X CLASS

1) Number of integer pairs (x, y) such that $x^2+y^2-2x-4y+5=0$ is n then

$n^2-5n+6=$_____

1) 2 2) 0 3) 4 4) 7

2) $2-\sqrt{3}$ is a root of $x^2+ax+b=0$ then (a+1)(b+1)=_____ Where a, b $\in$ Z

1)-3 2)-6 3)0 4)8

3) a+ b + c = 0 then $a^6+b^6+c^6+2a^3b^3c^3\left[\frac{1}{a^3}+\frac{1}{b^3}+\frac{1}{c^3}\right]-9a^2b^2c^2+1=$_____

1)8 2)0 3)1 4)24

4) S_1, S_2 are inscribed and Circumscribed circles of a square of side unity. Then difference of areas of these circles is _____

1) $\frac{\pi}{4}$ 2) $\frac{\pi}{3}$ 3) $\frac{\pi}{6}$ 4) π

5) Mean of first 2020 odd natural numbers is_____

1)1010 2)2021 3)4040 4)None of these

6) $1^2-2^2+3^2-4^2+.....+1997^2-1998^2=A$ *then* $\frac{A}{1999}=$ _____

1)-1000 2)-999 3)1001 4)999

7) Base of a regular hexagon has ends (0, 0) ,(3, 4). Its area is $x\sqrt{3}$ then $\frac{2x}{25}$=____

1)2 2)3 3)4 4)5

8) In an equilateral triangle of side $\sqrt{3}$, the sum of lengths of medians is____

1)4.5 2)3.8 3)5.4 4)6.6

9) Product of n + 1, n + 2, n + 3, n + 4 where n $\in$ N is always Divisible by____

1)48 2)24 3)35 4)50

10) The author of Sidhantha Siromani is _____

1) Aryabhatta 2) Bhaskaracharya 3) Varahamihara 4) Apastambha

11) Number of quadratic factors with integer coefficients for x^8+1 is_____

1)2 2)4 3)0 4)8

12) If $x=1+\sqrt{-2}$ *then* $\left(x^4-4x^3+4x^2-8\right)^2=$ _____

1)1 2)0 3)-8 4)-6

13) Least value of $a^2+b^2+c^2-ab-bc-ca$ where a, b, c $\in$ R is _____

1)1 2)-3 3)0 4)can't be decided

14) There are **n** persons in a room and total number of hand shakes between all possible pairs is 378. No. of persons is_____

1) 20 2) 28 3) 32 4) 26

15) $\sqrt{2+\sqrt{2+\sqrt{2+.....\infty}}}$ = x then $x^2-x+3=$_____

1) divisible by 6 2) even but not prime 3)odd prime 4)even prime

16) (x-α) (x-β) (x-γ) = ax^3+bx^2+cx+d then (1-α^2) (1-β^2) (1-γ^2)=_____

1) $(a+b)^2-(c+d)^2$ 2) $(b+d)^2-(a+c)^2$ 3) $a^2+b^2+c^2+d^2$ 4) $\left(a+c\right)^2-(b+d)^2$

17) Natural numbers are divided into groups $\{1\}\{2,3\}\ \{4,5,6\}\{7,8,9,10\}$ …….. The first number in 100^{th} group is_____

1)5051 2)5050 3)4951 4)6280

18) Degree of (1+x) (1+ $2x^2$) (1+$3x^3$)..... $(1+99x^{99})$ is_____

1)4531 2)6150 3)99 4) None of these

19) If $\frac{1}{1^2}+\frac{1}{2^2}+\frac{1}{3^2}+\frac{1}{4^2}+\ldots\ldots\ldots\infty$ =x then $\frac{1}{1^2}+\frac{1}{3^2}+\frac{1}{5^2}+\frac{1}{7^2}+\ldots\ldots\ldots\infty=$

1) $\frac{x}{2}$ 2) $\frac{3x}{4}$ 3) $\frac{3x}{8}$ 4) $\frac{2x}{3}$

20) Sum of all exterior angles of a regular hexagon is_____

1) 360° 2) 1080° 3) 720° 4) 180°

21) $\sqrt{x^2+\sqrt{x^2+\sqrt{x^2+.....\infty}}}$ = 4 then x=_____

1) $2\sqrt{3}$ 2)6 3) $3\sqrt{2}$ 4)2

22) If x + y + z = 12 and x,y, z >0 then maximum value of $\sqrt[3]{x^2y^2z^2}+3$ is _____

1)12 2)19 3)11 4)9

23) $(a+b+c)^2+(a-b+c)^2+(a-b-c)^2+(a+b-c)^2$ =
$K\left(a^2+b^2+c^2\right)+L\left(ab+bc+ca\right)$ Then KL + K + L + 3 =_____

1)4 2)7 3)11 4)17

24) Arithmetic mean of $x_1, x_2 x_3$ ……. x_n is $\bar{x}$ then Arithmetic mean of
$2x_1+3, 2x_2+3, \ldots\ldots\ldots 2x_n+3$ is _____

1) $2\bar{x}$ 2) $2\bar{x}+3$ 3) $3\bar{x}+2$ 4) $2\bar{x}-3$

25) Who first said that something divide by zero can not be defined.

1) Archemedes 2) Bhaskaracharya 3) Varahamihara 4) Apastambha

26) From a well shuffled pack of playing cards one card is drawn at random. The probability that it is neither a spade nor an ace is_____

1) $\frac{36}{51}$ 2) $\frac{19}{132}$ 3) $\frac{9}{13}$ 4) $\frac{7}{52}$

27) From first 200 naturals one number is selected at random. The chance that it is divisible by 3 or 5 is_____

1) $\frac{93}{200}$ 2) $\frac{77}{200}$ 3) $\frac{67}{200}$ 4) $\frac{37}{100}$

28) A Survey shows that 63% people in a city read newspaper A whereas 76% read newspaper **B**. If x% of people read both newspapers, then a possible value of x can be_____

1)65 2)55 3)37 4)29

29) The modern study of set theory was initiated by

1) Sakuntala Devi 2) George Cantor 3) Rene Descartes 4) Euclid

30) $2^{\log_4 x} + 3^{\log_9 y} = 13$ *and* $2x - 3y = 114$ *then* $5x - 3y =$ _____

1)357 2)161 3)218 4)178

31) $\frac{\sin^2 60^\circ + \cos^2 30^\circ}{\cos^2 60^\circ + \sin^2 30^\circ} =$ _____

1)1 2)$\frac{1}{3}$ 3)3 4)0

32) Let $f_k(x) = \frac{1}{k}\left(\sin^k x + \cos^k x\right)$ *for* $k = 1, 2, 3, ...$*then for all* $X \in R$,

$f_4(x) - f_6(x) =$ _____

1) $\frac{5}{12}$ 2)$\frac{1}{4}$ 3)$-\frac{1}{12}$ 4)$\frac{1}{12}$

33)A clock tower stands at centre of an equilateral triangular park of side 100m. It subtends an angle of 60^0 at every corner of the park. Height of the tower is _____ m.

1) $200\sqrt{3}$ 2) $150\sqrt{3}$ 3)$100\sqrt{3}$ 4) 100

34) An aeroplane flying at a constant speed, parallel to horizontal ground $\sqrt{3}$ km above it is observed at an elevation of 60^0 from a point on the ground. If after 5 seconds its elevation from same point is 30^0 then speed of aeroplane in kmph is____

1) 750 2)1440 3)1500 4)720

35) Equation of angular bisector of lines x=3 and y=3 is_____

1) x-y=0 2)x+y=0 3)x=0 4)y=0

36) $A\left(at_1^2, 2at_1\right)$, $B\left(at_2^2, 2at_2\right)$ are such that slope of AB is $\frac{1}{2}$. Then $t_1^2 + t_2(2t_1 + t_2)$ equals _____

1)16 2)10 3)$\frac{1}{8}$ 4)$\frac{1}{4}$

37) (a, 0) ,(0,b) ,(x, y) are colinear then $\left(xa^{-1}+yb^{-1}\right)^3+8=$

1)10 2)9 3)8 4)0

38) For different values of a, b the line ax+(a +b) y+2a-b=0 always passes through the point _____

1)(1, 1) 2)(2, -3) 3)(-3, 1) 4)(0,1)

39) Area of Δ formed by (2020, 2021) (2019, 2020) and (1889,1890) is_____

1)1 2)0 3)2021 4)1010

40) Mid points of sides of a Δ are (1, 0) (2, 7) (3, 1) then area of original triangle is_____

1) 12 2)26 3)18 4)4.5

41) $Tan1^\circ\, Tan2^\circ\, Tan3^\circ.....Tan89^\circ =$ _____

1)45 2)1 3) $\frac{1}{90}$ 4) $\frac{1}{45}$

42) $n\left(\overline{A\cup B}\right)=k\,n\left(\overline{A}\cap\overline{B}\right)$ in the set notations where **k**is a constant and $n(A)$ denotes cardinal number of set A. Then $K^2-3K+3=$ _____

1)1 2)10 3)0 4)4

43) If $x^2+y^2=1$ *then* $\sqrt{x^2(3-4x^2)^2+y^2(4y^2-3)}=$ _____

1)0 2)1 3)3 4)4

44) $\frac{\sqrt{1^3+2^3+3^3+.....+2021^3}}{1+2+3+.....+2021}=$ _____

1)1 2)2021 3)20210 4)10810

45) Distance between centroid and circumcenter of Δ formed by (0, 0) (2, 0) $(1,\sqrt{3})$ is _____

1)1 2) $\frac{1}{\sqrt{2}}$ 3) $\sqrt{2}$ 4) none of these

46) The value of $Sin\theta + Cos\theta$ lies between ____

1) 1 and -1 2) $-\sqrt{2}$ *and* $\sqrt{2}$ 3) 0 and 1 4) -1 and 0

47) (2020,2021) is reflected continuously about co-ordinate axes starting with X-axis 2020 times. Then it is reflected about origin and final position is (a, b) then $(a-b)^2 + ab(a-b-1) =$ _____

1)1 2) 2020^2 3) 2021^2 4)0

48) $\log_{y3} x^2 \log_{z4} y^3 \log_{x5} z^4 =$ _____

1) 0.85 2)0.75 3)0.4 4)0.25

49) Number of positive integers **n** such that $\log_n^{1024}$ is also an integer is_____

1)3 2)4 3)5 4)1023

50) Number of positive integer divisiors of 256 X 243 is _____

1)54 2)36 3)24 4)68

51) $x = \sin\theta + \cos\theta,\ y = \cos\theta - \sin\theta$ satisfies relation $ax^2 + by^2 + c = 0$ Then_____

1) $a+b+c=8$ 2) $2a+3b-c=7$

3) $ab+bc=7$ 4) $a+b-3c=5$

52) The graph of $y - x^2 = x + 7$ represents _____

1) Circle 2)Straight line 3)Parabola D)Hyperbola

53) Observe the following statements

S1 : $\log_3^2$ is rational

S2 : $\sec^2 x + \cos ec^2 x = \sec^2 x \cos ec^2 x$

S3 : Exactly two straight lines pass through all the three points (0, 5) (1, 4), (2,3)

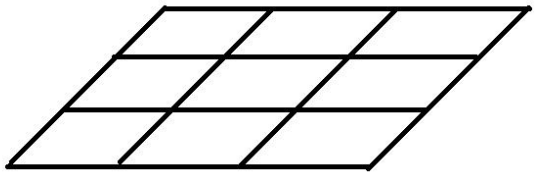
out of the above, number of true statements is_____

1)0 2)1 3)2 4)3

54) Number of **x** values for which $Sin^2x - 2xSinx + 2x^2 - 4x + 4 = 0$ has atleast one solution is_____

1)2 2) Infinite 3)1 4)0

55) Number of parallelograms formed by network shown here is_____



1)18 2)36

3)48 4)64

56) ABCD is a square. **p** is an interior point, such that Δ PAB is equilateral , then $\angle PCB =$_____

1) 45° 2) 30° 3) 60° 4) 75°

57) The last digit in the finite decimal representation of 5^{-2003} is _____

1) 2 2)4 3)6 4)8

58) When integers 1 to 1000 are written on a paper, total no. of zeros that appear will be_____

1)192 2)144 3)200 4)500

59) Sum of digits in $1000^{20} - 20$ expressed in decimal notation is_____

1) 530 2)520 3)510 4)500

60) Given $|x| = \begin{cases} x & if \quad x \geq 0 \\ -x & if \quad x < 0 \end{cases}$ then quadratic equation $x^2 + 2|x| + 1 = 0$ has _____

1) One +ve and one -ve roots 2) Both positive roots

3) Both -ve roots 4) No real roots