beholder.
(a) Allure (b) Charm
(c) Inelegance (d) Ideal

57. Reading details about suicide cases can push vulnerable people taking the extreme step.
(a) Imperious (b) Impervious
(c) Helpless (d) Defenseless

58. Standing before a judge in a courtroom can be daunting for anyone.
(a) Uncomfortable (b) Encouraging
(c) Demoralizing (d) Off-putting

59. He has been facing a kind of intimidation by his friends for last two years.
(a) Wiles (b) Conviction
(c) Persuasion (d) support

60. There are many factors that constrain the philosophy of job enrichment in practice.
(a) Oblige (b) Pressure
(c) Restrict (d) Support

61. People look for plausible remedies to the problems which they do not know.
(a) Acceptable (b) Unthinkable
(c) Solvable (d) Believable

62. The departing speech of the Chairperson ended with a plaintive note.
(a) Melancholic (b) Gleeful
(c) Doleful (d) Adventurous

63. The members have taken a unanimous decision to discord some of the rulings of the Managing Committee on problems relating to maintenance.
(a) Accord (b) Dissension
(c) Dispute (d) Friction

64. The insolent nature of the speaker had provoked the members of the house and this led to pandemonium.
(a) Respectful (b) Autocratic
(c) Impudent (d) Thought provoking

65. Incessant rains have resulted in failure of crops during this season.
(a) Sporadic (b) Persistent
(c) Continual (d) Ceaseless

SYNONYMS

DIRECTIONS: Each item in this section consist 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 your Answer Sheet accordingly.

66. The properties of the family have been impounded by the order of the court.
(a) Confiscated (b) Permitted
(c) Sold (d) Put on hold

67. The officer in charge of the operations has been impugned for the excesses.
(a) Expelled (b) Rewarded
(c) Challenged (d) Given allowance

68. Cognitivist and linguists believe that every child is born with innate qualities.
(a) Biological (b) Intrinsic
(c) Extrinsic (d) Unnatural

69. It was obligatory for the board to implement the rule.
(a) Compulsory (b) Unnecessary
(c) By chance (d) Problematic

70. They describe the act as a blatant betrayal of faith.
(a) Loyal (b) Faithfulness
(c) Treachery (d) Honesty

71. However, if it must decide, then it should do so on the narrowest ground possible.
(a) Widest (b) Slightly
(c) Smallest (d) Thlck

72. This is akin to a contractual relationship that places obligations on the entities entrusted with data.
(a) Removed (b) Narrow
(c) Similar (d) Unparallel

73. Many communication problems can be attributed directly to misunderstandings and inaccuracies.
(a) Disapproved (b) Unofficial
(c) Ascribed (d) Tribute

74. The exemptions granted to State institutions for acquiring informed consent from processing personal data in many cases appear to be too blanket.
(a) Obtain (b) Lose
(c) Giving (d) Thinking

75. The manner in which this exercise has been undertaken leaves much to be desired.
(a) Disliked (b) Unlikely
(c) Wish for (d) Asked for

ORDERING OF SENTENCES

DIRECTIONS: In this section, each item consists of six sentences of a passage. The first and sixth sentences are given in the beginning as S1 and S6. The middle four sentences in each item have been jumbled up and labelled as P, Q, R and S. You are required to find the proper sequence of the four sentences and mark your response accordingly on the Answer Sheet.

76. S1 : The master always says, "Refuse to be miserable".
S6 : This is the art of right contact in life.
P : Before you fall into self-pity and blame games, remember that responsibility comes to only those who feel responsible.
Q : Challenges are faced by the strong and courageous, and if life brings you such opportunities, then turn failures into success.
R : Life can be painful, but it need not be sorrowful.
S : If you want to be happy, find occasions to be cheerful.
The correct sequence should be
(a) RSPQ (b) SQPR
(c) QRSP (d) RQSP

77. S1 : Gandhiji reached Newcastle and took charge of the agitation.
S6 : The treatment that was meted out to these brave men and women in jail included starvation and whipping, and being forced to work in the mines by mounted military police.
P : During the course of the march, Gandhiji was arrested twice, released, arrested a third time and sent to jail.
Q : The employers retaliated by cutting off water and electricity to the workers' quarters, thus forcing them to leave their homes.
R : Gandhiji decided to march this army of over two thousand men, women and children over the border and thus see them lodged in Transvaal jails.
S : The morale of the workers, however, was very high and they continued to march till they were prosecuted and sent to jail.
The correct sequence should be
(a) QRPS (b) SRQP
(b) QPSR (c) RQSP

78. S1 : One of the most important forces in the modern world, socialism was a direct result of the Industrial Revolution.
S6 : This is how socialism as a theory and practice came into being.
P : Socialism was a direct challenge to capitalism and sought to put an end to such an exploitative economic structure.
Q : The gulf between the 'haves' and the 'have nots' continued to increase and out of this gap between the rich and poor sprang disputes.
R : It generated new wealth but as this new wealth only went to a minority, it could not solve the question of distribution.
S : The Industrial Revolution solved the question of production.
The correct sequence should be
(a) PQRS (b) SRQP
(c) SRPQ (d) RQSP

79. S1 : Institutions define and play a regulatory role with regard to human behaviour.
S6 : It shows how important it is for a nation to build institutions for nurturing democracy.
P : Once established, institutions set a dynamic relationship with the members constituting them and they mutually affect each other.
Q : They shape preferences, power and privilege.
R : At the same time, institutions themselves can be transformed by the politics they produce and such transformation can affect social norms and behaviours.
S : They also provide a sense of order and predictability.
The correct sequence should be
(a) RPQS (b) QRSP
(c) PSRQ (d) QSRP

80. S1 : Idioms are a colourful and fascinating aspect of language.
S6 : Idioms may also suggest a particular attitude of the person using them, for example, disapproval, humour, exasperation or admiration, so you must use them carefully.
P : Your language skills will increase rapidly if you can understand idioms and use them confidently and correctly.
Q : They are commonly used in all types of language, informal and formal, spoken and written.

R : In addition, idioms often have a stronger meaning than non-idiomatic phrases.
S : One of the main problems students have with idioms is that it is often impossible to guess the meaning of an idiom from the words it contains.
The correct sequence should be
(a) RQPS (b) RSPQ
(c) SRQP (d) QPSR

81. S1 : Each organism is adapted to its environment.
S6 : What can be taken in and broken down depends on the body design and functioning.
P : There is a range of strategies by which the food is taken in and used by the organism.
Q : For example, whether the food source is stationary (such as grass) or mobile (such as deer), would allow for differences in how the food is accessed and what is nutritive apparatus used by a cow or a lion.
R : The form of nutrition differs depending on the type and availability of food material as well as how it is obtained by an organism.
S : Some organisms break down the food material outside the body and then absorb it and others take in the whole material and break it down inside their bodies.
The correct sequence should be
(a) RQPS (b) QPSR
(c) SQPR (d) QPRS

82. S1 : "When I was alive and had a human heart," answered the statue, "I did not know what tears were, for I lived in the Palace of Sans-Souci where sorrow is not allowed to enter.
S6 : And now that I am dead they have set me up here so high that I can see all the ugliness and all the misery of my city, and though my heart is made of lead yet I cannot choose but weep."
P : So I lived, and so I died.
Q : Round the garden ran a very lofty wall, but I never cared to ask what lay beyond it, everything about me was so beautiful.
R : My courtiers called me the Happy Prince, and happy indeed I was, if pleasure be happiness.
S : In the daytime I played with my companions in the garden and in the evening I led the dance in the Great Hall.
The correct sequence should be
(a) QSRP (b) PQRS
(c) PRQS (d) RPQS

83. S1 : One day her mother, having made some cakes, said to her, "Go, my dear, and see how your grandmother is doing, for I hear she has been very ill. Take her a cake, and this little pot of butter."
S6 : "Does she live far off?" said the wolf.
P : He asked her where she was going.
Q : The poor child, who did not know that it was dangerous to stay and talk to a wolf, said to him, "I am going to see my grandmother and carry her a cake and a little pot of butter from my mother."
R : As she was going through the wood, she met with a wolf, who had a very great mind to eat her up, but he dared not, because of some woodcutters working nearby in the forest.
S : She set out immediately to go to her grandmother, who lived in another village.
The correct sequence should be
(a) PRQS (b) SRPQ
(c) PRSQ (d) RPQS

84. S1 : I had spent many nights in the jungle looking for game, but this was the first time I had ever spent a night looking for a man-eater.
S6 : It was in this position my men an hour later found me fast asleep; of the tiger I had neither heard nor seen anything.
P : I bitterly regretted the impulse that had induced me to place myself at the man-eater's mercy.
Q : The length of road immediately in front of me was brilliantly lit by the moon, but to right and left the overhanging trees cast dark shadows, and when the night wind agitated the branches and the shadows moved, I saw a dozen tigers advancing on me.
R : As the grey dawn was lighting up the snowy range which I was facing, I rested my head on my drawn-up knees.
S : I lacked the courage to return to the village and admit I was too frightened to carry out my self-imposed task, and with teeth chattering, as much from fear as from cold, I sat out the long night.
The correct sequence should be
(a) QPSR (b) SRPQ
(c) PRSQ (d) RPQS

IDIOMS/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.

85. Dirt cheap
(a) Extremely cheap (b) Extremely costly
(c) Very cheap person (d) Very cheap item

86. A shrinking violet
(a) A lean person (b) A shy person
(c) A happy person (d) A sad person

87. Gordian knot
(a) Undoable job (b) A difficult problem
(c) A different problem (d) Doable job

88. Fall in a heap
(a) To be at the mercy of someone else
(b) To be thinking about someone
(c) To lose control of one's own feelings
(d) To be in control of one's own feelings

89. Have a conniption fit
(a) To be very angry
(b) To be very happy
(c) To be very sad
(d) To be a jubilant person

90. Be in seventh heaven
    (a) To be extremely happy
    (b) To be extremely upset
    (c) To be extremely adventurous
    (d) To be extremely silent
91. Hand in glove
    (a) Working separately
    (b) Working together
    (c) Working for someone
    (d) Not willing to work
92. Nip in the bud
    (a) Prevent a small problem before it becomes severe
    (b) Prevent the big problems
    (c) Make it severe
    (d) Beating the problem
93. Like a shag on a rock
    (a) Completely alone
    (b) Completely idle
    (c) Complete silence
    (d) Complete happy
94. A pearl of wisdom
    (a) An important piece of news
    (b) An important person
    (c) An important thing for life
    (d) An important piece of advice

CLOZE COMPREHENSION

DIRECTIONS: Each of the following passages in this section has some blank spaces with four words or groups of words given. Select whichever word or group of words you consider most appropriate for the blank space and indicate your response on the Answer Sheet accordingly.

Comprehension-I

95. The founders of the Indian Republic ____ the farsightedness and the courage to
    (a) had
    (b) has
    (c) has had
    (d) were
96. commit _____ to two major innovations of historical significance in
    (a) them
    (b) themselves
    (c) the people
    (d) the course
97. nation-building and social engineering : first, to _____ a democratic and civil
    (a) build
    (b) building
    (c) constructing
    (d) built
98. _____ society among illiterate people and, second, to undertake economic
    (a) libertarian
    (b) liberation
    (c) liberating
    (d) liberty
99. development _____ democratic political structure. Hitherto, in all
    (a) with a
    (b) within a
    (c) for the
    (d) without a
100. societies in which an economic takeoff or an early industrial and agricultural _____ had occurred, effective democracy, especially from the working
    (a) breakthrough
    (b) breakout
    (c) breaking
    (d) investment

101. people, had been extremely limited. On the other hand, _____ the begining,
(a) with
(b) from
(c) within
(d) for

102. India was committed to _____ democratic and civil libertarian political order
(a) few
(b) some
(c) a
(d) an

103. and a representative system of government _____ on free and fair elections o be conducted on the basis of universal adult franchise.
(a) basing
(b) basis of
(c) based
(d) function

Comprehension-II

104. Ecology, in a very simple term, is a science that _____ the interdependent,
(a) studies
(b) study
(c) studying
(d) exploring

105. mutually reactive and interconnected relationships _____ the organisms and
(a) among
(b) between
(c) to
(d) for

106. _____ physical environment on the one hand and among the organisms on the
(a) their
(b) its
(c) theirs
(d) all

107. other hand. _____ the term 'ecology' was first coined and used by the
(a) Through
(b) In spite of
(c) Though
(d) Because

108. German biologist Ernst Haeckel in 1869, a few conceptual terms _____
(a) are
(b) were
(c) have been
(d) have

109. already proposed to reveal relationships _____ organisms and their environment.
(a) among
(b) those
(c) of
(d) between

110. For example, French zoologist I. G. Hilaire used the term 'ethology' _____ the
(a) for
(b) to
(c) with
(d) in

111. study of the relations of _____ organisms within the family and society in the
(a) the
(b) a
(c) live
(d) dead

112. aggregate and in the community. British naturalist St. George Jackson Mivart proposed the term 'hexicology' with regard to the study of the relations _____ living creatures
(a) for
(b) of
(c) within
(d) in

113. to other organisms and their environment as regards the nature of the locality they frequent, the temperatures and the _____ of light which suit them, and their relations to other organisms as enemies, rivals, or accidental and involuntary benefactors.
(a) amount
(b) focus
(c) share
(d) quality

SPELLING

DIRECTIONS: In this section, a word is spelled in four different ways. You are to identify the one which is correct. Choose the alternative bearing the correct spelling from (a), (b), (c) and (d).

114. (a) Accommodate (b) Acomodate
(c) Accomdate (d) Acomodait

115. (a) Recommand (b) Reccommend
(c) Recommend (d) Reccomand

116. (a) Argyument (b) Argument
(c) Arguement (d) Argyooment

117. (a) Decisive (b) Desicive
(c) Descisive (d) Desisive

118. (a) Aggressive (b) Agresive
(c) Agressive (d) Aggresive

119. (a) Assassination (b) Asassination
(c) Asasination (d) Assasination

120. (a) Embarassment (b) Embbarasment
(c) Embrasement (d) Embarrassment

GENERAL KNOWLEDGE

1. The term soil impoverishment relates to which one of the following ?
(a) Soil erosion
(b) Soil deposition
(c) Soil getting very deficient in plant nutrients
(d) Soil getting enriched with plant nutrients

2. Which one of the following is the correct sequential phase in the successional development of vegetation community in a habitat ?
(a) Migration, Reaction, Stabilization and Nudation
(b) Migration, Stabilization, Reaction and Nudation
(c) Nudation, Migration, Reaction and Stabilization
(d) Reaction, Migration, Stabilization and Nudation

3. Match List I with List II and select the correct answer using the code given below the lists :

List I (Soil type)		**List II (Major characteristic)**
A. Oxisols	1.	Very rich in organic matter
B. Vertisols	2.	Soil lacking horizons
C. Histosols	3.	Very old and highly weathered
D. Entisols	4.	Rich in clay content and highly basic

Code :

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

4. Which one of the following mountains separates Black Sea and Caspian Sea ?
(a) Urals (b) Caucasus
(c) Carpathians (d) Balkan mountains

5. Rains caused by thunderstorms during the hot weather season (mid-March to mid-June) in Karnataka are called
(a) Kalbaisakhi (b) Mango showers
(c) Loo (d) Cherry blossoms

6. Which one of the following is the largest fresh water lake in India ?
(a) Chilika (b) Loktak
(c) Dal (d) Wular

DIRECTION: The following 4 (four) items consist of two statements, Statement I and Statement II. Examine these two statements carefully and select the correct answer using the code given below:

Code :
(a) Both the statements are individually true and Statement II is the correct explanation of Statement I.
(b) Both the statements are individually true but Statement II is ***not*** the correct explanation of Statement I.
(c) Statement I is true but Statement II is false.
(d) Statement I is false but Statement II is true.

7. *Statement I :*
The Greek travellers were most impressed by the fertility of India's soil and the energy and ability of her cultivators.

Statement II :

Ancient India knew the use of manure.

8. *Statement I:*

Non-cooperation began in Punjab with the student movement inspired by Lala Lajpat Rai in January 1921.

Statement II :

The Sikh dominated central Punjab countryside was stirred by the powerful Akali upsurge.

9. *Statement I:*

The Oudh Kisan Sabha established in 1920 failed to bring under its wing any Kisan Sabhas.

Statement II :

The Oudh Kisan Sabha asked the Kisans to refuse to till bedakhli land, not to offer hari and begar.

10. *Statement I :*

The United Provinces during Non-Cooperation became one of the strongest bases of the Congress.

Statement II :

The literary outcrop of Non-Cooperation in Bengal was quite meagre compared to the days of the Swadeshi agitation.

11. Who were Alvars ?
(a) Those who immersed in devotion to Vishnu
(b) Devotees of Shiva
(c) Those who worshipped abstract form God
(d) Devotees of Shakti

12. Which one of the following is monatomic ?
(a) Hydrogen (b) Sulphur
(c) Phosphorus (d) Helium

13. In graphite, each carbon atom is bonded to three other carbon atoms
(a) forming a three-dimensional structure
(b) in the same plane giving a hexagonal array
(c) in the same plane giving a square array
(d) in the same plane giving a pentagonal array

14. Soap solution used for cleaning purpose appears cloudy. This is due to the fact that soap micelles can
(a) refract light (b) scatter light
(c) diffract light (d) polarize light

15. People prefer to wear cotton clothes in summer season. This is due to the fact that cotton clothes are
(a) good absorbers of water
(b) good conveyors of heat
(c) good radiators of heat
(d) good absorbers of heat

16. Employing Chromatography, one cannot separate
(a) radio-isotopes
(b) colours from a dye
(c) pigments from a natural colour
(d) drugs from blood

17. Consider the following statement:
"Atomic number of an element is a more fundamental property than its atomic mass." Who among the following scientists has made the above statement ?
(a) Dmitri Mendeleev (b) Henry Moseley
(c) J.J. Thomson (d) Ernest Rutherford

18. Which one of the following acids, is also known as Vitamin C?
(a) Methanoic acid (b) Ascorbic acid
(c) Lactic acid (d) Tartaric acid

19. Which one of the following is *not* found in animal cells ?
(a) Free ribosomes (b) Mitochondria
(c) Nucleolus (d) Cell wall

20. Marsilea, Fern and Horse-tail are examples of which one of the following plant groups ?
(a) Pteridophyta (b) Bryophyta
(c) Gymnosperms (d) Angiosperms

21. Which one of the following organisms is responsible for sleeping sickness ?
(a) Leishmania (b) Trypanosoma
(c) Ascaris (d) Helicobacter

22. Which one of the following body parts/organs of the human body does ***not*** have smooth muscles ?
(a) Ureters (b) Iris of eye
(c) Bronchi of lungs (c) Biceps

23. What is Inter-cropping ?
(a) It is the time period between two cropping seasons.
(b) It is growing of two or more crops in random mixture.
(c) It is growing of two or more crops in definite row patterns.
(d) It is growing of different crops on a piece of land in a pre-planned succession.

24. Magnification is
(a) actual size of specimen/observed size
(b) observed size of specimen/actual size
(c) actual size of specimen – observed size
(d) actual size of specimen × observed size

25. Which one of the following cell organelles is known as 'suicide bags' of a cell ?
(a) Lysosomes (b) Plastids
(c) Endoplasmic reticulum (d) Mitochondria

26. Which one of the following statements with regard to economic models is ***not*** correct ?
(a) They involve simplification of complex processes.
(b) They represent the whole or a part of a theory.
(c) They can be expressed only through equations.
(d) They help in gaining an insight into cause and effect.

27. The value of the slope of a normal demand curve is
(a) positive (b) negative
(c) zero (d) infinity

28. Which one of the following is an example of a price floor ?
(a) Minimum Support Price (MSP) for Jowar in India
(b) Subsidy given to farmers to buy fertilizers
(c) Price paid by people to buy goods from ration shops
(d) Maximum Retail Price (MRP) printed on the covers/ packets of goods sold in India

29. Which one of the following factors is ***not*** considered in determining the Minimum Support Price (MSP) in India ?
(a) Cost of production
(b) Price trends in international and domestic markets
(c) Cost of living index

(d) Inter-crop price parity

30. Which one of the following is ***not*** a dimension of the Human Development Index ?
(a) A long and healthy life
(b) Knowledge
(c) Access to banking and other financial provisions
(d) A decent standard of living

31. Gini Coefficient or Gini Ratio can be associated with which one of the following measurements in an economy ?
(a) Rate of inflation (b) Poverty index
(c) Income inequality (d) Personal income

32. Consider the following statements :
1. Particles of matter intermix on their own.
2. Particles of matter have force acting between them.
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.

33. Rate of evaporation increases with
(a) an increase of surface area
(b) an increase in humidity
(c) a decrease in wind speed
(d) a decrease of temperature

34. If an object is at rest, then the time (X-axis) versus distance (Y-axis) graph
(a) is vertical
(b) is horizontal
(c) has 45° positive slope
(d) has 45° negative slope

35. Consider the following statements about mixture :
1. A substance can be separated into other kinds of matter by any physical process.
2. Dissolved sodium chloride can be separated from water by the physical process of evaporation.
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

36. Which one of the following statements is ***not*** correct ?
(a) Elements are defined by the number of protons they possess.
(b) Isobars are atoms having the same atomic number but different mass number.
(c) The mass number of an atom is equal to the number of nucleons in its nucleus.
(d) Valency is the combining capacity of an atom.

37. If the speed of a moving magnet inside a coil increases, the electric current in the coil
(a) increases (b) decreases
(c) reverses (d) remains the same

38. The frequency (in Hz) of a note that is one octave higher than 500 Hz is
(a) 375 (b) 750
(c) 1000 (d) 2000

39. Which of the following statements as per the Constitution of India are ***not*** correct ?
1. The President tenders his resignation to the Chief Justice of India.
2. The Vice-President tenders his resignation to the President of India.
3. The Comptroller and Auditor General of India is removed from his office in the like manner as the President of India.
4. A Judge of the Supreme Court can resign his office by writing under his hand addressed to the Chief Justice of India.
Select the correct answer using the code given below :
(a) 1 and 2 only (b) 3 and 4 only
(c) 1, 2 and 3 (d) 1, 3 and 4

40. Rajya Sabha has exclusive jurisdiction in
(a) creation of new States
(b) declaring a war
(c) financial emergency
(d) authorizing Parliament to legislate on a subject in the State List

41. Which one of the following statements about the Government of India Act, 1919 is ***not*** correct ?
(a) It extended the practice of communal representation.
(b) It made the Central Executive responsible to the Legislature.
(c) It is also known as the Montague-Chelmsford Reforms.
(d) It paved the way for federalism by clearly separating the responsibilities of the Centre and the Provinces.

42. The concept of "Four Pillar State", free from district magistracy for India was suggested by
(a) Lala Lajpat Rai
(b) Ram Manohar Lohia
(c) Raja Ram Mohan Roy
(d) Subash Chandra Bose

43. Which one among the following is ***not*** a part of the Fundamental Rights (Part III) of the Constitution of India ?
(a) Prohibition of traffic in human beings and forced labour
(b) Prohibition of employment of children in factories
(c) Participation of workers in management of industries
(d) Practice any profession, or to carry on any occupation, trade or business

44. Which one of the following, is ***not*** a geographical requirement for cultivation of cotton ?
(a) Temperature reaching 25°C or more in summer
(b) Moderate to light rainfall
(c) Medium loam soil with good drainage
(d) A growing period of at least 100 frost free days

45. Which one of the following statements regarding temperate coniferous forest biome is ***not*** correct ?
(a) They are characterized by very little undergrowth.
(b) They have a growing period of 50 to 100 days in a year.
(c) There is low variation in annual temperature.
(d) There is high range in spatial distribution of annual precipitation.

46. Match List I with List II and select the correct. answer using the code given below the lists :

List I	**List II**

(Peak)		(Name of Hill)
A.	Anaimudi	1. Nilgiri
B.	Doddabetta	2. Satpura
C.	Dhupgarh	3. Aravali
D.	Guru Shikhar	4. Annamalai

Code :

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

47. Coral reefs are ***not*** found in which one of the following regions ?
(a) Lakshadweep Islands (b) Gulf of Kachchh
(c) Gulf of Mannar (d) Gulf of Cambay

48. In which one of the following States is jute ***not*** significantly cultivated ?
(a) Assam (b) West Bengal
(c) Odisha (d) Andhra Pradesh

49. Consider the following statements :
1. According to Mahavamsa, Ashoka turned to the Buddha's dhamma when his nephew Nigrodha preached the doctrine to him.
2. Divyavadana ascribes Ashoka being drawn to the Buddha's teaching to the influence of Samudra, a merchant-turned monk.
3. Dipavamsa speaks of Samudra, the 12-year-old son of a merchant, as the key figure in Ashoka's coming under the influence of the Buddhist dhamma.

Which of the statements given above is/are correct ?
(a) 1 only (b) 2 only
(c) 1 and 2 (d) 1 and 3

50. Name the site that gives us valuable information about India's maritime links on the Coromandel coast.
(a) Bharukachchha (b) Karur
(c) Arikamedu (d) Anuradhapura

51. Where are the largest quantity of cichlids found in India ?
(a) Backwaters of Kerala (b) Sunderbans
(c) Narmada (d) Godavari

52. Which Greek philosopher coined the term "Geography" in the 3rd century B.C.E. ?
(a) Euclid (b) Plato
(c) Eratosthenes (d) Clio

53. Who is the author of the 16th century Sanskrit text, the Vraja Bhakti Vilasa which focuses on the Braj region in North India?
(a) Todar Mal (d) Narayana Bhatta
(c) Chaitanya (d) Rupa Goswami .

54. Bose-Einstein Condensate is
(a) solid state of matter (b) fifth state of matter
(c) plasma (d) state of condensed matter

55. The rate of evaporation of liquid does ***not*** depend upon
(a) temperature
(b) its surface area exposed to the atmosphere
(c) its mass
(d) humidity

56. Rutherford's alpha particle scattering experiment on thin gold foil was responsible for the discovery of
(a) electron (b) proton
(c) atomic nucleus (d) neutron

57. Food chain is
(a) relationship between autotrophic organisms
(b) exchange of genetic material between two organisms
(c) passage of food (and thus energy) from one organism to another
(d) modern entrepreneur establishment providing food outlets

58. Which one of the following is active transport ?
(a) It is the movement of a substance against a diffusion gradient with the use of energy from respiration.
(b) It is the movement of a substance against a diffusion gradient without the use of energy.
(c) It is the movement of a substance against a diffusion gradient with the use of energy from photosynthesis,
(d) It is the movement of a substance along a diffusion gradient with the use of energy from respiration.

59. Chlorophyll in photosynthetic prokaryotic bacteria is associated with
(a) plastids (b) membranous vesicles
(c) nucleoids (d) chromosomes

60. What do you mean by 'Demographic Dividend' ?
(a) A rise in the rate of economic growth due to a higher share of working age people in a population
(b) A rise in the rate of literacy due to development of educational institutions in different parts of the country
(c) A rise in the standard of living of the people due to the growth of alternative livelihood practices
(d) A rise in the gross employment ratio of country due to government policies

61. Which one of the following equals Personal Disposable Income?
(a) Personal Income – Direct taxes paid by households and miscellaneous fees, fines, etc.
(b) Private Income – Saving of Private Corporate Sectors – Corporation Tax
(c) Private Income – Taxes
(d) Total expenditure of Households – Income Tax – Gifts received

62. The working of the price mechanism in a free-market economy refers to which one of the following ?
(a) The interplay of the forces of demand and supply
(b) Determination of the inflation rate in the economy
(c) Determination of the economy's propensity to consume
(d) Determination of the economy's full employment output

63. Indexation is a method whose use can he associated with which one of the following ?
(a) Controlling inflation
(b) Nominal GDP estimation
(c) Measurement of savings rate
(d) Fixing of wage compensation

64. A car undergoes a uniform circular motion. The acceleration of the car is
(a) zero
(b) a non-zero constant
(c) a non-zero but not a constant
(d) None of the above

65. An echo is heard after 5 seconds of the production of sound

which moves with a speed of 340 m/s. What is the distance of the mountain from the source of sound which produced the echo ?
(a) 0.085 km (b) 0.85 km
(c) 0.17 km (d) 1.7 km

66. A 100 W electric bulb is used for 10 hours a day. How many units of energy are consumed in 30 days ?
(a) 1 (b) 10 (c) 30 (d) 300

67. Which of the following statements relating to the Fifth Schedule of the Constitution of India is ***not*** correct ?
(a) It relates to the special provision for administration of certain areas in the States other than Assam, Meghalaya, Tripura and Mizoram.
(b) Tribal advisory councils are to be constituted to give advice under the Fifth Schedule.
(c) The Governor is not authorized to make regulations to prohibit or restrict the transfer of land by, or among members of the Scheduled Tribes.
(d) The Governors of the States in which there are scheduled areas have to submit reports to the President regarding the administration of such areas.

68. Consider the following statements with regard to the formation of new States and alteration of boundaries of existing States :
1. Parliament may increase the area of any State.
2. Parliament may diminish the area of any State.
3. Parliament cannot alter the boundary of any State.
4. Parliament cannot alter the name of any State.
Which of the statements given above is/are ***not*** correct ?
(a) 1 and 2 (b) 2 and 3
(c) 3 and 4 (d) 4 only

69. Consider the following statements :
1. The Advocate General of a State in India is appointed by the President of India upon the recommendations of the Governor of the concerned State.
2. As provided in the Code of Civil Procedure, High Courts have original appellate advisory jurisdiction at the State level.
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

70. Which one of the following forms of Constitution contains the features of both the Unitary and Federal Constitution ?
(a) Unitary (b) Federal
(c) Quasi-Federal (d) Quasi-Unitary

71. Which one of the following Indian States has ***no*** international boundary ?
(a) Bihar (b) Chhattisgarh
(c) Uttarakhand (d) Meghalaya

72. Which one of the following Indian cities is ***not*** located on a river bank ?
(a) Agra (b) Bhagalpur
(c) Bhopal (d) Kanpur

73. Where are Jhumri Telaiya and Mandar Hills situated ?
(a) Jharkhand (b) Bihar
(c) Assam (d) West Bengal

74. Which one of the following is ***not*** correct regarding South India ?
(a) Diurnal range of temperature is less
(b) Annual range of temperature is less
(c) Temperature is high throughout the year
(d) Extreme climatic conditions are found

75. Which one of the following statements regarding sex composition is ***not*** correct ?
(a) In some countries, sex ratio is expressed as number of males per thousand females,
(b) In India, sex ratio is expressed as number of females per thousand males.
(c) At world level, sex ratio is about 102 males per 100 females.
(d) In Asia, there is high sex ratio.

76. Who among the following has given the concept of Human Development ?
(a) Amartya Sen (b) Mahbub-ul-Haq
(c) Sukhamoy Chakravarty (d) G.S. Chaddha

77. Which one of the following regions is an important supplier of citrus fruits ?
(a) Equatorial region (b) Mediterranean region
(c) Desert region (d) Sub-humid region

78. Who were the Nayanars ?
(a) Those who were immersed in devotion to Vishnu
(b) Those who were devotees of Buddha
(c) Leaders who were devotees of Shiva
(d) Leaders who were devotees of Basveshwara

79. Match List I with List II and select the correct answer using the code given below the lists .

List I (Ethnic Territorial Segment)	**List II (Related Occupational Pattern)**
A. Maruta Makkal	1. Pastoralists
B. Kuravan Makkal	2. Fishing people
C. Mullai Makkal	3. Ploughmen
D. Neyta! Makkal	4. Hill people

Code :

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

80. Who among the following Mughal emperors was a follower of the Naqshbandiyya leader Khwaja Ubaydullah Ahrar ?
(a) Babur (b) Humayun
(c) Akbar (d) Jahangir

81. Arrange the following in the chronological order of their implementation :
1. The Indian Factory Act (First)
2. The Vernacular Press Act
3. The Morley-Minto Reforms
4. The Cornwallis Code
Select the correct answer using the code given below :
(a) 4, 2, 1, 3 (b) 2, 4, 1, 3 (c) 3, 4, 1, 2 (d) 2, 1, 3, 4

82. Article 371A of the Constitution of India provides special privileges to
(a) Nagaland (b) Mizoram (c) Sikkim (d) Manipur

83. How many Zonal Councils were set up vide Part-III of the States Re-organization Act, 1956 ?

(a) Eight (b) Seven (c) Six (d) Five

84. Which provision of the Constitution of India provides that the President shall ***not*** be answerable to any Court in India for the exercise of powers of his office ?
(a) Article 53 (b) Article 74
(c) Article 361 (d) Article 363

85. Which law prescribes that all proceedings in the Supreme Court shall be in English language ?
(a) Article 145 of the Constitution of India
(b) Article 348 of the Constitution of India
(c) The Supreme Court Rules, 1966
(d) An Act passed by the Parliament

86. The total number of members in the Union Council of Ministers in India shall ***not*** exceed
(a) 10% of the total number of members of the Parliament
(b) 15% of the total number of members of the Parliament
(c) 10% of the total number of members of the Lok Sabha
(d) 15% of the total number of members of the Lok Sabha

87. Which one of the following is the most noticeable characteristic of the Mediterranean climate ?
(a) Limited geographical extent .
(b) Dry summer
(c) Dry winter
(d) Moderate temperature

88. Which one of the following rivers takes a 'U' turn at Namcha Barwa and enters India ?
(a) Ganga (b) Tista
(c) Barak (d) Brahmaputra

89. What was the Dutt-Bradley thesis ?
(a) The Working Committee of the Indian National Congress decided that Congress should play a crucial role in realising the independence of India
(b) The Socialist party decided to play foremost part in anti-imperialist struggle
(c) Revolutionary socialist Batukeshwar Dutt put forth a ten-point plan to work for the success of anti-imperialist front
(d) It was a Communist party document, according to which the National Congress could play a great part and a foremost part in realising the anti-imperialist people's front

90. The *khuntkatti* tenure was prevalent in which one of the following regions of India during the British Colonial Rule ?
(a) Bundelkhand (b) Karnataka
(c) Chota Nagpur (d) Madras Presidency

91. Who was the author of the book '*Plagues and Peoples*' ?
(a) William H. McNeill (b) W.I. Thomas
(c) Rachel Carson (d) David Cannadine

92. Who among the following started the Indian Agriculture Service ?
(a) Lord Curzon (b) William Bentinck
(c) Lord Minto (d) Lord Rippon

93. '*Chandimangala*' was composed in which one of the following languages during the 16th century CE ?
(a) Sanskrit (b) Tamil (c) Bengali (d) Oriya

94. In December 1962, which Soviet leader declared that China was responsible for the Sino-Indian War of 1962 ?
(a) Khrushchev (b) Bulganin
(c) Suslov (d) Malenkov

95. Which of the following statements with regard to the 'Make in India' initiative is/are correct ?
1. It was launched in the year 2018.
2. Its objective is to foster innovation.
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

96. Which one of the following States does ***not*** have a Legislative Council ?
(a) Karnataka (b) Telangana
(c) Jammu and Kashmir (d) Arunachal Pradesh

97. What is SWAYAM ?
(a) Study Webs of Active-Learning for Young Aspiring Minds
(b) Study Webs of Active-Learning for Youth Aspiring Minds
(c) Study Webs of Active-Learning for Young Aspiration Minds
(d) Study Webs of Active-Learning for Youth of Aspiration Minds

98. Which one of the following is ***not*** enumerated in the Constitution of India as a fundamental duty of citizens of India?
(a) To safeguard public property
(b) To protect and improve the natural environment
(c) To develop the scientific temper and spirit of inquiry
(d) To promote international peace and security

99. Who among the following in his book '*The Managerial Revolution*' argued that a managerial class dominated all industrial societies, both capitalist and communist, by virtue of its technical and scientific knowledge and its administrative skills ?
(a) James Burnham
(b) Robert Michels
(c) Gaetano Mosca
(d) Vilfredo Pareto

100. Which one of the following conditions laid down in the Constitution of India for the issue of a writ of Quo-Warranto is ***not*** correct ?
(a) The office must be public and it must be created by a Statute
(b) The office must be a substantive one
(c) There has been a contravention of the Constitution or a Statute in appointing such person to that office
(d) The appointment is in tune with statutory provision

101. Which one of the following is the motto of NCC ?
(a) Unity and Discipline
(b) Unity and Integrity
(c) Unity and Command
(d) Unity and Service

102. Which one of the following departments is ***not*** under the Ministry of Home Affairs ?
(a) Department of Official Languages
(b) Department of Border Management
(c) Department of Jammu and Kashmir Affairs
(d) Department of Legal Affairs

103. Which of the following statements is/are correct ?
1. India is a signatory to the United Nations Convention to Combat Desertification (UNCCD).
2. Ministry of Home Affairs is the nodal Ministry in the Government of India for the UNCCD.

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

104. Under which one of the following Article of the Constitution of India, a statement of estimated receipts and expenditure of the Government of India has to be laid before the Parliament in respect of every financial year ?
(a) Article 110 (b) Article 111
(c) Article 112 (d) Article 113

105. The South Asian Association for Regional Cooperation was founded in
(a) Colombo (b) Islamabad
(c) Kathmandu (d) Dhaka

106. Which one of the following countries is ***not*** a founding member of the New Development Bank ?
(a) Brazil (b) Canada
(c) Russia (d) India

107. The Public Financial Management System (PFMS) is a web-based online software application designed, developed, owned and implemented by the
(a) Department of Financial Services
(b) Institute of Government Accounts and Finance
(c) Controller General of Accounts
(d) National Institute of Financial Management

108. Match List I with List II and select the correct answer using the code given below the lists :

	List I (Institute)		**List II (Location)**
A.	National Institute of Ayurveda	1.	Chennai
B.	National Institute of Homoeopathy	2.	Bengaluru
C.	National Institute of Unani Medicine	3.	Kolkata
D.	National Institute of Siddha	4.	Jaipur

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

109. Which of the following statements about 'Invest India' is/are correct ?
1. It is a joint venture (not for profit) company.
2. It is the National Investment Promotion and Facilitation Agency of India.

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

110. The National Dope Testing Laboratory functions under
(a) Ministry of Health and Family Welfare
(b) Ministry of Science and Technology
(c) Ministry of Youth Affairs and Sports
(d) Ministry of Home Affairs

111. In how many phases was the general election, 2019 conducted in India ?
(a) 6 phases (b) 7 phases
(c) 8 phases (d) 9 phases

112. Which one of the following statements about the Organization of Islamic Cooperation is ***not*** correct ?
(a) Its permanent Secretariat is located at Jeddah.
(b) It endeavours to safeguard and protect interests of the Muslim world in the spirit of promoting international peace and harmony among various people of the world.
(c) It is the largest inter-governmental organization of the world.
(d) It has consultative and cooperative relations with the UN.

113. Who among the following won the Italian Open Women's Tennis Singles Title, 2019 ?
(a) Karolina Pliskova (b) Johanna Konta
(c) Naomi Osaka (d) Serena Williams

114. Which among the following IN ship (s) participated in the SIMBEX - 19 ?
1. INS Kolkata 2. INS Shakti
3. INS Vikrant

Select the correct answer using the code given below:
(a) 1, 2 and 3 (b) 1 and 2 only
(c) 2 and 3 only (d) lonly

115. 'Triples' is a new format of
(a) Boxing (b) Judo
(c) Chess (d) Badminton

116. Who among the following was the Chairman of the Committee on Deepening Digital Payments appointed by the RBI ?
(a) H.R. Khan (b) Nandan Nilekani
(c) N.R. Narayana Murthy (d) Sanjay Jain

117. 'The Sasakawa Award' of United Nation is given in recognition of the work done in the field of
(a) Disaster Reduction
(b) Peace Keeping
(c) Health Services
(d) Poverty Alleviation

118. Why was India's G.S. Lakshmi in news recently ?
(a) She was the first Indian to play cricket for an English County Club.
(b) She became the first female ICC match referee.
(c) She was awarded the Ramon Magsaysay Award for the year 2019.
(d) She was the recipient of the Booker Prize in the year 2019.

119. Who among the following was elected as the President of Indonesia for the second term ?
(a) Joko Widodo
(b) Prabowo Subianto
(c) Sandiaga Uno
(d) Jusuf Kalla

HINTS & EXPLANATIONS

MATHEMATICS

1. (a) $6^{23} \times 75^9 \times (105)^2$
$= 2^{23} \times 3^{23} \times 3^9 \times 5^9 \times 5^9 \times 3^2 \times 7^2 \times 5^2$
$= 2^{23} \times 5^{20} \times 3^{34} \times 7^2$
$= 2^{23} \times 5^{20}$
10 is divided by 2 and 5
Minimum of 20 and 23 is 20
$\therefore \quad n = 20$

2. (b) Unit digit of $(3^{18} - 3^{89})$
= Unit digit of $(3^{96} - 3^2 - 3^{88} - 3)$
= Unit digit of $(1 \times 9 - 1 \times 3)$
$= 6$

3. (b) $(n-1)^2 + n^2 + (n+1)^2 + (n+2)^2 = 294$
$n^2 + 1 - 2n + n^2 + n^2 + 1 + 2n + n^2 + 4n + 4 = 294$
$4n^2 + 4n + 6 = 294$
$4n^2 + 4n - 288 = 0$
$n^2 + n - 77 = 0$
$n^2 + 9n - 8n - 72 = 0$
$\Rightarrow \quad (n-8)(n+9) = 0$
$\Rightarrow \quad \therefore \quad n = 8, -9$
$\therefore$ number are 7, 8, 9, 10
Sum of number $= 7 + 8 + 9 + 10 = 34$

4. (a) p and q are roots of
$x^2 + px + q = 0$
$\Rightarrow \quad p + q = -p$ and $pq = q$
$\Rightarrow \quad pq - q = 0$
$\Rightarrow \quad q(p-1) = 0 \Rightarrow \quad (p-1) = 0 \Rightarrow p = 1$
Adding p in equation $p + q = -p$
$\Rightarrow \quad 1 + q = -1$
$\Rightarrow \quad q = -2$

5. (b) $a^2 - b^2 = 35$
$\Rightarrow \quad (a+b)(a-b) = 35 \times 1$ or 7×5
Hence, two such pairs are (1,35) and (5,7).

6. (d) $(b-6)$ is a root of
$x^2 - 6x + b = 0$
$\Rightarrow \quad (b-6)^2 - 6(b-6) + b = 0$
$b^2 + 36 - 12b - 6b + 36 + b = 0$
$b^2 - 17b + 72 = 0$
$b^2 - 9b - 8b + 72 = 0$
$b(b-9) - 8(b-9) = 0$
$(b-8)(b-9) = 0$
$\Rightarrow \quad b = 9$ or $b = 8$
Maximum value of $b^2 = 9^2 = 81$

7. (c) $a = \sqrt{7 + 4\sqrt{3}} = \sqrt{(2)^2 + (\sqrt{3})^2 + 4\sqrt{3}}$
$= \sqrt{(2+\sqrt{3})^2} = 2 + \sqrt{3}$
$= \frac{1}{a} = \frac{1}{2+\sqrt{3}} = 2 - \sqrt{3} \Rightarrow \quad a + \frac{1}{a} = 4$

8. (d) $\frac{1}{x^2 + 5x + 10}$ will be maximum
when $x^2 + 5x + 10$ will be minimum
Minimum value of $x^2 + 5x + 10$
$= -\frac{D}{4a}$ {where D = Discriminant $= -15$}
$= \frac{15}{4}$ Maximum value of expression $= \frac{4}{15}$

9. (b) $\frac{(x+2)(x-3)}{(x+4)(x-2)} = \frac{x^2 - x - 6}{x^2 + 2x - 8} = \frac{3}{4}$
$\Rightarrow \quad 4x^2 - 4x - 24 = 3x^2 + 6x - 24$
$\Rightarrow \quad x^2 - 10x = 0 \qquad \Rightarrow \quad x = 0, 10$

10. (c) If $p \times q$ is even
then at least one of p or q is even
So the statement both p and q are even is a false statement

11. (d) $n^2 + 19n + 92 = (n^2 + 18n + 81) + n + 11$
To be perfect square
$n + 11 = 0 \qquad \therefore \quad n = -11$
$n^2 + 19n + 92 = (n^2 + 20n + 100) - n - 8$
To be perfect square, $-n - 8 = 0$
$n = -8$
ATQ, Sum $= -11 - 8 = -19$

12. (a) $x^3 + 3x^2 + 3x + 1 = (x+1)^3$
$x^3 + 5x^2 + 5x + 4 = (x+4)(x^2 + x + 1)$
$x^2 + 5x + 4 = (x+1)(x+4)$
L.C.M $= (x+1)^3 (x+4)(x^2 + x + 1)$

13. (b) We know if $a + b + c = 0$,
then $a^3 + b^3 + c^3 = 3abc$
Here
$(x-y) + (y-z) + (z-x) = 0$
$\Rightarrow \quad (x-y)^3 (y-z)^3 + (z-x)^3$
$= 3(x-y)(y-z)(z-x)$
$\therefore \quad \frac{(x-y)^3 + (y-z)^3 + (z-x)^3}{9(x-y)(y-z)(z-x)}$
$= \frac{3(x-y)(y-z)(z-x)}{9(x-y)(y-z)(z-x)} = \frac{1}{3}$

14. (d) $(X \cap Y) = \{a, \{b\}, c\} \cap \{\{a\}, b, c\} = c$
Now, $(X \cap Y) \cap Z$
$= c \cap \{a, b, \{c\}\} = \phi$

15. (c) $Px^2 + 3x + 2q = 0$
Let two root are α and β
then, $\alpha + \beta = -6 = \frac{-3}{P}$
$\therefore \quad P = \frac{1}{2}$
$\alpha.\beta = -6 = \frac{2q}{P}$
$\frac{q}{p} = -3$

$q = -3p = -3 \times \frac{1}{2} = -1.5$

$(p - q) = \left(\frac{1}{2} + 1.5\right) = 2$

16. (c) $x + \frac{1}{x} = \frac{x^2+1}{x} = \frac{26}{5}$

$5x^2 - 26x + 5 = 0$

The qadridic eq. will have two different solution.

Required real number = 5 and $\frac{1}{5}$

17. (c)

18. (a) Radha's Age = A

Rani's Age = B

$\frac{A-5}{B-5} = 3 \Rightarrow A - 5 = 3(B-5)$ ...(i)

$\frac{A-1}{B-1} = 2 \Rightarrow A - 1 = 2(B-1)$ ...(ii)

from equation (i) and (ii)

$\Rightarrow -4 = B - 13 \Rightarrow B = 9$

So $A - 1 = 18 - 2 \Rightarrow A = 17$

$A - B = 17 - 9 = 8$ years

19. (b) Let x and y be the number of apples and oranges bought by the person.

$5x + 7y = 500 \Rightarrow y = \frac{500 - 5x}{7} = \frac{5(100-x)}{7}$

for x and y to be integers

For $x = (2, 9, 16, 23, 30, 37, 46, 51, 58, 65, 72, 79, 86, 93)$ y gives integer value

Hence, required number = 14

20. (c) $y = \frac{k}{\sqrt{x}}$

$36 = \frac{k}{\sqrt{36}} = \frac{k}{6} \Rightarrow k = 36 \times 6 = 216$

Now $\sqrt{x} = \frac{216}{54} = 4 \Rightarrow x = 16$

21. (c) $(a+b)^2 = 16 + 6\sqrt{7}$

$\Rightarrow 2ab = 6\sqrt{7}$

$\Rightarrow ab = 3\sqrt{7}$

$\Rightarrow a = 3, b = \sqrt{7}$

$\therefore (16 + 6\sqrt{7}) = (9 + 7 + 6\sqrt{7})$

$= (3^2 + (\sqrt{7})^2 + 2 \times 3\sqrt{7})$

$= (\sqrt{7} + 3)^2$

$\therefore$ Square root of $(16 + 6\sqrt{7})$ is $(3 + \sqrt{7})$

22. (d) $\log 7^{25} = 25 \log 7 = 25 \times 0.845$

$= 21.125$

Its characterlstic is 21 $\Rightarrow$ No. of digits = 22

$\log 8^{23} = \log 2^{69} = 69 \log 2$

$= 69 \times 0.301 = 20.769$

Its characterishe is 20 $\Rightarrow$ No. of digits = 21

$\log 9^{20} = \log 3^{40}$

$= 40 \times \log 3$

$= 40 \times 0.477 = 19.08 \Rightarrow$ No. of digts = 20

Near about is 22, 21, 20 so option (d) satisfy

23. (b) ATQ, $x = 14a + 7 = 15b + 5$

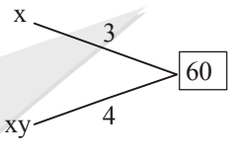
For smallest value of x two number a and b should be minimum and when a = 2 = b,

then, $x = 14 \times 2 + 7 = 35$

24. (c) x drain full tank of water in 20 minutes

x and y drain full tank of water 15 minutes

L.C.M 20 and 15 is 60



total capacity of tank is 60 unit

y drain full tank of water in one minutes

= (4 –3) unit = 1 unit.

$\therefore$ time taken to drain full tank when only y is opened.

= 60 × 1 = 60 minutes

25. (d) Statement1: $\sqrt{75}$ is rational number is false

Statement 2: – there exerts at least a positive integer x such that $-\frac{4x}{5} < -\frac{-7}{8}$

It is true for x > 1

Statement 3: $\frac{x-2}{x} < 1$ is not true for all real value of x.

Statement 4: $4.232323..... = \frac{423-4}{99} = \frac{419}{99}$

Hence, it is true

26. (c) Total sunday = 5

other day = 25

$\therefore$ Average number of visitor in a month

$= \frac{5 \times 510 + 25 \times 240}{30}$

$= \frac{2550 + 6000}{30} = \frac{8550}{30} = 285$

27. (a) $\frac{36}{11} = 3 + \frac{1}{x + \frac{1}{y + \frac{1}{z}}}$ $\frac{3}{11} = \frac{1}{x + \frac{1}{y + \frac{1}{z}}}$

$\Rightarrow x + \frac{1}{y + \frac{1}{z}} = \frac{11}{3} = 3 + \frac{2}{3}$

$\Rightarrow x = 3, \frac{1}{y + \frac{1}{z}} = \frac{2}{3} \Rightarrow y + \frac{1}{z} = \frac{3}{2} \Rightarrow y + \frac{1}{z} = 1 + \frac{1}{2}$

$\Rightarrow y = 1, z = 2$

$\Rightarrow x + y + z = 3 + 1 + 2 = 6$

28. (a) Combined % loss $= \frac{10\times10}{100}\% = 1\%(\text{loss})$

29. (b) Let speed of train and Car are x and y km/hr respectively.

$$\frac{120}{x}+\frac{480}{y}=11 \quad ...(i)$$

$$\frac{200}{x}+\frac{400}{y}=\frac{35}{3} \quad ...(ii)$$

from (i) and (ii)

$$\frac{1200}{y}=20 \Rightarrow y=60 \quad \text{and} \quad x=40.$$

Now, $x : y = 40 : 60$
$= 2 : 3$

30. (c) Let $y = x - x^2$

Differentiationy both, side w.r.t.x $\frac{dy}{dx} = 1-2x$

At max. $\frac{dy}{dx}=0 \Rightarrow 1-2x=0 \Rightarrow x=\frac{1}{2}=0.5$

31. (a) $a\sqrt{a}+b\sqrt{b}=32$ ...(i)

$a\sqrt{b}+b\sqrt{a}=31$ ...(ii)

Squaring and subtracting equation (i) and (ii), we have

$$a^2a + b^2b + 2ab\sqrt{ab} = 32^2$$
$$\frac{a^2b+b^2a+2ab\sqrt{ab}=31^2}{a^2(a-b)-b^2(a-b)=32^2-31^2}$$
$$(a-b)^2(a+b)=63$$
$$(a-b)^2(a+b)=3^2\cdot7$$
$\therefore \quad (a-b)=3$ and $a+b=7$
$\Rightarrow \quad a=5, b=2$

Now, $\frac{5(a+b)}{7}=\frac{5(5+2)}{7}=5$

32. (a) $y=x^3 \Rightarrow x=\sqrt[3]{y}$

$$\Rightarrow \sqrt[3]{y}=\frac{\sqrt{3}+1}{2}$$

$$\Rightarrow 2\sqrt[3]{y}=\sqrt{3}+1$$

$$\Rightarrow 8y=3\sqrt{3}+9+3\sqrt{3}+1 \quad \text{(cutting)}$$
$$\Rightarrow (4y-5)^2=27$$
$$\Rightarrow 16y^2-40y+25=27$$
$$\Rightarrow 16y^2-40y-2=0$$
$$\Rightarrow 8y^2-20y-1=0$$

33. (a) Let two numbers are 12a and 12b.
Such that H.C.F = 12.
then L.C.M = 12.a.b
Here, L.C.M of these two number must be divisible by 12.
'80' is not divisible by 12, so can not be L.C.M

34. (c) 1. Number — Unit digit
7^1 — 7
7^2 — 9
7^3 — 3
7^4 — 1
7^5 — 7
7^{174} — $(7)^{43\times4}$ — $1\times9=9$

2. Let n is a add number then (n+2) is also a odd number,
Now, $(n+2)-(n)^2=(2n+2).2$
$=4(n+1)$
As n is odd, so (n + 1) is even number and must be divissible by 2.
Hence difference of square of two odd number is away divisible by 8.

3. Let n and (n + 2) are two odd number.
Now, $n(n+2)+1=n^2+2n+1=(n+1)^2$
This is perfect square
Hence, statement 2 and 3 are true

35. (c) If ₹1 is the principal then difference in amount
$=(1.1)^4-(1.2)^2=1.4641-1.44$
$=0.0241$

$$\therefore \quad p=\frac{482}{0.0241}=2\times10^4=₹20,000$$

36. (a) For k= 0, $x^3-7x+6=0$
$x^2(x-1)+x(x-1)-6(x-1)=0$
$(x-1)(x^2+x-6)=0$
$(x-1)(x+3)(x-2)=0$
$\therefore \quad x=1, 2, \text{and} -3$
Hence, for k = 0, given expression can be resolved into three linear factors.

37. (d) X completes a round in inch 252 sec.
Y completes a round in inch 308 sec.
Z completes a round in inch 198 sec.
L.C.M of 252, 308 and $198 = 2\times2\times3\times3\times7\times11$
$= 2772$ sec.
$= 46$ min. 12 sec.

38. (d) L.C.M of $\frac{1}{3},\frac{5}{6},\frac{2}{9},\frac{4}{27}$

$$=\frac{\text{L.C.M of } 1,5,2,4}{\text{H.C.F of } 3,6,9,27}$$

$$=\frac{20}{3}$$

39. (b) We know that two equation
$a_1x^2+b_1x+c_1=0$
$a_2x^2+b_2+c2=0$
have common root when
$(c_1a_2-a_1c_2)^2=(b_1c_2-c_1b_2)(a_1b_2-b_1a_2)$
So, for $x^2+5x+6=0$ and $x^2+kx+1=0$
we have $(5)^2=(5-6x)(x-5)$
$\Rightarrow \quad 25=-6x^2+35x-25$
$\Rightarrow \quad 6x^2-35x+50=0$

$$\Rightarrow \quad x=\frac{5}{2} \text{ or } \frac{10}{3}$$

40. (c) Interest from B $\rightarrow \frac{25000\times4\times7}{100}=7000$

Total interest $\rightarrow$ 11200
Interest received from c $\rightarrow 11200-7000=4200$

Then money lent to c $= \frac{4200\times100}{7\times4}=15000$

41. (c) Let selling price of two computers is ₹100 each.
then cost price of first computer

$$=100\times\frac{100}{(100+30)}=76.92$$

and cost price of second computer

$= 100 \times \frac{100}{(100-30)} = 142.86$

total cost price $= 142.86 + 76.92 = 219.78$

Loss $= 219.78 - 200 = 19.78$

Loss % $= \frac{19.78}{219.78} \times 100 \approx 9$ % Loss

42. (c) Income - A : B
4 : 3
Expenditure - 3 : 2
Each saving - 600
As Income – Expenditures $= 4x - 3x = 600$
Income – Expenditures $x = 600$
Income - $4x \rightarrow 600 \times 4 = 2400$

43. (a)

Train fire	:	Bus fire
3	:	4
↓12%	:	↓13%
3.6		5.2

Ratio $= 3.6 : 5.2 \Rightarrow$ **9 : 13**

44. (c) quotient = 182.
Remainder $= 182 - 175 = 7$
Number $N = 17 \times 182 + 7$
$= 3101$

45. (a) Required number of days.

$= \frac{240 \times 48}{160} = 72$ days

46. (a) $x^4 - x^2 + 7x + 5$
$= (x+2)(ax^3 + bx^2 + cx + d) + k$
$= ax^4 + (b+2a)x^3 + (c+2b)x^2 + (d+2c)x + 2d + k$
On Equating the coefficient, we get
$a = 1, b + 2a = 0, c + 2b = -1$
$d + 2c = 7, 2d + k = 5$
$\Rightarrow$ $a = 1, b = -2, c = 3, d = 1$

47. (d) Semiperimeter of triangle $= \frac{30+16+28}{2} = 37$
$P - a = 7$
$P - b = 9$
$P - c = 21$
$P = 37$
$\therefore$ quantities that are required
$= 37, 21, 9, 7$

48. (b) Let $z = (0.001995)^{1/8}$
$= (1995 \times 10^{-6})^{1/8}$

$\Rightarrow \log_{10} z = \frac{1}{8}[\log_{10} 1995 + \log_{10} 10^{-6}]$

$= \frac{1}{8}[3.3 - 6] = \frac{-2.7}{8} = -0.3375$

$\log_{10} z = -0.3375$

$\Rightarrow z = 10^{-0.3375} = \frac{1}{10^{0.3375}}$

49. (a) $(x-a)(x-b)(x-c)$
$= (x^2 - ax - bx + ab)(x-c)$
$= x^3 - ax^2 - bx^2 + abx - cx^2 + acx + bcx - abc$
$= x^3 - x^2(a+b+c) + x(ab+ac+bc) - abc$

50. (a) $\log_{10} 1050 = \log_{10}(3 \times 10 \times 35)$
$= \log_{10} 3 + 1 + \log_{10} 35$
$\Rightarrow 3.0212 = \log_{10} 3 + 1 + 1.5441$
$\Rightarrow \log_{10} 3 = 0.4771$

Now, $\log_{10} 35 = \log \frac{7 \times 10}{2}$

$= \log_{10} 7 + \log_{10} - \log_{10} 2$
$\Rightarrow \log_{10} 7 = 0.8451$

Now, $A = \frac{\sqrt{3}}{4} \times (7)^2$

$\log 10^{A^4} = 4 \log_{10} A$

$= 4 \log \frac{\sqrt{3} \times 7^2}{4}$

$= 4\left[\frac{1}{2}\log_3 + 2\log_{10} 7 - 2\log 2\right] = 5.3070$

51. (a) volume of cone $= \frac{1}{3}\pi r_c^2 h_c$

volume of hollow sphere $= \frac{4}{3}\pi(R_1^3 - R_2^3)$

Now, $\frac{1}{3}\pi r_c^2 h_c = \frac{4}{3}\pi(R_1^3 - R_2^3)$
$(4)^2 H_c = 4(3^3 - 2^3)$
$16 H_c = 19 \times 4$
$\therefore$ $H_c = \frac{19}{4} = 4.75$ cm

52. (b) Volume of solid metallic cylender $= \pi r^2 h$
$= \pi \times 36 \times 10 = 360\pi$
flat surface area of cylinder $= 2\pi r^2$
$= 2 \times \pi \times 6 \times 6 = 72\pi$
After melted to make two cones in the ratio of volume 1 : 2

volume of first cone $= \frac{1}{3}\pi r_1^2 h = 120\pi$

$r_1^2 h = 360$

$\therefore$ $r_1^2 = 36$

volume of secound cone $= \frac{1}{3}\pi r_2^2 h = 240\pi$

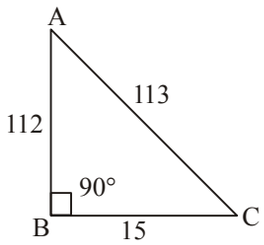
$r_2^2 h = 720$

$\therefore$ $r_2^2 = 72$

Flat surface area of two cone $= 72p + 36p = 108p$
Change in surface $= 108\pi - 72\pi = 36\pi$

% change $= \frac{36\pi}{72\pi} \times 100 = 50\%$

53. (a)



$\sqrt{(112)^2+(15)^2}=\sqrt{12544+225}$

$=\sqrt{12769}=113$

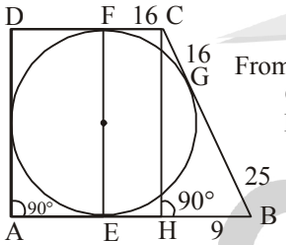
$\therefore$ Perimeter of the triangle $=(113+112+25)$cm
$=240$ cm

54. (d) Length of the rod = 24 feet.
Number of pieces of rod used to form a cube = 12 So,

side length of the cube $=\frac{24}{12}=2$ feet

$\therefore$ area of one of the faces $=2\times 2=4$ square feet.

55. (d)



From tangent properties
CF = CG = 16
BE = BG = 25

$\therefore$ BC = 16 + 25 = 41 cm
From ΔBCH,

CH = diameter $=\sqrt{(41)^2-(9)^2}$

$=\sqrt{1681-81}$

$=\sqrt{1600}=40$ cm

56. (d) Let R = radius of larger sphere

ATQ, $\frac{4\pi}{3}(3^3+4^3+5^3)=\frac{4\pi}{3}R^3$

$\Rightarrow R^3=3^3+4^3+5^3=216=6^3$

$\therefore \quad R=6$

57. (b) Let r = radius of hemisphere
Volume of hemisphere = 155232

$\therefore \frac{2}{3}\times\frac{22}{7}r^3=155232$

$\Rightarrow r^3=\frac{155232\times 21}{44}=3528\times 21$

$=2^3\times 3^3\times 7^3=(42)^3$

$\Rightarrow \quad r=42$

58. (b) From formula we know that Volume of bucket

$=\frac{1}{3}\pi H(R^2+\gamma R+\gamma^2)$

$=\frac{1}{3}\times\frac{22}{7}\times 7(36+18+9)$

$=21\times 22=462\,cm^3$

59. (d) Total surface area of cone $=\pi R^2+\pi LR$

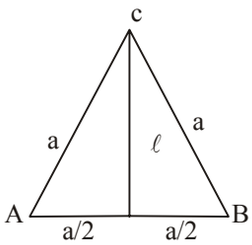
$=\pi R\left[R+\sqrt{R^2+H^2}\right] \because l=\sqrt{R^2+H^2}$

$=\pi\times 6(6+10)=96\pi\,cm^2$

60. (c) Resulting surface area of cuboid
$=2(l\times b+b\times h+l\times h)$
$=2(12\times 72+12\times 12+72\times 12)$
$=2((864+144+864)cm^2$
$=2\times 1872\,cm^2$
$=3744\,cm^2$

61. (b) ℓ = length, b= breadth, h = height
ATQ, $x=\ell b$, $y=bh$, $z=\ell h$
$\Rightarrow \quad xyz=\ell^2b^2h^2=(\ell bh)^2=v^2$

62. (a) Area of eq. triangles $=\frac{\sqrt{3}}{4}a^2$



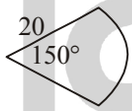
$\ell=\sqrt{a^2-\left(a/2\right)^2}=\frac{\sqrt{3}}{2}a$

$\therefore \quad a=\frac{2}{\sqrt{3}}\ell$

$=\frac{\sqrt{3}}{4}a^2=\frac{\sqrt{3}}{4}\left(\frac{2}{\sqrt{3}}\ell\right)^2$

$=\frac{\sqrt{3}}{4}\times\frac{4}{3}\ell^2=\frac{\sqrt{3}\ell^2}{3}$

63. (d)



From $\ell=r.\theta$

here $\theta=150°=\frac{5\pi}{6}$

$\ell=\frac{5\pi}{6}\times 20=\frac{50}{3}\times\frac{22}{7}$

Perimeter $=2\times 20+\frac{50\times 22}{3\times 7}=40+\frac{50\times 22}{3\times 7}$

r = radius of required circle

then, $\quad 2\pi r=40+\frac{50\times 22}{3\times 7}$

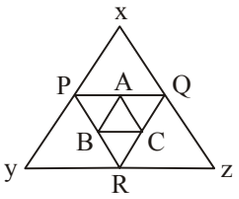
$\Rightarrow \quad 2\times\frac{22}{7}r=40+\frac{50\times 22}{3\times 7}$

$\Rightarrow \quad \frac{44}{7}r=\frac{44}{7}\times\frac{25}{3}=40$

$\Rightarrow \quad \left(r-\frac{25}{3}\right)\frac{44}{7}=40 \Rightarrow r-\frac{25}{3}=40\times\frac{7}{44}=\frac{70}{11}$

$\Rightarrow \quad r=\frac{25}{3}+\frac{70}{11}=\frac{485}{33}$

64. (b)

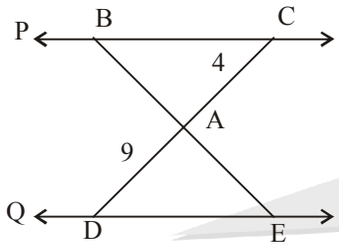


Area of $\Delta XYZ = 128\ cm^2$

Area of $\Delta PQR = \frac{128}{4} = 32 cm^2$

Area of $\Delta ABC = \frac{32}{4} = 8 cm^2$

65. (c)



Ratio of area = (Ratio of sides)^2

$\therefore \quad \frac{\Delta ABC}{\Delta ADE} = \left(\frac{AC}{DA}\right)^2 = \left(\frac{AB}{AE}\right)^2 = \left(\frac{BC}{DE}\right)^2$

$\frac{\Delta ABC}{\Delta ADE} = \left(\frac{AC}{DA}\right)^2$

$\therefore \quad \frac{\Delta ABC}{\Delta ADE} = \left(\frac{4}{9}\right)^2 = \frac{16}{81}$

66. (c) Let the length of sides of equilateral triangle and square are a_r and a_s respectiveiy

$\therefore$ Length $= 3a_r = 4a_s$

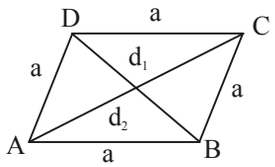
$\Rightarrow \quad a_s = \frac{3}{4}a_r$

Area of square $(a_s)^2 \left(\frac{3}{4}a_r\right)^2 = \frac{1}{16}a_r^2$

$\frac{\text{Area of } \Delta}{\text{Area of } \square} = \frac{\sqrt{3}/4\, a_r^2}{a_s^2} = \frac{\sqrt{3}}{4} \times \frac{16}{9}$

$= \frac{4\sqrt{3}}{9}$

67. (c)



All sides are same for the parallogram

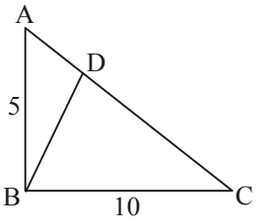
$\therefore$ It is a rhombus

Now $d_1 + d_2 = 12$ cm and $d_2 = 2d_1$

$\Rightarrow \quad d_1 = 4$ cm and $d_2 = 8$ cm

Area $= \frac{1}{2}d_1 d_2 = \frac{1}{2} \times 4 \times 8 = 16\ cm^2$

68. (b) From properties of perpendicular in a right angled triangle



$\frac{1}{BD^2} = \frac{1}{BC^2} + \frac{1}{AB^2}$

$= \frac{1}{25} + \frac{1}{100} = \frac{1}{20}$

BD $= \sqrt{20} = 2\sqrt{5}$ cm

69. (b) Volume $= \pi R_1^2 H_1 = \pi R_2^2 H_2$

$\Rightarrow \left(\frac{R_1}{R_2}\right)^2 = \frac{H_2}{H_1} \Rightarrow \frac{R_1}{R_2} = \sqrt{\frac{H_2}{H_1}} = \sqrt{\frac{3}{2}}$

70. (a) Let length and breadth of as recgtangle is x and y.

$\therefore \quad$ Area $= x \times y$

After increase length 20% and breadth 10% Change in Area $= (1.32\,xy - xy) = 0.32xy$

$\therefore \quad$ % increase $= \frac{0.32}{1} \times 100 = 32\%$

71. (c) Area will be maximum when P and B will be same

So $P^2 + P^2 = H^2 \Rightarrow P^2 = \frac{H^2}{2}$

$\Rightarrow \quad P = \frac{H}{\sqrt{2}}$

Area $= \frac{1}{2}BP = \frac{1}{2}P^2 = \frac{1}{2} \cdot \frac{H^2}{2} = \frac{H^2}{4}$

$= \frac{100}{4} = 25\ cm^2$

72. (a) $D_S = 2R \qquad D_S^2 = (2R)^2$

$\frac{\text{Area of circle}}{\text{Area of square}} = \frac{\pi R^2}{\frac{1}{2}D_S^2} = \frac{\pi}{2} = \frac{22}{14} = \frac{11}{7}$

73. (c) Diameter $= 20$ cm

$\therefore \quad$ Radius $= 10$ cm

Curved surface area $= 2\pi rh$

$\therefore \quad 2\pi rh = 1000$

$\pi h = \frac{1000}{2 \times 10} = 50$

$\therefore \quad$ Volume of the cylinder

$= \pi r^2 h = 50 \times 10 \times 10$

$= 5000\ cm^3$

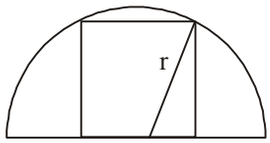
74. (c) Angle subtended by the are at the centre of the circle $= \theta$

Then $\frac{\theta}{360} \cdot 2\pi R = 33$

$\Rightarrow \theta = \frac{33 \times 360 \times 7}{2 \times 22 \times 14} = 3 \times 45 = 135°$

75. (b) Side of the square inscribed in a semicircle of radius r is s, then $(r)^2 = (s)^2 + \left(\frac{s}{2}\right)^2 \Rightarrow r^2 = \frac{5s^2}{4}$

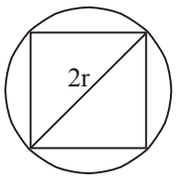
Area $(s)^2 = \frac{4r^2}{5}$



When square is drawn inside a full circle, then its Side

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

$\therefore$ Area $= \frac{4r^2}{2} = 2r^2$



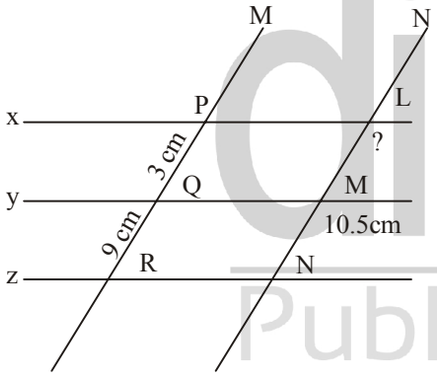
$\therefore$ Ratio $= \frac{\frac{4r^2}{5}}{2r^2} = \frac{2}{5} = 2:5$

76. (c) As per the given condition, the radius of sphere and cylinder will be same.
Volume of cylinder $= \pi R^2 H = \pi R^2 . D = 2\pi R^3$
(where R = Radius)

Volume of sphere $V_s = \frac{4}{3}\pi R^3$

$\Rightarrow \frac{V_S}{V} = \frac{\frac{4}{3}\pi R^3}{2\pi R^3} = \frac{2}{3} \quad \Rightarrow V_S = \frac{2}{3}V$

77. (b)



Now, $\frac{PQ}{QR} = \frac{LM}{MN}$

$\Rightarrow \frac{3}{9} = \frac{x}{10.5} \quad \therefore \quad x = \frac{10.5 \times 3}{9} = 3.5\,cm$

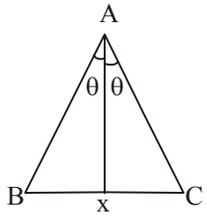
78. (b) $\pi(16) = 360°$

$\therefore$ Sector $= \frac{25.6}{\pi \times 16} \times 360$

$= \frac{25.6}{180 \times 16} 360 = 3.2$

79. (c) In a right angle triangle. Its orthocentre lies on the triangle

80. (b)

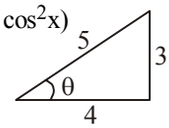


Here, AB > BX

81. (b) $\log_{10}^{(\cos\theta)} + \log_{10}^{(\sin\theta)} + \log_{10}^{(\tan\theta)} + \log_{10}^{(\cot\theta)} + \log_{10}^{(\sec\theta)} + \log_{10}^{(\operatorname{cosec}\theta)}$
we known
$\log_{10} a + \log_{10} b = \log_{10}(a.b)$
$\therefore \quad \log_{10}^{(\cos\theta + \sin\theta \times \tan\theta \times \cot\theta + \sec\theta \times \operatorname{cosec}\theta)}$
$\therefore \quad \log_{10}^{1} = 0$

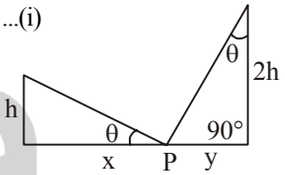
82. (a) $\cos^2 x + \cos x = 1 \Rightarrow \cos x = 1 - \cos^2 x = \sin^2 x$
$= \sin^{12} x + 3\sin^{10} x + 3\sin^8 x + \sin^6 x$
$= \sin^6 x[\sin^6 x + 3\sin^4 x + 3\sin^2 x + 1]$
$= \sin^6 x[\sin^2 x + 1]^3$
$= [\sin^4 x + \sin^2 x]^3 \qquad (\because \sin^4 x = \cos^2 x)$
$= (\sin^2 x + \cos^2 x) = 1$

83. (d) As $\sin\theta = \frac{3}{5} \Rightarrow \cot\theta = \frac{4}{3}$



$1 + 3x + 9x^2 + 27x^3 + 81x^4 + 243x^5$
$= 1 + 3\times\frac{4}{3} + 9\times\frac{16}{9} + 27\times\frac{64}{27} + 81\times\frac{256}{81} + 243\times\frac{1024}{243}$
$= 1 + 4 + 16 + 64 + 256 + 1024$
$= 5 + 30 + 1280 = 1365$

84. (c) $\tan\theta = \frac{h}{x} \qquad ...(i)$



$\tan(90 - \theta)$
$= \cot\theta = \frac{2h}{y}$

$\Rightarrow \tan\theta = \frac{y}{2h} \qquad ...(ii)$

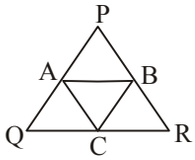
from (i) and (ii) we get $\frac{h}{x} = \frac{y}{2h} \quad \Rightarrow \boxed{2h^2 = xy}$

85. (c) $\frac{\sin 19°}{\cos 71°} + \frac{\cos 73°}{\sin 17°}$

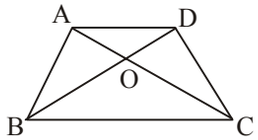
$= \frac{\sin 19°}{\cos(90° - 19°)} + \frac{\cos 73°}{\sin(90° - 73°)}$

$= \frac{\sin 19°}{\sin 19°} + \frac{\cos 73°}{\cos 73°} = 1 + 1 = 2$

86. (b) Perimeter of $\Delta ABC = 22$
Perimeter of ΔPQR
$= 2(AB + BC + AC)$
$= 2 \times 22 = 44$



87. (d)



Area (ΔABC) = Area (ΔDBC)
Area $(\Delta AOB + \Delta BOC)$ = Area $(\Delta DOC + \Delta BOC)$
Area $\Delta BOC = 8 - 3 = 5\,cm^2$ and Area $(\Delta DOC) = 3$

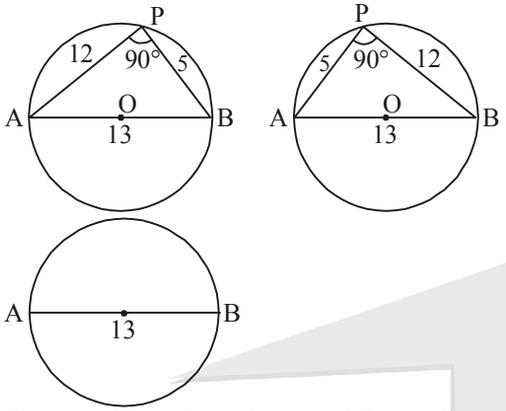
Now, $\frac{\text{Area (AOB)}}{\text{Area (BOC)}} = \frac{3}{5} = \frac{\frac{1}{2} \times AO \times \text{Length}}{\frac{1}{2} \times CO \times \text{Length}}$

$\Rightarrow \quad \frac{AO}{CO}=\frac{3}{5}$

$\frac{\text{Area of }(\Delta AOD)}{\text{Area of }(\Delta BOC)}=\left(\frac{AO}{CO}\right)^2=\frac{9}{25}$

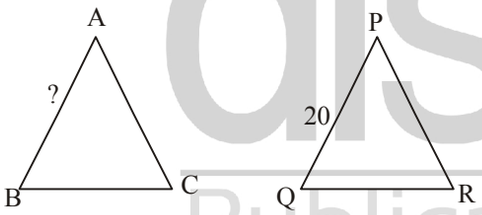
$\text{Area }(\Delta AOD)=\frac{9\times5}{25}=1.8\,cm^2$

88. (a)



P does not lie on the circle at x = 6.5cm and y = 6.5 cm because, as <APB = 90°
then, $AB^2 = AP^2 + BP^2$
$(13)^2 \neq (6.5)^2+(6.5)^2$
Hence, point P does not lies on the circle

89. (b)

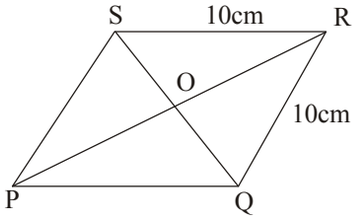


Perimeter of ΔABC = 75 cm
Perimeter of ΔPQR = 50 cm

So, $\frac{\Delta ABC}{\Delta PQR}=\frac{AB}{PQ} \quad \Rightarrow \quad \frac{75}{50}=\frac{?}{20}$

$\therefore \quad ?=\frac{75\times20}{50}=30\text{ cm}$

90. (b)



As ΔQRS is equilateral. So, QR = RS = QS = 10cm
∴ Given parallelogram is a rhombus.
So area = 2 × area of ΔQRS

$\frac{1}{2}d_1d_2=\frac{\sqrt{3}}{4}\times2\times(d_1)^2$

$\Rightarrow \quad d_2=d_1\ \sqrt{3}=10\sqrt{3}\text{ cm}$

91. (c) $x+y=100-(20+15+10)=55$
$2x+y=100-(4+8+4)=84$

$\Rightarrow \quad x=29 \text{ and } y=26$

Max. of freg. distribution of series I

$=\frac{(15\times20)+(25\times15)+(35\times10)+(45\times29)+(55\times26)}{100}$

$=\frac{(300+375+350+1305+1430)}{100}=\frac{3760}{100}=37.6$

92. (c) Mode of frequency distribution of series II is 46.

93. (c) No. of scooters of Y sold by E
$=12\%\times6400-8\%\times3600$
$=528$
No. of total scooters by showroom
$c=15\%\times6400=960$

$\text{Reqd. }\%=\frac{528}{960}\times100=55\%$

94. (c) Number of scooters of both company sold by showroom B

$=6400\times\frac{21}{100}=1344.$

Number of scooter of company x sold by showroom A

$=3000\times\frac{24}{100}=720$

$\text{Required percentage}=\left(\frac{1344-720}{720}\right)\times100=86\frac{2}{3}\%$

95. (a) Reqd. Avg.

$=\frac{(19+15+12)\%\times6400-(24+20+8)\%\times3000}{3}$

$=\frac{46\times64-52\times30}{3}=\frac{1384}{3}=461\frac{1}{3}$

96. (d) Number of scooters of both company x and y sold by showroom A

$6400\times\frac{19}{100}=1216$

Number of scooter of company X sold by B and E together $=3000\times\left(\frac{18+8}{100}\right)=780$

Difference in number = 1216 − 780 = 436

97. (d) Average number of pedestrians killed per day in year

$2017=\frac{20457}{365}\approx56.$

98. (a) Pedestrians fatalities in 2014 = 12330
Pedestrians fatalities in 2017 = 20457

$\text{Percentage change}=\left(\frac{20457-12330}{12330}\right)\times100$
$=66\%$

99. (d) Average number of bikers killed daily in road accident in the year 2017

$=\frac{48746}{365}\approx134.$

100. (a) Average number of cyclists killed daily in ground accident in 2017 $=\frac{3559}{365}\approx10.$

ENGLISH

1. (b) huge and extensive the answer can be obtained from the first and the second lines of the First paragraph of the passage
2. (c) 'the present times pose much more challenges to human than the previous times' it is obvious from the first paragraph of the passage.
3. (b) There was no economic, political and social systems as is clear from the second paragraph of the passage.
4. (a) Humans started migrating and held goat-herds it is clear from the third paragraph of the passage.
5. (b) Emerged
6. (a) The land reform proves to be slow because of the disparity in power structure as is clear from the first paragraph.
7. (a) 1 and 4
8. (a) We can infer the answer from the last few lines of the second paragraph.
9. (b) Litigations
10. (c) Agriculture is the primary source of livelihood in India. It is obvious from the first and second lines of the last paragraph.
11. (a) The answer can be inferred from the last few lines of the paragraph
12. (d) The first three options are mentioned in the first paragraph but there is no mention of remuneration.
13. (a) The option (a) is the right answer this is clear from the second paragraph of the passage
14. (a) The answer is clear from the third paragraph of the passage
15. (a) Tendency
16. (a) The answer 'to maintain the secrecy of a person' as is obvious from the fourth paragraph of the passage.
17. (a)
18. (a) RPSQ
    The correct sequence is 'employees who are leaving the company are often asked for their opinions during the formal or informal interviews.
19. (b) QSRP
    There is a possibility of heavy rain towards the weekendwhile there could be a hailstorm activity in the evening.
20. (c) The correct sequence is "the minimum temperature has been below normal since last week when rain and hailstorm activity recorded in some part of the city."
21. (a) SPRQ
    A selection committee meeting for guest teachers was also held in the department of biotechnology.
22. (d) RSQP
    The correct sequence is "applications are invited in a prescribed format from Indian nationals for deployment as teacher of Indian culture for two years for contractual assignment at cultural centres abroad."
23. (a) the correct sequence is "do the difficult things while they are easy and do the great things while they are small"
24. (b) QSPR
    If you can't handle me at my worst then you sure don't deserve me at my best
25. (d) SPRQ
    Twenty years from now you will be more disappointed by the things you didn't do than by the ones you did do.
26. (c) RPQS
    A successful man is one who can lay a firm foundation with the bricks others have thrown at him.
27. (a) RSQP
    We know what we are but we know not what we may be
28. (c) RQSP
    If you are not willing to risk the unusual you will have to settle for the ordinary.
29. (b) SQPR
    He regarded his major achievements as mere stepping stones for the next advance
30. (a) SPRQ
    Events in our childhood have a great influence on our adult lives and they often shape our personality
31. (d) 'in human society innumerable problems' should be replaced with human society with innumerable problems
32. (d) the word 'consumed' should be replaced with *consumes*
33. (c) 'against all metals' should be replaced with *amongst all metals*
34. (b) article the should be used before the superlative degree *largest*
35. (a) every care is taken as singular so have been taken should be replaced with has been taken
36. (a) *my sister and me* is the subject therefore the word 'me' should be replaced with I.
37. (a) article the before the word *thrill* is not correct contextually.
38. (d)
39. (c) according to the singular subject (her knowledge) helping verb *is* should be used on the place of *are*.
40. (c) the word *were* should be replaced with *was* as in this case the verb should be used according to the first subject.
41. (b) *have* should be replaced with *had*
42. (b) the subject (the real voyage of discovery) is singular noun hence as per the subject verb agreement the word *consist* should be replaced with *consists*.
43. (a) the word succeed is correct usage contextually.
44. (b) according to the singular subject (tomorrow) the word *belongs* is correct contextually.
45. (a) the word *come* should be replaced with *comes*.
46. (a) verb
    The word eats is showing action
47. (b) Adverb
    The word *abruptly* is modifying the verb *ended*
48. (C) preposition
    The given underlined word is the preposition of time as it used before third week of august.
49. (c) conjunction
    And is a coordinating conjunction
50. (d) Adverb
    The word *truthfully* is showing the way of answering hence it is the adverb of manner.
51. (a) Interjection
    The word *Hurrah* is an interjection

52. (d) adjective
The word *meaningless* is showing the quality of letters. Hence it is an adjective.
53. (d) Pronoun
The word himself is a reflexive pronoun.
54. (d) Preposition
Through is the preposition of movement.
55. (a) adverb
The word *slowly* is used to show the manner of walking. Hence it is an adverb of manner.

56.	(c)	inelegance	57.	(b)	impervious
58.	(b)	encouraging	59.	(b)	support
60.	(d)	support	61..	(b)	unthinkable
62.	(b)	gleeful	63.	(a)	accord
64.	(a)	respectful	65.	(a)	sporadic
66.	(a)	confiscated	67.	(c)	challenged
68.	(b)	intrinsic	69.	(a)	compulsory
70.	(c)	treachery	71.	(c)	smallest
72.	(c)	similar	73.	(c)	ascribed
74.	(a)	obtain	75.	(c)	wish for

76. (a) RSPQ
The two linkages are R-S and P-Q. The sentence S the extension of S1; further related sentence is shown in R hence it is the second in sequence. Q can't be the third as its next sentence is S6; in this way P should be the third and obviously Q is the last in sequence. Hence, the correct sequence is RSPQ.
77. (a) QRPS
The two linkages are Q-R and P-S. Gandhi reached Newcastle then what he did there is shown in Q; the next in sequence is R showing Gandhi's decision to march to army with men and women. What happened when he started marching is shown in P hence it is the third in sequence and S is the last in sequence. Therefore, the correct sequence is QRPS.
78. (b) SRQP
The S1 of the paragraph talks about industrial revolution; what is the result of industrial revolution is shown in S making it the opener sentence. The next in sequence is R as it is beginning with pronoun it which used for the industrial development. P should be the last fragment as it is the fore sentence of S6 and then obviously Q is the third fragment. Hence, the correct sequence is SRQP.
79. (d) QSRP
In S1 institutions are being mentioned and for institutions 'they' is the right pronoun in this way sentence Q is the first in sequence. Sentence S is the extension of Q making it the next in sequence. R is the third in sequence and P is the last as it is linked with S6. Hence, the correct sequence is QSRP.
80. (d) QPSR
This paragraph is about idioms and their definition. The sentence Q is beginning with pronoun '*they*' which is used for idioms mentioned in S1. Hence it is the first sentence in sequence; sentence P is the next fragment which is the extension of Q. The next linkage is S-R; where S will precede R as R is beginning with *in addition* which used to show main problems mentioned in S. Hence the correct sequence is QPSR.
81. (d) in the given paragraph Q should be the first and S should be the last fragment because Q should succeed S1 and S should precede S6. Hence, (d) is the correct option.
82. (a) the sentence P should be the last fragment as it is preceding sentence of S6. Hence in this way option (a) is the right answer.
83. (b) S is the only option succeeding S1 and Q is preceding S6 which can be seen in option (b). Hence, it is the right answer.
84. (a) Q is the succeeding sentence of S1 and R is the preceding part of S6 which can be seen in option (a). Hence it is the right option.
85. (a) extremely cheap
86. (b) a shy person
87. (b) a difficult problem
88. (c) to lose control of one's own feelings
89. (a) to be very angry
90. (a) to be extremely happy
91. (a) working together
92. (a) prevent a small problem before it becomes severe
93. (a) completely alone
94. (d) an important piece of advice
95. (a) the sentence talks about past hence the use of 'had' is the right option
96. (b) themselves is the right option as the subject mentioned in the first sentence is plural.
97. (a) to + v1 is the right structure here.
98. (a) since the word 'civil' is an adjective the word 'libertarian' is a noun which means a person who believes in free will.
99. (b) the option (b) is the right answer as *Within* means 'inside or not further than a particular area or space':
100. (a) the word breakthrough means an act or instance of moving through or beyond an obstacle
101. (b) from is the right usage before the word ' the beginning'
102. (c)
103. (c) the word is 'based' is the right option to be used before the preposition 'on'.
104. (a) studies is the right answer according to the singular subject 'ecology'.
105. (b) the preposition 'between' is used to show two reference points. The two reference points are organisms and physical environment.
106. (a) the right pronoun for the word organisms is their because organisms is a plural word.
107. (c) Although and though both mean 'in spite of something'; they are subordinating conjunctions. This means that the clause which they introduce is a subordinate clause, which needs a main clause to make it complete: ...
108. (c) 109. (d)
110. (a) for is the correct preposition
111. (a) the
112. (b) of
113. (a) amount is the right word contextually.
114. (a) the correct spelling is accommodate
115. (c) the correct spelling is recommend

116.	(b)	argument	117.	(a)	decisive
118.	(a)	aggressive	119.	(a)	assassination

120. (d) embarrassment

GENERAL KNOWLEDGE

1. (c) Soil impoverishment is based on the innate ability of prairie plants to tolerate and flourish in soils with low levels of nitrogen. Soil impoverishment, or reverse fertilization, involves the removal of nutrients from the soil.It is most of- ten done by introducing large amounts of organic matter to the soil.
2. (c) Nudation
Invasion / Migration
Competition and reaction
Stabilization or climax
Succession causes
Initiating causes - These include biotic and climatic factors which destroy the existing populations of the area. Climatic factors include wind, fire, natural disasters, erosion etc. The biotic factors include activities of other organisms.
3. (b) Oxisols- (from French oxide, "oxide") are very highly weathered soils that are found primarily in the intertropical regions of the world. These soils contain few weatherable minerals and are often rich in Fe and Al oxide minerals.
Vertisols -a clayey soil with little organic matter which occurs in regions having distinct wet and dry seasons. The dominant soil-forming processes in Vertisols are: cracking, argilli-pedoturbation (mixing of clay in the pedon) and mass movement of materials due to shrinkage and swelling of clays during drying/wetting cycles. ... The wetting and drying cycles cause the clays to expand and contract.
Histosols- (from Greek histos, "tissue") are soils that are composed mainly of organic materials. They contain at least 20-30 percent organic matter by weight and are more than 40 cm thick. Bulk densities are quite low, often less than 0.3 g cm3.
Entisols- are defined as soils that do not show any profile development other than an A horizon. An entisol has no diagnostic horizons, and most are basically unaltered from their parent material, which can be unconsolidated sediment or rock.
4. (b) The Caucasus Mountains are a mountain system at the intersection of Europe and Asia. Stretching between the Black Sea and the Caspian Sea, it surrounds the eponymous Caucasus region and is home to Mount Elbrus, the highest peak in Europe.
5. (b) Mango showers is a colloquial term to describe the occurrence of pre-monsoon rainfall. These rains normally occur from March to April, Their intensity can range from light showers to heavy and persistent thunderstorms towards the close of the summer season, pre-monsoon showers are common especially in Kerala, Karnataka and parts of Tamil Nadu in India. They help in the early ripening of mangoes and are often referred to as "Mango showers.
6. (d) Wular Lake is one of the largest fresh water lakes in Asia. It is sited in Bandipora district in Jammu and Kashmir, India. The lake basin was formed as a result of tectonic activity and is fed by the Jhelum River. The lake's size varies seasonally from 12 to 100 square miles (30 to 260 square kilometres).
7. (b) The Greek travellers highly praised the fertility of Indian soil and favourable climate condition describing the principal agricultural products of the land. They also affirm that India has a double rainfall and the Indians generally gather two harvests. - Megasthenes witnesses - the sowing of wheat in early, winter rains and of rice, 'bosporum', sesamum and millets in the summer solstice. The people of ancient India knew the use of manure. Thus both the explanations are individually true.
8. (a) The adoption of the Non- Cooperation resolution by the Congress gave it a new energy and from January 1921, it began to register considerable success all over India. Gandhi along with Ali Brothers undertook a nation-wide tour during which he addressed hundreds of meetings. In the first month, 9,000 students left schools and colleges and joined more than 800 national institutions that had sprung up all over the country. The educational boycott was particularly successful in Bengal under the leadership of Chitta Ranjan Das and Subhas Chandra Bose. Punjab, too, responded to the educational boycott and Lala Lajpat Rai played the leading role. In Punjab, the Akali movement was a part of the general movement of Non-Cooperation.
9. (b) Oudh Kisan sabha (or) Awadh Kisan sabhawas formed by Jawaharlal Nehru , Baba Ramachandra and several others It was formed by October 1920. The movement was against talukdars and landlords who demanded from peasants exorbitantly high rents and a variety of other cesses. The Oudh Kisan Sabha asked the kisans to refuse to till bedakhli land, not to offer hari and begar (forms of unpaid labour), to boycott those who did not accept these conditions and to solve their disputes through panchayats.
10. (c) In the united provinces, an agricultural region with a largely rural population, it was the agrarian system which modelled the character of the non co-operation and anti non-co-operation movements. This region became strongest base of the Congress. Under the leadership of JM Sengupta the whole of Eastern Bengal was in ferment. But the best organised of the village movements was the anti-Union Board agitation in Midnapur led by Birendranath Sasmal.
11. (a) The azhwars also spelt as alwars or Alvar, those immersed in god were Tamil poet-saints of South India who espoused bhakti (devotion) to the Hindu god Vishnu or his avatar Krishna in their songs of longing, ecstasy and service. They are venerated especially in Vaishnavism, which regards Vishnu or Krishna as the Supreme Being. Many modern academics place the Azhwar date between 5th century to 10th century CE, however traditionally the Azhwar are considered to have lived between 4200 BCE - 2700 BCE.
12. (d) The noble gases (helium, neon, argon, krypton, xenon, and radon) are also gases at STP, but they are monatomic. Helium is a member of the noble gases which means it has a filled outer shell of electrons.
13. (b) In graphite, each carbon atom is bonded to three other carbon atoms in the same plane giving a hexagonal array. One of these bonds is a double-bond, and thus the valency of carbon is satisfied.
14. (b) When soap is mixed in water a colloidal solution is formed. The soap solution has soap micelles which are an aggregate of soap molecules. These micelles are large and they scatter light. That is why the soap solution appears cloudy.

15. (a) Cotton readily absorbs water. This is because the fibers of the cotton have a lot of space between them. ... One reason cellulose makes cotton absorbent is that it contains a negative charge, which helps attract "dipolar" water molecules and absorb them. Another reason is cotton's "hydrophilic properties."
16. (a) Because isotopes of the same element have identical chemical properties, they cannot be separated by chemical methods, but only by methods that are based on their mass differences, such as mass spectrometry.
17. (b) Moseley's law advanced atomic physics, nuclear physics and quantum physics by providing the first experimental evidence in favour of Niels Bohr's theory, aside from the hydrogen atom spectrum which the Bohr theory was designed to reproduce. That theory refined Ernest Rutherford's and Antonius van den Broek's model, which proposed that the atom contains in its nucleus a number of positive nuclear charges that is equal to its (atomic) number in the periodic table. This remains the accepted model today.
18. (b) Vitamin C, also known as ascorbic acid and ascorbate, is a vitamin found in various foods and sold as a dietary supplement. It is used to prevent and treat scurvy. Vitamin C is an essential nutrient involved in the repair of tissue and the enzymatic production of certain neurotransmitters.
19. (d) Animal cells do not have cell walls because they do not need them. Cell walls, which are found in plant cells, maintain cell shape, almost as if each cell has its own exoskeleton. This rigidity allows plants to stand upright without the need for bones.
20. (a) A pteridophyte is a vascular plant (with xylem and phloem) that disperses spores. Because pteridophytes produce neither flowers nor seeds, they are sometimes referred to as "cryptogams", meaning that their means of reproduction is hidden. Examples include ferns, horsetails and club-mosses.
21. (b) Trypanosoma is a genus of kinetoplastids (class Trypanosomatidae[1]), a monophyletic[2] group of unicellular parasitic flagellate protozoa. Trypanosoma is part of the phylum Sarcomastigophora. Most trypanosomes are heteroxenous and most are transmitted via a vector. The majority of species are transmitted by blood-feeding invertebrates, but there are different mechanisms among the varying species. Some, such as Trypanosoma equiperdum, are spread by direct contact. In an invertebrate host they are generally found in the intestine, but normally occupy the bloodstream or an intracellular environment in the mammalian host.
    Trypanosomes infect a variety of hosts and cause various diseases, including the fatal human diseases sleeping sickness, caused by Trypanosoma brucei, and Chagas disease, caused by Trypanosoma cruzi.
22. (d) Smooth muscle cells are found in the walls of hollow organs, including the stomach, intestines, urinary bladder and uterus, and in the walls of passageways, such as the arteries and veins of the circulatory system, and the tracts of the respiratory, urinary, and reproductive systems.
23. (c) Intercropping is growing two or more crops next to each other at the same time.It is very important not to have crops competing with each other for space, nutrients, water, or sunlight. An example of an intercropping strategy is planting one crop that has deep roots with another that has shallow roots.
24. (b) Magnification is the process of enlarging the apparent size, not physical size, of something. This enlargement is quantified by a calculated number also called "magnification". When this number is less than one, it refers to a reduction in size, sometimes called minification or de-magnification.
25. (a) Lysosomes are found in animal cell, they are also known as suicidal bags of the cell. A human cell contains around 300 lysosomes. They not only digest large molecules but also responsible for breaking down and getting rid of waste products of the cell. They have enzymes which allow them to carry out these processes.
26. (c) The economic model is a theoretical construct representing economic processes by a set of variables and a set of logical and/or quantitative relationships between them. The economic model is a simplified, often mathematical, framework designed to illustrate complex processes. Frequently, economic models posit structural parameters.A model may have various exogenous variables, and those variables may change to create various responses by economic variables. Methodological uses of models include investigation, theorizing, and fitting theories to the world.
27. (b) Normal demand curve is the graph that shows relationship between demand and price under ceteris paribus… normal demand curve shows negative slope because of the inversely proportional between price and quantity demanded in the market such that when the price is higher quantity demanded decreases and vise versa.
28. (a) Minimum Support Price is the price at which government purchases crops from the farmers, whatever may be the price for the crops. Minimum Support Price is an important part of India›s agricultural price policy. The MSP helps to incentivize the framers and thus ensures adequate food grains production in the country.
29. (c) A cost-of-living index is a theoretical price index that measures relative cost of living over time or regions. It is an index that measures differences in the price of goods and services, and allows for substitutions with other items as prices vary.
    Minimum Support Price is the price at which government purchases crops for the farmers, to safeguard the interests of the farmers.
30. (c) The Human Development Index (HDI) is a statistic composite index of life expectancy, education, and per capita income indicators, which are used to rank countries into four tiers of human development. ... Examples include—Being: well fed, sheltered, healthy; Doing: work, education, voting, participating in community life.
31. (c) In economics, the Gini coefficient sometimes called the Gini index or Gini ratio, is a measure of statistical dispersion intended to represent the income or wealth distribution of a nation's residents, and is the most commonly used measurement of inequality. It was developed by the Italian statistician and sociologist Corrado Gini and published in his 1912 paper Variability and Mutability

32. (c) A matter is anything that has mass and occupies space. Pen, paper, clips, sand, air, ice, etc. are different forms of matter. Every matter is made up of tiny particles. These particles are so tiny that they can't be seen with naked eyes.
Every substance is made up of particles. These particles exhibit some characteristics. They can influence the state and properties (physical and chemical) of a substance. The five characteristics shown by particles of matter are as follows.
1. All matter is made of particles
2. Particles have space between them
3. Particles are always moving
4. Particles move faster and get farther apart when heated
5. Particles are attracted to each other

33. (a) Evaporation is the process by which water changes from a liquid to a gas or vapor. Evaporation is the primary pathway that water moves from the liquid state back into the water cycle as atmospheric water vapor. The rate of evaporation is affected by the following factors: Temperature: The rate of evaporation increases with an increase in temperature. Surface area: The rate of evaporation increases with an increase in surface area.
Humidity: The amount of water vapour present in the air is called humidity.

34. (b) The distance-time graph determines the change in the position of the object. The speed of the object as well can be determined using the line graph. Here the time lies on the x-axis while the distance on the y-axis. The line graph of uniform motion is always a straight line or Horizontal.

35. (b) In chemistry, a mixture is a material made up of two or more different substances which are physically combined. A mixture is the physical combination of two or more substances in which the identities are retained and are mixed in the form of solutions, suspensions and colloids.
Mixtures are one product of mechanically blending or mixing chemical substances such as elements and compounds, without chemical bonding or other chemical change, so that each ingredient substance retains its own chemical properties and makeup. Despite the fact that there are no chemical changes to its constituents, the physical properties of a mixture, such as its melting point, may differ from those of the components. Some mixtures can be separated into their components by using physical (mechanical or thermal) means.

36. (b) A chemical element is a species of atom having the same number of protons in its atomic nuclei. For example, the atomic number of oxygen is 8, so the element oxygen describes all atoms which have 8 protons. In total, 118 elements have been identified.
An atom is the smallest constituent unit of ordinary matter that constitutes a chemical element. Every atom is composed of a nucleus and one or more electrons bound to the nucleus. The nucleus is made of one or more protons and a number of neutrons.
Isobars are atoms (nuclides) of different chemical elements that have the same number of nucleons. Correspondingly, isobars differ in atomic number (or number of protons) but have the same mass number. An example of a series of isobars would be 40S, 40Cl, 40Ar, 40K, and 40Ca.
Valency of an element is a measure of its combining power with other atoms when it forms chemical compounds or molecules.

37. (a) The speed of the electric current would increase. Increasing the speed of the relative motion between the coil and the magnet – If the same coil of wire passed through the same magnetic field but its speed or velocity is increased, the wire will cut the lines of flux at a faster rate so more induced emf would be produced.

38. (c) An octave can defined as interval between two points where the frequency at the second point is twice the frequency of the first. f = 1000 Hz. Thus, the frequency of a note that is one octave higher than 500 Hz is 1000 Hz.

39. (d) President removal from office is to be in accordance with procedure prescribed in Article 61 of the Constitution. He may, by writing under his hand addressed to the Vice-President, resign his office. Comptroller and Auditor General of India can be removed by the President only in accordance with the procedure mentioned in the Constitution that is the manner same as removal of a Supreme Court Judge. A Judge of SC may resign his office, by submitting his resignation letter to the President.

40. (d) Rajya Sabha in India's Parliament has certain exclusive powers with respect to the following: Enable the parliament to make law on a matter of state list. Creation of new All India Services. Enforcing proclamation of emergency when Lok Sabha is dissolved.

41. (b) The Government of India Act 1919 was passed to expand participation of Indians in the government of India. The Act embodied the reforms recommended in the report of the Secretary of State for India, Edwin Montagu, and the Viceroy, Lord Chelmsford. The Act covered ten years, from 1919 to 1929. This Act represented the end of benevolent despotism (the act of authorities enhancing themselves) and began the genesis of responsible government in India.

42. (b) The Four Pillars is a research programme set up in 1987 by the Geneva Association, also known as the International Association for the Study of Insurance Economics. The aim of the Four Pillars research programme is to study the key importance in the new service economy of Social Security, Insurance, Savings and Employment. The programme focuses on the future of pensions, welfare and employment. The Geneva Association launched its Four Pillars research programme with a view to identifying possible solutions to the issue of the future financing of pensions and more generally, to organising social security systems in our post-industrial societies. Demographic trends - especially increased life and health expectancy - could be seen as positive if we were able to devise ways of enabling "ageing in good-health populations" to make a valid economic and social contribution to the functioning of our service economies over the decades to come.
The concept of four pillar state free from district magistracy for India was suggested by Ram Manohar Lohia.

43. (c) The Constitution offers all citizens, individually and collectively, some basic freedoms. These are guaranteed in the Constitution in the form of six broad

categories of Fundamental Rights, which are justiciable. Article 12 to 35 contained in Part III of the Constitution deal with Fundamental Rights. These are:
Right to equality, including equality before law, prohibition of discrimination on grounds of religion, race, caste, sex or place of birth, and equality of opportunity in matters of employment.
Right to freedom of speech and expression, assembly, association or union, movement, residence, and right to practice any profession or occupation (some of these rights are subject to security of the State, friendly relations with foreign countries, public order, decency or morality).
Right against exploitation, prohibiting all forms of forced labour, child labour and traffic in human beings.
Right to freedom of conscience and free profession, practice, and propagation of religion.
Right of any section of citizens to conserve their culture, language or script, and right of minorities to establish and administer educational institutions of their choice; and
Right to constitutional remedies for enforcement of Fundamental Rights.

44. (c) Climate: Cotton grows well in warm and moist climate where summer is long and where there is salinity in the soil. Temperature: Cotton grown well in a temperature of 24°C. But cotton bursts out, high temperature is injurious. Rainfall: 60-100 cm rainfall is essential for the cultivation of cotton.

45. (a) Temperate coniferous forest is a terrestrial habitat type defined by the World Wide Fund for Nature. Temperate coniferous forests are found predominantly in areas with warm summers and cool winters and vary in their kinds of plant life. In some, needle leaf trees dominate, while others are home primarily to broadleaf evergreen trees or a mix of both tree types.[1] A separate habitat type, the tropical coniferous forests, occurs in more tropical climates.
Temperate coniferous forests are common in the coastal areas of regions that have mild winters and heavy rainfall, or inland in drier climates
Temperate coniferous forests sustain the highest levels of biomass in any terrestrial ecosystem and are notable for trees of massive proportions in temperate rainforest regions.

46. (c) Anaimudi peak is located in Anamalai Hills in Kerala at the elevation of 2,695 meters (8,843 ft), it is considered the highest peak in the Western Ghats and the whole of South India. Dodabetta, is located approximately 10 km away from Ooty. It towers to a staggering height of 8650 feet or 2,623 meters above the sea level and is the highest peak in the Nilgiri Hills. Dhoopgarh is the highest point in the Mahadeo Hills (Satpura Range), Madhya Pradesh, India. Located in Pachmarhi, it has an elevation of 1,352 metres (4,429 ft). Guru Shikhar, a peak in the Arbuda Mountains of Rajasthan, is the highest point of the Aravalli Range. It rises to an elevation of 1,722 metres (5,650 ft).

47. (d) Coral reefs are located in tropical oceans near the equator. The largest coral reef is the Great Barrier Reef in Australia. The second largest coral reef can be found off the coast of Belize, in Central America. Other reefs are found in Hawaii, the Red Sea and other areas in tropical oceans.
Coral reef are not present in Gulf of Cambay. For habitat of coral reef they require warm, shallow, clear, sunny and agitated water.

48. (d) The cultivation of jute in India is mainly confined to the eastern region of the country . The jute crop is grown in nearly 83 districts of seven states - West Bengal , Assam , Orissa , Bihar , Uttar Pradesh , Tripura and Meghalaya .

49. (c) The meeting of Ashoka with Nigrodha the son of Sushima his elder brother is a turning point in Emperor Ashokas life. Two incidents made Ashoka realize the path of ahimsa and Buddhism. Samudra was a Buddhist monk. Samudra taught him the doctrines of Buddha and Ashoka proclaimed his faith into that.

50. (c) The Coromandel Coast is the southeastern coast region of the Indian subcontinent, bounded by the Utkal Plains to the north, the Bay of Bengal to the east, the Kaveri delta to the south and the Eastern Ghats to the west, extending over an area of about 22,800 square kilometres. Its definition can also include the north western coast of the island of Sri Lanka.[citation needed] The coast has an average elevation of 80 metres and is backed by the Eastern Ghats, a chain of low, flat-topped hills.
Arikamedu is a coastal fishing village, under the Ariankuppam Panchayat, on the southeastern coast of India, 4 kilometres (2.5 mi) from Pundicherry, on the Pundicherry-Cuddalore road; it was originally a French colonial town. It is located on the bank of the Ariyankuppam River (for most part of the year the river is considered a lagoon), also known as Virampattinam River, which forms the northern outlet of the Gingee River as it joins the Bay of Bengal. As the site is located at the bend of the river it provides protection to sea-going vessels that dock there.

51. (a) Cichlid are fish from the family Cichlidae in the order Cichliformes. Cichlids were traditionally classed in a suborder, Labroidei, along with the wrasses (Labridae), in the order Perciformes but molecular studies have contradicted this grouping. The closest living relatives of cichlids are probably the convict blennies and both families are classified in the 5th edition of Fishes of the World as the two families in the Cichliformes, part of the subseries Ovalentaria. This family is both large and diverse. At least 1,650 species have been scientifically described,[5] making it one of the largest vertebrate families.
The largest quantity of cichilds are found in backwater of kerala.

52. (c) Eratosthenes of Cyrene was a Greek polymath: a mathematician, geographer, poet, astronomer and music theorist. He was a man of learning, becoming the chief librarian at the Library of Alexandria. His work is comparable to what is now known as the study of geography and he introduced some of the terminology still used today.
He is best known for being the first person to calculate the circumference of the Earth, which he did by using the extensive survey results he could access in his role at the Library; his calculation was remarkably accurate. He was also the first to calculate the tilt of the Earth's axis, once again with remarkable accuracy. Additionally, he may have accurately calculated the distance from the Earth to the Sun and invented the

leap day. He created the first global projection of the world, incorporating parallels and meridians based on the available geographic knowledge of his era.

53. (b) Narayana Bhatta Goswami was a disciple of Shri Krishna Dasa Brahmachari, coming in the line of Gadadhara Pandit Goswami. Narayana Bhatta was completely attached to Vraja bhumi. He saw no difference between the transcendental name, form, pastimes, and dhama of Vrindavana. He always relished the pastimes of Radha-Gopinatha in the association of rasika Vaishnavas.
Constantly, he wandered through the twelve forests of Vraja mandala. He uncovered many lost Deities and re-established Their worship. He also revealed many of Radha-Shyamasundara's pastime places. Quoting Varaha Purana, he compiled Vraja-bhakti-vilasa, a detailed guidebook of Vraja Mandala. In this book he reveals his identity as Narada Muni. For this and other books he is known by the Vrajavasis as the Vrajacharya. His Samadhi is in Unchagoan, the village of Shrimati Lalita-sakhi, located just near Shrimati Radharani's palace in Barshana.

54. (b) A Bose–Einstein condensate (BEC) is a state of matter (also called the fifth state of matter) which is typically formed when a gas of bosons at low densities is cooled to temperatures very close to absolute zero (-273.15 °C). Under such conditions, a large fraction of bosons occupy the lowest quantum state, at which point microscopic quantum phenomena, particularly wave function interference, become apparent macroscopically. A BEC is formed by cooling a gas of extremely low density, about one-hundred-thousandth (1/100,000) the density of normal air, to ultra-low temperatures.
This state was first predicted, generally, in 1924–1925 by albert Einstein[1] following a paper written by Satyendra Nath Bose, although Bose came up with the pioneering paper on the new statistics

55. (c) The rate of evaporation is affected by the following factors:
Temperature: The rate of evaporation increases with an increase in temperature.
Surface area: The rate of evaporation increases with an increase in surface area.
Humidity: The amount of water vapour present in the air is called humidity. The rate of evaporation decreases with an increase in humidity.
Wind speed: Evaporation increases with an increase in wind speed.

56. (c) Rutherford overturned Thomson's model in 1911 with his well-known gold foil experiment in which he demonstrated that the atom has a tiny and heavy nucleus. Rutherford designed an experiment to use the alpha particles emitted by a radioactive element as probes to the unseen world of atomic structure. If Thomson was correct, the beam would go straight through the gold foil. Most of the beams went through the foil, but a few were deflected.
Rutherford presented his own physical model for subatomic structure, as an interpretation for the unexpected experimental results. In it, the atom is made up of a central charge (this is the modern atomic nucleus, though Rutherford did not use the term "nucleus" in his paper) surrounded by a cloud of (presumably) orbiting electrons. In this May 1911 paper, Rutherford only committed himself to a small central region of very high positive or negative charge in the atom.

57. (c) A food chain shows how each living thing gets food and how nutrients and energy are passed from creature to creature. Food chains begin with plant-life and end with animal-life. Some animals eat plants, some animals eat other animals. A simple food chain could start with grass, which is eaten by rabbits.

58. (c) In cellular biology, active transport is the movement of molecules across a membrane from a region of lower concentration to a region of higher concentration—against the concentration gradient. Active transport requires cellular energy to achieve this movement. There are two types of active transport: primary active transport that uses adenosine triphosphate (ATP), and secondary active transport that uses an electrochemical gradient. An example of active transport in human physiology is the uptake of glucose in the intestines.
An example of primary active transport using redox energy is the mitochondrial electron transport chain that uses the reduction energy of NADH to move protons across the inner mitochondrial membrane against their concentration gradient. An example of primary active transport using light energy are the proteins involved in photosynthesis that use the energy of photons to create a proton gradient across the thylakoid membrane and also to create reduction power in the form of NADPH.

59. (b) The chlorophyll in photosynthetic prokaryotic bacteria is associated with membranous vesicles.
These vesicles are typically spherical, ranging in size from 20 to 100 nm in Gram-positive bacteria and archaea to 100–300 nm in Gram-negative bacteria. They can contain cell-wall material, as well as a variable content enclosed by the membrane.

60. (a) Demographic dividend, as defined by the United Nations Population Fund (UNFPA) means, "the economic growth potential that can result from shifts in a population's age structure, mainly when the share of the working-age population (15 to 64) is larger than the non-working-age share of the population (14 and younger, and 65 and older).
In other words, it is "a boost in economic productivity that occurs when there are growing numbers of people in the workforce relative to the number of dependents. UNFPA stated that, "A country with both increasing numbers of young people and declining fertility has the potential to reap a demographic dividend.

61. (a) Disposable income is total personal income minus personal current taxes. In national accounts definitions, personal income minus personal current taxes equals disposable personal income.[2] Subtracting personal outlays (which includes the major category of personal [or private] consumption expenditure) yields personal (or, private) savings, hence the income left after paying away all the taxes is referred to as disposable income.

62. (a) The term free price system refers to an economic system where prices are decided by exchange of demand and supply and the prices resulting from it is taken as a signal which is communicated between

consumers and producers and which helps in guiding production and distribution of the resources.
The interaction of buyers and sellers in free markets enables goods, services, and resources to be allocated prices. ... Resources move towards where they are in the shortest supply, relative to demand, and away from where they are least demanded.

63. (a) Indexation is a technique to adjust income payments by means of a price index, in order to maintain the purchasing power of the public after inflation, while deindexation is the unwinding of indexation. Indexation is used to adjust the purchase price of an investment to reflect the effect of inflation on it. A higher purchase price means lesser profits, which effectively means a lower tax. With the help of indexation, you will be able to lower your long-term capital gains, which brings down your taxable income.

64. (c) Uniform circular motion is accelerated because the velocity changes due to continuous change in the direction of motion. So even when the body moves to a constant speed its velocity is not constant. Therefore circular motion is an acceleration motion even when the speed remains constant.
Uniform circular motion can be described as the motion of an object in a circle at a constant speed. As an object moves in a circle, it is constantly changing its direction. At all instances, the object is moving tangent to the circle. Since the direction of the velocity vector is the same as the direction of the object's motion, the velocity vector is directed tangent to the circle as well.

65. (b) Duration = 2.5seconds
Speed = 340 m/s
Distance = speed × time
2.5×340 = 850m or 0.85 km is the distance between the source and the mountain

66. (c) A kilowatt-hour is 1,000 watts used for one hour. As an example, a 100-watt light bulb operating for ten hours would use one kilowatt-hour.
How to calculate electric usage cost:
1. Volts × Amps = Watts
2. Watts ÷ 1,000 = Kilowatts (kW)
3. Kilowatts (kW) × Hours of Use = Kilowatt Hours (kWh)

A 100-Watt bulb if kept on for 10 hours will consume: 100 × 10 = 1000 Watt-Hour = 1 Kilowatt-Hour (kWH) = 1 units

67. (c) The Fifth Schedule of the Constitution deals with the administration and control of Scheduled Areas as well as of Scheduled Tribes residing in any State other than the States of Assam, Meghalaya, Tripura and Mizoram.
In the Article 244(1) of the Constitution, expression Scheduled Areas means such areas as the President may by order declare to be Scheduled Areas.
The President may at any time by order direct that the whole or any specified part of a Scheduled Area shall cease to be a Scheduled Area or a part of such an area; increase the area of any Scheduled Area in a State after consultation with the Governor of that State; alter, but only by way of rectification of boundaries, any Scheduled Area; on any alteration of the boundaries of a State on the admission into the Union or the establishment of a new State, declare any territory not previously included in any State to be, or to form part of, a Scheduled Area; rescind, in relation to any State of States, any order or orders made under these provisions and in consultation with the Governor of the State concerned, make fresh orders redefining the areas which are to be Scheduled Areas.

68. (c) The Fifth Amendment of the Constitution of India, officially known as The Constitution (Fifth Amendment) Act, 1955, empowered the President to prescribe a time limit for a State Legislature to convey its views on proposed Central laws relating to the formation of new States and alteration of areas, boundaries or names of existing States.The amendment also permitted the President to extend the prescribed limit, and prohibited any such bill from being introduced in Parliament until after the expiry of the prescribed or extended period. The 5th Amendment re-enacted the proviso to Article 3 of the Constitution.
Under the proviso to Article 3 of the Constitution (relating to formation of new States and alteration of areas, boundaries or names of existing States), no bill for the purpose of forming a new state, increasing or decreasing the area of any state or altering the boundaries or name of any state could be introduced in.

69. (b) The Governor of each State shall appoint a person who is qualified to be appointed as a Judge of a High Court to be Advocate General for the State. The Governor appoints the Advocate General of the state. The person who is appointed should be qualified to be appointed a judge of a high court.
The Code of Civil Procedure, 1908 is a procedural law related to the administration of civil proceedings in India. The Code is divided into two parts: the first part contains 158 sections and the second part contains the First Schedule, which has 51 Orders and Rules.
The act clarified that the provisions of the Civil Procedure Code as amended by the Act would have an overriding effect over any rules of the High Court or of the amendments made by the state government concerned.

70. (c) A unitary system is governed constitutionally as one single unit, with one constitutionally created legislature. ... In Unitary Constitution the provinces are subordinate to the centre, but in federal constitution, there is a division of powers between the federal and the state governments.
Quasi federal refers to government organized similar to a union of states under a central government rather than the individual governments of the separate states. Quasi federal refers to a system of government where the distribution of powers between the centre and the state are not equal. India is a federation with a unitary bias and is referred as a quasi federal state because of strong central machinery. States are also dependent on the centre for resources.

71. (b) Madhya Pradesh, Jharkhand, Chhattisgarh, Haryana, Delhi do not have coastline nor international border.

72. (c) Bhopal is the capital city of the Indian state of Madhya Pradesh and it is not located on any River bank. While Agra is located on bank of River Yamuna, and Bhagalpur and Kanpur are located on the bank of River Ganga.

73. (a) Jhumri Telaiya is a city in the Koderma District of Jharkhand, India. It is situated in the Damodar Valley.
Mandar Parvat, also known as Mandar Hill is a small mountain situated in Banka district under Bhagalpur. It

is about 700 ft high and approximately 45 km south of Bhagalpur city off Bausi, a place located on the state highway between Bhagalpur and Dumka.

74. (d) The south India region has a tropical climate and depends on monsoons for rainfall. The region, which includes Karnataka, inland Tamil Nadu and western Andhra Pradesh, gets between 400 and 750 millimetres (15.7 and 29.5 in) of rainfall annually with hot summers and dry winters with temperatures around 20–24 °C (68–75 °F).

75. (d) Sex Composition - The number of women and men in a country is an important demographic characteristic. The ratio between the number of women and men in the population is called the Sex Ratio. In some countries it is calculated by using the formula: or the number of males per thousand females.

76. (b) Human development is defined as the process of enlarging people's freedoms and opportunities and improving their well-being. ... The human development concept was developed by economist Mahbub ul Haq.

77. (b) Around 70% of the world's total citrus production is grown in the Northern Hemisphere, in particular countries around the Mediterranean and the United States, although Brazil is the largest citrus producer.

78. (c) The Nayanars were a group of 63 saints (also saint poets) in the 6th to 8th century who were devoted to the Hindu god Shiva in Tamil Nadu. They, along with the Alwars, their contemporaries who were devoted to Vishnu, influenced the Bhakti movement in Tamil. The names of the Nayanars were first compiled by Sundarar.

79. (c) Maruta makkal or tribes were ploughmen (ulavar) inabiting fertile, well-watered tracts (panai) and living in villages called ur. The Kuravar is an ethnic Tamil community native to the Kurinji mountain region of southern India. Mullai Makkal or Pastoralists, also called Ayar (Cowmen) were the habitat of Tamil regions. Netal Makkal were fishing people living in large coastal village called Pattinam and who were living in small villages, called pakkam.

80. (a) Babur, Mughal emperor, was a follower of Naqshbandi Sufi saint Khwaja Ubaidullah Ahrar. Explanation: Nassiruddin Ubaidullah Ahrar or Khwaja Ahrar was a member of Naqshbandi Sufi spiritual order of Central Asia. He was deeply involved in the political, economics, and social activities of Transaxonia

81. (a) in the Cornwallis Code of 1793, collectors lost their judicial powers and reverted to the business of collecting alone. The code abolished the distinction between civil and revenue causes and gave the district courts the power to hear all civil causes. The Vernacular Press Act of 1878 was designed to better control the Vernacular Press and to empower the Government with more effective means of punishing and repressing seditious writings. The Indian Factories Act was enacted in 1881. The Indian Councils Act 1909, commonly known as the Morley-Minto or Minto-Morley Reforms, was an Act of the Parliament of the United Kingdom that brought about a limited increase in the involvement of Indians in the governance of British India.

82. (a) 371A. Special provision with respect to the State of Nagaland.—(1) Notwithstanding anything in this Constitution,—
No Act of Parliament in respect of— (i) religious or social practices of the Nagas, (ii) Naga customary law and procedure, (iii) administration of civil and criminal justice involving decisions according to Naga customary law, (iv) ownership and transfer of land and its resources.

83. (d) Originally five councils were created as per the States Reorganization Act 1956 as follows: Northern Zonal Council: Haryana, Himachal Pradesh, Jammu & Kashmir, Punjab, Rajasthan, National Capital Territory of Delhi and Union Territory of Chandigarh.

84. (c) Article 361 of the co situation of India extends protection to the president from legal liability. He enjoys personal immunity legal liability for his official acts. During his term of office, he is immune from any criminal proceedings.

85. (b) Article 348 (1) of the Constitution of India provides that all proceedings in the Supreme Court and in every High court shall be in English Language until Parliament by law otherwise provides.

86. (d) All union cabinet members shall submit in writing to the President to propose proclamation of emergency by the president in accordance with Article 352. According to the Constitution of India, the total number of ministers in the council of ministers must not exceed 15% of the total number of members of the Lok Sabha.

87. (d) A Mediterranean climate or dry summer climate is characterized by dry summers and mild, wet winters. The climate receives its name from the Mediterranean Basin, where this climate type is most common. Mediterranean climate zones are typically located along the western sides of continents, between roughly 30 and 45 degrees north and south of the equator. The main cause of Mediterranean, or dry summer climate, is the subtropical ridge which extends northwards during the summer and migrates south during the winter due to increasing north-south temperature differences.

88. (d) Brahmaputra takes a 'U' turn at Namcha Barwa and then continues to flow in Arunachal Pradesh and after that, it is called as "Dihang River or Siang River". Explanation: The 'U' turn is pointed at the beginning of Grand Canyon.

89. (d) Dutt Bradely Thesis Was also known as "The Anti-Imperialist People's Front in India" written by Rajni Palme Dutt and Ben Bradley. Both of them were leaders of the Communist Party of Great Britain. In this document, while giving an analysis of the situation prevailing in India at that time, they also project the strategic alliance that would be required in the struggle against imperialism as well as the tactical approach that will have to be worked out in different stages. The role of the various classes in this struggle against imperialism and the varied forms to be adopted, the role of the working class in the struggle as well as the necessity of its intervention enabling it to acquire the leadership of the struggle in the process, has been pointed out.

90. (c) Under British Rule, there were three main types of land tenure systems in India. They were Zamindars, Mahalwari and Rayatwari. ... Under this system, the lands of a village or few villages was held by one person or few joint owners who were responsible for payment of land revenue to the Government.

91. (a) Plagues and Peoples is a book on epidemiological history by William Hardy McNeill published in New York City in 1976. It was a critical and popular success, offering a radically new interpretation of the extraordinary impact of infectious disease on cultures as a means of enemy attack.

92. (a) Foundation of Agricultural Research Institute was laid by Lord Curzon, The institute was established in 1905 at Pusa, Bihar, with the financial assistance of Henry Phipps, Jr., an American philanthropist. Phipps was a family friend of Lady Curzon, the daughter of an American millionaire, and the wife of Lord Curzon, the Viceroy of India. Phipps stayed as a guest of the Curzons during his visit to India. More importantly, Phipps left behind with them a donation of $30,000, which was used to establish the institute. He laid the foundation stone of the Agricultural Research Institute and college on 1 April 1905. The Institute was originally called the Agricultural Research Institute (ARI).

93. (c) The Chandimangal is an important subgenre of mangalkavya, the most significant genre of medieval Bengali literature. The texts belonging to this subgenre eulogize Chandi or Abhaya, primarily a folk goddess, but subsequently identified with Puranic goddess Chandi. This identification was probably completed a few centuries before the earliest composition of the Chandimangalkavya. Most of the texts of this subgenre comprises two unrelated narratives. The narrative of Kalketu and Phullara is known as the Akhetik Khanda (hunter section), and the narrative of Dhanapati and his wives, Lahana and Khullana is known as the Banik Khanda (merchant section).

94. (a) Nikita Sergeyevich Khrushchev led the Soviet Union during part of the Cold War as the first secretary of the Communist Party of the Soviet Union from 1953 to 1964 and as chairman of the Council of Ministers from 1958 to 1964.
The Sino-Indian War, also known as the Indo-China War and Sino-Indian Border Conflict, was a war between China and India that occurred in 1962. A disputed Himalayan border was the main cause of the war, but other issues also played a role. There had been a series of violent border skirmishes between the two countries after the 1959 Tibetan uprising, when India granted asylum to the Dalai Lama. India initiated a Forward Policy in which it placed outposts along the border, including several north of the McMahon Line, the eastern portion of the Line of Actual Control proclaimed by Chinese Premier Zhou Enlai in 1959.

95. (d) It was launched by Prime Minister. Narendra Modi on 25 September 2014.
Make in India is a major national programme of the Government of India designed to facilitate investment, foster innovation, enhance skill development, protect intellectual property and build best in class manufacturing infrastructure in the country.

96. (d) The State Legislative Council is the upper house in those states of India that have a bicameral state legislature; the lower house being the State Legislative Assembly. Its establishment is defined in Article 169 of the Constitution of India.
As of November 2019, after the bifurcation of Jammu and Kashmir, 6 out of 28 states have a State Legislative Council. The latest state to have a council is Telangana. In accordance with a resolution passed by the Andhra Pradesh Vidhan Sabha, the Indian Parliament abolished the Vidhan Parishad through the Andhra Pradesh Legislative Council (Abolition) Act in 1985, after the Congress (I) suffered a major defeat in the state elections in Andhra Pradesh.

97. (a) SWAYAM is a Hindi acronym that stands for "Study Webs of Active-Learning for Young Aspiring Minds" is an Indian Massive open online course (MOOC) platform. SWAYAM is an initiative launched by the Ministry of Human Resource Development, Government of India under Digital India to give a coordinated stage and free entry to web courses, covering all advanced education, High School and skill sector courses. It was launched on 9th July 2017 by Honorable President of India.

98. (d) The Fundamental Rights, Directive Principles of State Policy and Fundamental Duties are sections of the Constitution of India that prescribe the fundamental obligations of the states to its citizens and the duties and the rights of the citizens to the State
To abide by the Constitution and respect its ideals and institutions, the National Flag and the National Anthem;
To cherish and follow the noble ideals which inspired our national struggle for freedom;
To uphold and protect the sovereignty, unity and integrity of India.

99. (a) In 1941, Burnham wrote a book analyzing the development of economics and society as he saw it, called The Managerial Revolution: What is happening in the World. Burnham's seminal work, The Managerial Revolution (1941), theorized about the future of world capitalism based upon its development in the interwar period. Burnham weighed three possibilities: (1) that capitalism was a permanent form of social and economic organization and would continue indefinitely; (2) that it was temporary and destined by its nature to collapse and be replaced by socialism; (3) that it was currently being transformed into some non-socialist future form of society.[21] Since capitalism had a more or less definite beginning in the 14th century, it could not be regarded as an immutable and permanent form.

100. (d) The word Quo Warranto literally means "under what authority?" This kind of a writ is issued to ensure that the person holding a public office to which he is not entitled. The writ of quo-warranto is used to prevent illegal assumption of any public office or usurpation of any public office by anybody. The fundamental basis of the proceeding of Quo Warranto is that the public has an interest to see that an unlawful claimant does not usurp a public office. For example, a person of 62 years has been appointed to fill a public office whereas the retirement age is 60 years. Now, the appropriate High Court has a right to issue a writ of Quo Warranto against the person and declare the office vacant.

101. (a) The National Cadet Corps is the youth wing of Armed Forces with its Headquarters at New Delhi, Delhi, India. It is open to school and college students on voluntary basis. National Cadet Corps is a Tri-Services Organisation, comprising the Army, Navy and Air Wing, engaged in grooming the youth of the country into disciplined and patriotic citizens.
Its motto is 'Unity and Discipline'.

102. (d) Among the main functions of the Home Ministry are - Law and Order; Police, Public Security and Prisons; Administration of Union Territories; Centre-State Relations; Official Languages and Civil Defence and Miscellaneous.

103. (a) India is a signatory to the United Nations Convention for Combating Desertification (UNCCD). The Ministry

of Environment, Forest and Climate Change (MoEFCC) is the nodal Ministry of Government of India (GoI) that oversees implementation of the Convention in the country.

104. (c) Annual financial statement. (1) The President shall in respect of every financial year cause to be laid before both the Houses of Parliament a statement of the estimated receipts and expenditure of the Government of India for that year, in this Part referred to as the annual financial statement.

105. (d) SAARC- South Asian Association for Regional Cooperation (SAARC) was established with the signing of the SAARC Charter in Dhaka on 8 December 1985. SAARC comprises of eight Member States: Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka.

106. (b) The five founding members of the Bank include Brazil, Russia, India, China and South Africa. Bank's Articles of Agreement specify that all members of the United Nations could be members of the bank, however the share of the BRICS nations can never be less than 55% of voting power.

107. (c) The Public Financial Management System (PFMS), earlier known as Central Plan Schemes Monitoring System (CPSMS), is a web-based online software application developed and implemented by the Office of Controller General of Accounts (CGA).

108. (c) The National Institute of Ayurveda is located in Jaipur, the capital of the State of Rajasthan in India.
The National Institute of homoeopathy is located in Kolkata, the capital of the State of West Bengal in India.
National Institute of Unani Medicine is situated in Bangalore in Karnataka state of India. Established in 1984, it is accredited from other and it is affiliated to Rajiv Gandhi University.
National Institute of Siddha is situated in Chennai in Tamil Nadu (Chennai) state of India. It is accredited from Central Council of Indian Medicine (CCIM) and it is affiliated to Tamil Nadu Dr. M.G.R. Medical University.

109. (c) Invest India is India's official agency dedicated to investment promotion and facilitation. It is a not-for-profit, single window facilitator, set up in 2010 for prospective overseas investors and to those aspiring Indian investors desiring to invest in foreign locations, and acts as a structured mechanism to attract investment. Invest India is essentially an Investment Promotion Agency in India.

110. (c) The National Dope Testing Laboratory (NDTL) is a premier analytical testing & research organization established as autonomous body under Ministry of Youth Affairs and Sports, Government of India. It is the only laboratory in the country responsible for human sports dope testing. It has significantly diversified its activities and roles by setting up unique dope testing facility and proficiency testing provider scheme for forensic and analytical drug testing laboratories.

111. (b) The 2019 Indian general election was held in seven phases from 11 April to 19 May 2019 to constitute the 17th Lok Sabha. The votes were counted and the result declared on 23 May. About 911 million people were eligible to vote, and voter turnout was over 67 per cent – the highest ever, as well as the highest ever participation by women voters.

112. (c) The Organisation of Islamic Cooperation is an international organization founded in 1969, consisting of 57 member states, with a collective population of over 1.8 billion as of 2015 with 53 countries being Muslim-majority countries. The organisation states that it is "the collective voice of the Muslim world" and works to "safeguard and protect the interests of the Muslim world in the spirit of promoting international peace and harmony".[1]
The OIC has permanent delegations to the United Nations and the European Union. The official languages of the OIC are Arabic, English, and French.

113. (a) 2019 Italian Open – Women's Singles. Elina Svitolina was the two-time defending champion, but lost in the second round to Victoria Azarenka. Karolína Plíšková won the title, defeating Johanna Konta in the final, 6–3, 6–4.

114. (b) In addition to IN ships Kolkata and Shakti, long range maritime patrol aircraft Poseidon-8I (P8I) was participated in simbex-19. The Singapore side was represented by RSN ships Steadfast and Valiant, maritime patrol aircraft Fokker-50 (F-50) and F-16 fighter aircraft.

115. (d) BWF(Badminton) has also launched a new format, called Triples, where it's match between a team of three players each with presence of, at least one female. The players are not allowed to hit successive returns.

116. (b) The Reserve Bank of India had constituted a High-Level Committee on Deepening of Digital Payments under the Chairmanship of Shri Nandan Nilekani, former Chairman, UIDAI, in January 2019.

117. (a) The United Nations Sasakawa Award is the most prestigious international award in the area of Disaster Risk Management. It was instituted more than 30 years ago and is jointly organized by the UNDRR and the Nippon Foundation. A total grant of USD 50,000 is distributed among the winners which can be either organizations or individuals.

118. (b) Former Indian cricketer GS Lakshmi is become the first woman match referee to oversee a men's ODI when she officiates the opening match of the third series of the World Cup League 2 in the United Arab Emirates .

119. (a) Joko Widodo (born Mulyono 21 June 1961), also known as Jokowi, is an Indonesian politician who is the 7th and current president of Indonesia. Elected in July 2014 as the first president not to come from an elite political or military background, he was previously the Mayor of Surakarta from 2005 to 2012, and the Governor of Jakarta from 2012 to 2014. He was named president-elect on 22 July 2014.

120. (d) May 21 is observed as Anti-Terrorism Day throughout the country. SICI pledges to oppose all forms of terrorism and violence on Anti-Terrorism Day and to spread the message of peace and humanity.