1. The total surface area of a cylinder o base radius $r$ and height $l$ is $k$ times the total surface area of a cone of base radius $r$ and slant side $l$. Which one of the following is correct?
   (a) $k$ is not an integer
   (b) $k$ is equal to 3
   (c) $k$ is equal to 2
   (d) $k$ is approximately equal to 3.5
2. A sphere of copper is dropped into a cylinder of radius $r$ and height $h$ (>4$r$) which is half filled with water. If the diameter of the sphere is $\frac{r}{2}$, the water will rise through which one of the following?
   (a) $\frac{4r}{3}$ (b) $\frac{r}{48}$
   (c) $\frac{r}{4}$ (d) $\frac{r}{6}$
3. What is the minimum radius (>1) of a circle whose circumference is an integer?
   (a) 2 (b) $\frac{4}{\pi}$
   (c) $\frac{6}{\pi}$ (d) $\frac{3}{\pi}$
4. The distance between the parallel sides of a trapezium = The distance between the mid-point of the slant sides = 4 cm. What is the area of the trapezium ?
   (a) 4 $cm^2$ (b) 8 $cm^2$
   (c) 16 $cm^2$ (d) 29 $cm^2$
5. A circular wire of radius 20 cm is cut to spread over the circumference of another circular wire of diameter 2 m. What is the angle subtended by the wire at the centre ?
   (a) $\frac{\pi}{4}$ radian (b) $\frac{2\pi}{5}$ radian
   (c) $\frac{\pi}{3}$ radian (d) $\frac{\pi}{5}$ radian
6. The length of an arc AB of a circle is 22 m, and the tangent to the circle at the points A and B are inclined to each other at an angle of 120°. What is the value of the radius of the circle?
   (a) 21 m
   (b) 4.2 m
   (c) Either 21 m or 4.2 m
   (d) Cannot be determined with the given data.
7. The mean of $n$ observations is $m$. If $m^2 - m + 1$ is added to each observation, what shall be the value of the new mean?
   (a) $m^2 + 1$ (b) $m^2 - m + 1$
   (c) $1 - m$ (d) 0
8. If for a frequency distribution with unequal class intervals, the frequency of a class is proportional to the area of the corresponding rectangle of the chosen graph, what is this graph termed as ?
   (a) Frequency polygon (b) Frequency curve
   (c) Bar diagram (d) Histogram
9. The medium of 15 observations is 61.5. If 10 is added to the observation with minimum value and 10 is subtracted from that with the maximum value, what shall be the value of the new median?
   (a) 61.5 (b) 71.5
   (c) 51.5 (d) Nothing definite can be said
10. Match List-I (*Statistical Term*) with List-II (*Characteristic*) and select the correct answer using the codes given below the Lists:

| **List-I** (*Statistical Term*) | **List-II** (*Characteristic*) |
|---|---|
| A. Arithmetic Mean | 1. Divides the measurements into four equal parts when the measurements are in natural order |
| B. Median | |
| C. Mode | 2. Most frequent value |
| D. Quartile | 3. Divides the measurements into two equal parts when the measurements are in natural order |
| | 4. Sum of the deviations from this measure is zero |

*Codes:*

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

***Directions*** The following five (5) items consists of two statements, one labelled as the 'Assertion (A)' and the other as 'Reason (R)'. You are to examine these two statements carefully and select the answers to these items using the codes given below:
(a) Both A and R are individually true and R is the correct explanation of A
(b) Both A and R are individually true but R is not the correct explanation of A
(c) A is true but R is false
(d) A is false but R is true

11. **Assertion (A):** A bar chart is a two dimensional figure.
    **Reason (R):** In a bar chart, the height of each bar is of significance and not its width.
12. **Assertion (A):** Mode is not a good measure of central tendency.
    **Reason (R):** Mode lays too much emphasis on the modal group and does not consider other variates at all.
13. **Assertion (A):** If $p$ is a prime number and it divides $ab$, where $a$, $b$ are positive integers, then $p$ must divide either $a$ or $b$.
    **Reason (R):** This is true if $p$ is any positive integer.

14. **Assertion (A):** The sum of $\frac{1}{\sqrt{5}+\sqrt{6}}$ and $\frac{1}{\sqrt{6}+\sqrt{7}}$ is irrational.
**Reason (R):** The sum of two irrational numbers is always irrational.

15. **Assertion (A):** If $O$ is the orthocenter of the triangle ABC, then $\angle BOC$ and $\angle BAC$ are supplementary.
**Reason (R):** Both the triangles BOC and BAC have a common base.

16. Let $p(x)$ and $q(x)$ be two unequal polynomials, and $h(x)$ and $l(x)$ be their HCF and LCM respectively, $p(x)$ divides $q(x)$.
Consider the following
1. $l(x)\, p(x) = h(x)\, q(x)$
2. $p(x)\, q(x) = l(x)\, h(x)$
3. $p(x) + q(x) = l(x) + h(x)$
Which of the above is/are correct?
(a) 2 only (b) 1 and 3
(c) 2 and 3 (d) 1, 2 and 3

17. $p$ and $q$ are two expressions whose LCM and HCF are P and Q respectively. If $p + q = P + Q$, then which one of the following is correct?
(a) $p + 2q = P + 2\,Q$ (b) $p - q = P - Q$
(c) $p^2 - q^2 = P^2 + Q^2$ (d) $p^2 + q^2 = P^2 + Q^2$

18. When expression $x^3 + 3x^2 - kx + 4$ is divided by $x - 2$, it leaves a remainder $k$. What is the value of $k$?
(a) 4 (b) 8
(c) 12 (d) 16

19. For what value of $k$, the equations $x + y = 2$, $3x + 4y = 7$ and $x - y = k$ have no common solution?
(a) $k$ is any real number
(b) $k = 0$
(c) $k$ is any real number other than 0
(d) $k$ is an integer

20. The average scores of boys and girls in an examination of a school are 71 and 73 respectively. The average score of the school in that examination is 71.8. What is the ratio of the number of boys to the number of girls who appeared in the examination?
(a) $\frac{5}{2}$ (b) $\frac{1}{4}$
(c) $\frac{3}{2}$ (d) $\frac{2}{3}$

21. A takes 2 hours more than B to walk $d$ km, but if A doubles his speed he can make it in 1 hour less than B. How much time does B require for walking $d$ km?
(a) $\frac{d}{2}$ (b) 3 hours
(c) 4 hours (d) $\frac{2d}{3}$ hours

22. Both A and B have some money. If A gives Rs. 30 to B, then B will have twice the money left with A. But if B gives Rs. 10 to A, then A will have thrice the money as much as is left with B. What is the amount of money with A?
(a) Rs. 44 (b) Rs. 62
(c) Rs. 72 (d) Rs. 34

23. $(x + 1)$ is the HCF of $ax^2 + bx + c$ and $bx^2 + ax + c$. What is the value of $c$?
(a) $-1$ (b) 1
(c) 0 (d) The value of $c$ cannot be determined

24. $x$ and $y$ denote the digits of a number at the ten's place and unit's place respectively. The sum of the two digits of the number is 13. If the digits are interchanged, the new number thus formed is smaller than the original number by 7. Which one of the following pairs of linear equations on being solved will give the values of $x$ and $y$?
(a) $10x + y = 13$, $9(x - y) = 7$
(b) $x + y = 13$, $9(y - x) = 7$
(c) $x + y = 13$, $9(x - y) = 7$
(d) $10x + y = 13$, $19(y - x) = 7$

25. Two polynomials
$P(x) = (x^2 + 3x + 2)(x^2 - 4x + a)$ and
$Q(x) = (x^2 - 6x + 9)(x^2 + 4x + b)$
Have their HCF as $(x + 2)(x - 3)$. What are the values of $a$ and $b$ respectively?
(a) 3 and 4 (b) 4 and 5
(c) 4 and 6 (d) 3 and 5

26. Let $p \in R$. Under which one of the following conditions is the equation $\sin x = p^2 - 4p + 5$ valid?
(a) $p < 2$ (b) $p > 2$
(c) $p = 0$ (d) $p = 2$

27. If $\operatorname{cosec}\theta = \sqrt{3\sqrt{3\sqrt{3\sqrt{.....}}}}$ infinitely, what is the value of $\sin\theta$?
(a) $\frac{1}{3}$ (b) $\frac{1}{\sqrt{3}}$
(c) $\frac{1}{9}$ (d) 1

28. Consider the following inequalities
1. $\sin 1^\circ < \sin 1^c$
2. $\cos 1^\circ < \cos 1^c$
3. $\tan 1^\circ < \tan 1^c$
Which of the inequalities given above are correct?
(a) 1 and 2 (b) 2 and 3
(c) 2 and 3 (d) 1, 2 and 3

29. What is the value of
$\cos^2 0^\circ + \cos^2 3^\circ + \cos^2 6^\circ + \ldots \cos^2 90^\circ$?
(a) 15 (b) 15.5
(c) 16 (d) 16.5

30. If $\sec x + \cos x = 2$, what is the value of $\sec^{10} x + \cos^{10} x$?
(a) 1 (b) 2
(c) $2^5$ (d) $2^{10}$

31. A person drives his car at an average speed of 40 km/hour on a straight road which runs 60° North of East. How far East of his starting point is he after 2 hours of driving?
(a) 20 km (b) 40 km
(c) $40\sqrt{3}$ km (d) $20\sqrt{3}$ km

32. If $\cos(A - B) = \frac{1}{2}$ and $\sin(A + B) = \frac{1}{2}$, what is the smallest positive value of A?
(a) 135° (b) 60°
(c) 30° (d) 105°

33. Consider the following statements:
1. $\sin\theta$ and $\operatorname{cosec}\theta$ are both positive in the 1st and 2nd quadrants.
2. $\cos\theta$ and $\sec\theta$ are both positive in the 1st and 3rd quadrants.

3. tan $\theta$ and cot $\theta$ are both positive in the 1st and 3rd quadrants.

Which of the statements, given above are correct?

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

34. If $ax^6 - c$ and $bx^6 - d$ leave no remainders when divided by $mx + n$ and $nx + m$, respectively; then which one of the following is correct?

(a) $ab = cd$ (b) $ac = bd$
(c) $ad = bc$ (d) $ac^6 = db^6$

35. A grocer buys two kinds of rice X and Y; one (X) at the rate of Rs. $A$ per kg, and the other (Y) at the rate of Rs. $B$ per kg. He mixes them and obtains a mixture of Rs. $C$ per kg. What is the ratio of the variety X to that of the variety Y in the mixture?

(a) $a : b$ (b) $(a + c) : (b + c)$
(c) $(c - a) : (b - c)$ (d) $(b - c) : (c - a)$

36. If $(x + y)^2 - z^2 = 4$, $(x + z)^2 - x^2 = 9$, $(z + x)^2 - y^2 = 36$; what is/are the value(s) of $x + y + z$?

(a) $\pm 1$ (b) 0
(c) $\pm 3$ (d) $\pm 7$

37. $\frac{a}{b+c} = \frac{b}{c+a} = \frac{c}{a+b} = k$

Consider the following:

1. $k = \frac{1}{2}$, if $a + b + c \neq 0$
2. $k = -1$, if $a + b + c = 0$
3. $k = 1$, if $a + b + c = 0$

Which of the above is/are correct?

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

38. What is the value of HCF of $a^2 - b^2 - c^2 - 2bc$, $b^2 - c^2 - a^2 - 2ca$ and $c^2 - a^2 - b^2 - 2ab$?

(a) $a + b + c$ (b) $a + b - c$
(c) $a - b + c$ (d) 1

39. If $x = 2 + 2^{2/3} + 2^{1/3}$. What is the value of the expression $x^3 - 6x^2 + 6x$?

(a) $-1$ (b) 0
(c) 1 (d) 2

40. Let $X_k = (p_1 p_2 \ldots p_k) + 1$ where $p_1 p_2 \ldots p_k$ are the first $k$ primes.

Consider the following:

1. X$k$ is a prime number
2. X$k$ is a composite number
3. X$k + 1$ is always an even number

Which of the above is/are correct?

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

41. For integers $x$, $y$ and $z$ consider the following:

1. HCF $(x, y) = 1$, HCF $(y, z) = 1 \Rightarrow$ HCF $(x, z) = 1$
2. LCM $(x, y) = xy$, LCM $(y, z) = yz \Rightarrow$ LCM $(x, z) = xz$

Which of the above is/are correct?

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

42. In limestone, 40% is calcium and the rest is carbon and oxygen. If in 20 kg of limestone, there is 9.4 kg of oxygen, what is the percentage of carbon in it?

(a) 12% (b) 13%
(c) 14% (d) 15%

43. Consider the following statements:

1. If $x$ and $y$ are composite numbers, then $x + y$ is always composite.
2. There does not exist a natural number which is neither prime nor composite.

Which of the above statements is/are correct?

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

44. How many digits are there in the expansion of $3^{17}$? ($\log_{10} 3 = 0.4771$)

(a) 7 (b) 8
(c) 9 (d) 10

45. If $x^3 + \left(\frac{1}{x^3}\right) = p$, what is the value of

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

(a) $\frac{p}{2}$ (b) $p$
(c) $3p$ (d) $p - 3$

46. If $ab + bc + ca = 0$, then what is the value of $\left(\frac{1}{a^2-bc} + \frac{1}{b^2-ca} + \frac{1}{c^2-ab}\right)$?

(a) 0 (b) 1
(c) 3 (d) $a + b + c$

47. If the polynomial $x^5 + px^4 + 7x^3 + x^2 + 5x + 7$ is divisible by $x^3 + 1$, then what is the value of $p$?

(a) 0 (b) 5
(c) $-5$ (d) $-1$

48. $(x - \alpha + 1)$ is one of the two factors of $x^2 - x(\alpha + \beta) + (\alpha - 1)(\beta + 1)$. What is the other factor?

(a) $x - \beta$ (b) $x - a - \beta$
(c) $x - \beta + 1$ (d) $x - \beta - 1$

49. $9x^4 - 12x^3 + 10x^2 + px + 1$ is a perfect square. What is the value of $p$?

(a) $-2$ (b) 2
(c) 4 (d) $-4$

50. The compound interest on a sum of money for 2 years at the rate of 5% per annum is Rs. 328. What is the simple interest for twice the principal for the same period of 2 years and at the same rate of interest?

(a) Rs. 656 (b) 640
(c) Rs. 664 (d) Rs. 650

51. In how many ways can Rs. 10 be paid in 50 paise coins or 25 paise coins of both?

(a) 19 (b) 20
(c) 21 (d) 22

52. Match List-I (*Figure*) with List-II (*Number of Lines of Symmetry*) and select the correct answer using the codes given below the Lists:

| **List-I** (*Figure*) | **List-II** (*Number of Lines of Symmetry*) |
|---|---|
| A. Square | 1. Zero |
| B. Rhombus | 2. One |

C. Trapezium 3. Two
D. Isosceles triangle 4. Three
5. Four

*Codes:*

| | | | | |
|---|---|---|---|---|
| (a) | A | B | C | D |
| | 2 | 3 | 1 | 5 |
| (b) | A | B | C | D |
| | 5 | 1 | 4 | 2 |
| (c) | A | B | C | D |
| | 2 | 1 | 4 | 5 |
| (d) | A | B | C | D |
| | 5 | 3 | 1 | 2 |

53. How many equilateral triangles can be formed by joining the mid-points of faces of a cube?
(a) 4 (b) 8
(c) 16 (d) Nil

54. If the area of a triangle formed by joining the mid-points of three adjacent faces of a cube is $\sqrt{3}$ square units, what is the total surface area of the cube?
(a) $6\sqrt{3}$ sq. units (b) $12\sqrt{3}$ sq. units
(c) 24 sq. units (d) 48 sq. units

55. Then length of a diagonal of a cuboid is 28 cm and the sum of the lengths of its three edges is 44 cm. What is the total surface area of the cuboid?
(a) 576 $cm^2$ (b) 1152 $cm^2$
(c) 1728 $cm^2$ (d) 2304 $cm^2$

56. What is the semi-vertical angle of a cone whose lateral surface area is double the base area?
(a) 30° (b) 45°
(c) 60° (d) 15°

57. What is area of an equilateral triangle inscribed in a circle of unit radius?
(a) $3\sqrt{3}$ sq. units (b) $\frac{3\sqrt{3}}{2}$ sq. units
(c) $\frac{3\sqrt{3}}{4}$ sq. units (d) $\frac{3\sqrt{3}}{16}$ sq. units

58. The length of diagonal of a rectangle is $4\sqrt{3}$ can which makes an angle of 30° with one of its sides. What is the area of the largest circle that can be inscribed in the rectangle?
(a) $3\pi$ $cm^2$ (b) $9\pi$ $cm^2$
(c) $12\pi$ $cm^2$ (d) $36\pi$ $cm^2$

59. $L_1$ and $L_2$ are two intersecting straight lines. How many circles can be drawn touching both the lines?
(a) 1 (b) 2
(c) 5 (d) Infinite

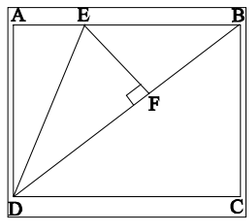
60. What is the locus of the centres of all the circles which touch a given straight line L at a given point P on it?
(a) A circle
(b) A straight line through P perpendicular to L
(c) A straight line through P making an angle 30° with L
(d) A straight line through P making an angle 45° with L

61. A triangle has sides of length 3 cm, 4 cm and 5 cm. What is the area of the circle inscribed in the triangle?
(a) $\pi$ $cm^2$ (b) $\frac{\pi}{2}$ $cm^2$
(c) $\frac{\pi}{4}$ $cm^4$ (d) $2\pi$ $cm^2$

62. OD is perpendicular to the chord AB of a circle whose centre is O. If BC is the diameter of the circle, then AC is equal to which one of the following?
(a) OD (b) $\left(\frac{3}{2}\right)$ OD
(c) 2 OD (d) 3 OD

63. Two concentric circles with centre O have radii 4 cm and 6 cm. OP and OPR are the common lined radii of the circles. If the tangent at P is drawn to meet bigger circle at point Q, what the length of QR?
(a) $2\sqrt{6}$ cm (b) $3\sqrt{3}$
(c) $4\sqrt{3}$ (d) $4\sqrt{6}$ cm

64. The area of the four walls of a room is 99 $m^2$. The sum of length and breadth of the room is 11 m. What is the height of the room?
(a) 4.1 m (b) 4.3 m
(c) 4.5 m (d) 4.7 m

65. 


In the above figure ABCD is a rectangle with AD = 4 units and AE = EB, EF is perpendicular to DB and is half of DF. If the area of the triangle DEF is 5 sq. units what is the area of ABCD?
(a) 20 sq. units (b) 28 sq. units
(c) $18\sqrt{3}$ sq. units (d) 24 sq. units

66. A cuboid has edges of $x$ cm, 1 cm and 2 cm. The total surface area of the cuboid has a numerical value which is some integral multiple of the numerical value of its volume. What is the value of $x$ for minimum positive possible integral multiple?
(a) 5 cm (b) 2 cm
(c) 3 cm (d) 4 cm

67. A square hole of cross-sectional area 4 $cm^2$ is drilled across a cube with its length parallel to a side of the cube. If an edge of the cube measures 5 cm, what is the total surface area of the body so formed?
(a) 140 $cm^2$ (b) 142 $cm^2$
(c) 162 $cm^2$ (d) 182 $cm^2$

68. A is the lateral surface area of right circular cone with $x$ as the radius of the base and height $y$. B is the lateral surface area of a right circular cone with $y$ as the radius of the base and height $x$. If A > B, which one of the following is correct?
(a) $x = y$ (b) $x < y$
(c) $x > y$ (d) $(x + y)$ < slant height of each cone

69. The base radius of a cone doubled. To maintain its volume at the same value, the height of the cone must be reduced by which one of the following factors?
(a) $\frac{1}{2}$ (b) $\frac{1}{3}$
(c) $\frac{1}{4}$ (d) $\frac{1}{6}$

70. The angles of depression of two posts at a distance of 2 units on the same side of a road from a balloon vertically over the

road, are observed to be 45° and 60°. What is the height of the balloon?

(a) $3-\sqrt{3}$ (b) $\sqrt{3}-1$

(c) $3+\sqrt{3}$ (d) $\sqrt{3}+1$

71. If A, B, C are three angles of a triangle, then which one of the following relations is not correct?

(a) sin A = sin (B + C) (b) tan (A – B – C) = tan 2A

(c) $\cos\left(\frac{B+C}{2}\right)=\sin\left(\frac{A}{2}\right)$ (d) cos (B + C) = cos A

72. Which one of following is a tigonometrical identity?

(a) $\frac{\tan A-\tan B}{\sin A+\cos B}=\frac{\sin A-\cos B}{\tan A+\tan B}$

(b) $\frac{\tan A-\tan B}{\sec A+\sec B}=\frac{\sec A+\sec B}{\tan A+\tan B}$

(c) $\frac{\tan A-\tan B}{\tan A+\tan B}=\frac{\sec A-\sec B}{\sec A+\sec B}$

(d) $\frac{\tan A-\tan B}{\tan A+\tan B}=\frac{\sin A-\cos B}{\sin A+\cos B}$

73. If $0<\theta<\frac{\pi}{2}$ and tan $\theta$ + sec $\theta$ = 2, what is the value of sin $\theta$?

(a) $\frac{3}{5}$ (b) $\frac{4}{5}$

(c) $\frac{3}{4}$ (d) –1

74. If $a\cos\theta + b\sin\theta = c$, what is the value of $(a\sin\theta - b\cos\theta)^2$?

(a) $a^2+b^2+c^2$ (b) $a^2+b^2-c^2$

(c) $a^2-b^2+c^2$ (d) $a^2-b^2-c^2$

75. If $\tan\theta + \cot\theta = 2$, what is the value of $\tan^4\theta + \cot^4\theta$?

(a) 2 (b) 16

(c) 0 (d) 4

76. Let tan A – tan B = $x$ and cot B – cot A = $y$.

What is the value of $\frac{\cot A\cot B+1}{\cot B-\cot A}$?

(a) $x+y$ (b) $x-y$

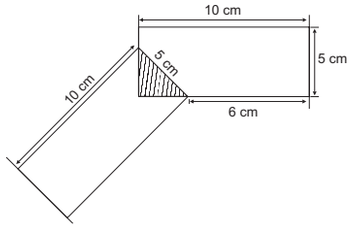
(c) $\left(\frac{1}{x}\right)-\left(\frac{1}{y}\right)$ (d) $\left(\frac{1}{x}\right)+\left(\frac{1}{y}\right)$

77. If A, B, C and D are angles of a cyclic quadrilateral other than a rectangle or a square, what is the value of (cos A + cos B + cos C + cos D)?

(a) 4 (b) 1

(c) 1 (d) 0

78.

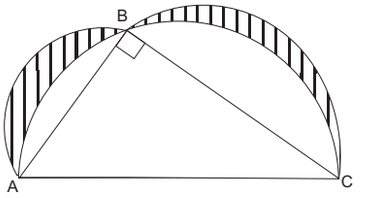



What is the area of the unshaded portion given in the above diagram in which two equal rectangles overlap?

(a) 94 cm$^2$ (b) 88 cm$^2$

(c) 75 cm$^2$ (d) Cannot be determined as the data is insufficient

79.

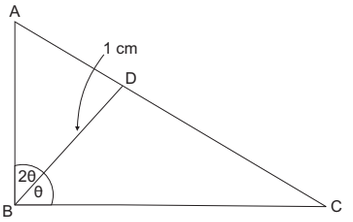



In the above figure, ABC is a right-angled triangle with B as the right angle. Three semicircles are drawn with AB, BC and AC as the diameters. What is the area of the shaded portion if the area of triangle ABC is 12 square units?

(a) 6 square units (b) 12 square units

(c) 24 square units (d) Cannot be determined as the data is insufficient

80.




One of the medians of a right-angled triangle ABC is of length $l$ cm and it divides the right angle in the ratio 1 : 2. What is the area of the triangle?

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

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

81. What is the number of double cones of semi-vertex angle $\alpha$ and having $r$ as the radius of the mid-section which can be moulded out of a cylinder of base radius $r$ and height $2r\cot\alpha$?

(a) 1 (b) 2

(c) 3 (d) 6

82. The minute had of a clock is 1.5 cm long. What is the distance traveled by its tip during an interval of 40 minutes? (*Take* $\pi$ = 3.14)

(a) 3.14 (b) 4.71

(c) 6.28 (d) 9.42

83. If $a$ is 60% of $b$. What per cent of $4a$ is $5b$?

(a) $\frac{25}{12}\%$ (b) $\frac{625}{3}\%$

(c) 148% (d) 240%

84. A school has to buy at least 15 chairs within a budgetary ceiling of Rs. 2000. A chair with arms costs Rs. 160 and one without arms costs Rs. 100. What is the maximum number of chairs with arms that the school can buy?

(a) 7 (b) 8

(c) 9 (d) 12

85. What is the least natural number which leaves no remainder when divided by all the digits from 1 to 9?

(a) 1800 (b) 5040

(c) 1920 (d) 2520

86. Match List I (*Time*) with List II (*Angle Between Hour Hand and Minute Hand of a Clock*) and select the correct answer using the codes given below the lists:

| List I (*Time*) | List II (*Angle Between Hour Hand and Minute Hand of a Clock*) |
|---|---|
| A. 1.10 p.m. | 1. 20° |
| B. 2.15 p.m. | 2. $22\frac{1}{2}°$ |
| C. 8.40 p.m. | 3. 24° |
| | 4. 25° |
| | 5. 30° |

*Codes:*

| | A | B | C | | A | B | C |
|---|---|---|---|---|---|---|---|
| (a) | 5 | 3 | 2 | (b) | 5 | 2 | 1 |
| (c) | 4 | 3 | 2 | (d) | 4 | 2 | 1 |

87. What is the remainder obtained with $2^{31}$ is 5?
(a) 1 (b) 2
(c) 3 (d) 4

88. What is the number of quadratic factors of $x^4 + x^2 + 1$?
(a) zero (b) 1
(c) 2 (d) 4

89. For $x^2 + 2x + 5$ to be a factor of $x^4 + px^2 + q$ what must be the values of $p$ and $q$ respectively?
(a) 5, 25 (b) 10, 20
(c) 6, 25 (d) 14, 25

90. $m$ men working $m$ hours per day can do $m$ units of work in $m$ days. How many units of this work would be completed by $n$ men working $n$ hours per day for $n$ days?
(a) $\frac{m^4}{n^3}$ (b) $n$
(c) $\frac{n^2}{m^3}$ (d) $\frac{n^3}{m^2}$

91. What is the speed of a train if it overtakes two persons who are walking in the same direction at the rate of $a$ m/s, $(a + 1)$ m/s, and pass them completely in $b$ seconds and $(b + 1)$ second respectively?
(a) $(2a + 1)$ m/s (b) $\frac{(2a+1)}{2}$ m/s
(c) $(a + b)$ m/s (d) $(a + b + 1)$ m/s

92. Match List I and List II and select the correct answer using the codes given below the Lists:

| List I | List II |
|---|---|
| A. (X – Y) | 1. X ∪ Y' |
| B. (Y – X) | 2. X' ∪ Y |
| C. (X ∩ Y)' | 3. X ∩ Y' |
| D. (X ∩ Y) | 4. X ∩ Y |

(X, Y are two non-empty subsets)

*Codes:*

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

93. The sum of all the possible proper subsets of A and that of B is equal to 158. What is the sum of all elements of A and that of B?
(a) 8 (b) 10
(c) 11 (d) 12

94. If $l$, $m$ are real and $l \neq m$, what is the nature of the roots of the equation $(l - m)x^2 - 5(l + m)x - 2(l - m) = 0$?
(a) Real and equal (b) Unreal and equal
(c) Real and unequal (d) Unreal and unequal

95. If $a^2 = by + cz$, $b^2 = cz + ax$, $c^2 = ax + by$; what is the value of $\left(\frac{x}{a+x} + \frac{y}{b+y} + \frac{z}{c+z}\right)$
(a) $\left(\frac{1}{a} + \frac{1}{b} + \frac{1}{c}\right)$ (b) 1
(c) 0 (d) –1

96. The sum of the roots of the equation $5x^2 + (p + q + r)x + pqr = 0$, is equal to zero. What is the value of the expression $p^3 + q^3 + r^3$?
(a) 0 (b) 1
(c) $pqr$ (d) $3pqr$

97. The numerator, of a fraction is $6x + 1$ and its denominator is $7 - 4x$. For what value of $x$ is the fraction always improper?
(a) $x < \frac{3}{5}$ (b) $x \leq \frac{3}{5}$
(c) $x > \frac{3}{5}$ (d) $x \geq \frac{3}{5}$

98. What is the value of $\frac{1}{1+\sqrt{2}} + \frac{1}{\sqrt{2}+\sqrt{3}} + \frac{1}{\sqrt{3}+\sqrt{4}}$ ... 15 terms?
(a) 0 (b) 1
(c) 3 (d) 4

99. Under which one of the following conditions does the polynomial $x^2 + px + q$ (with $p$ and $q$ greater than zero) have its minimum value?
(a) $x = -p$ (b) $x = \frac{p}{2}$
(c) $x = -\frac{p}{2}$ (d) $x = -2p$

100. Let $x = 1 + \cfrac{1}{1 + \cfrac{1}{1 + \cfrac{1}{1 + .....\infty}}}$
Which one of the following is correct?
(a) $x^2 - x - 1 = 0$ (b) $x^2 + x - 1 = 0$
(c) $x^2 - x + 1 = 0$ (d) $x^2 + x + 1 = 0$

# ANSWERS

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