SUN TUITION CENTER

PRE- HALF YEARLY EXAM

MATHEMATICS **TOTAL MARKS: 100**

Std - X **TIME: 2.30 HRS**

SECTION - A

I Choose the best answer **14x1=14**

1. If f: A → B is a bijective function and if n(B)=7, then n(A) is equal to
   1) 7 2) 49 3) 1 4) 14
2. The range of the relation R = {(x, x²)/ x is a prime number less than 13} is
   1) {2,3,5,7} 2) {2,3,5,7,11}
   3) {4,9,25,49,121} 4) {1,4,9,25,49,121}
3. An A.P consists of 31 terms. If its 16th term is m, then the sum of all the terms of this A.P is
   1) 16m 2) 62m 3) 31m 4) $\frac{31}{2}m$
4. The next term of the sequence $\frac{3}{16}, \frac{1}{8}, \frac{1}{12}, \frac{1}{18}, \ldots$
   1) $\frac{1}{24}$ 2) $\frac{1}{27}$ 3) $\frac{2}{3}$ 4) $\frac{1}{81}$
5. Which of the following should be added to make $x^4 + 64$ a perfect square
   1) $4x^2$ 2) $16x^2$ 3) $8x^2$ 4) $-8x^2$
6. If A is a 2×3 matrix and B is a 3×4 matrix, how many columns does AB have
   1) 3 2) 4 3) 2 4) 5
7. How many tangents can be drawn to a circle from an exterior point?
   1) one 2) two 3) infinite 4) zero
8. The area of the triangle formed by the points $(-5,0), (0,-5), (5,0)$ is
   1) 0 sq.units 2) 25 sq.units 3) 5 sq.units 4) none of these
9. (2,1) is the point of intersection of two lines
   1) $x - y - 3 = 0;\ 3x - y - 7 = 0$ 2) $x + y = 3; 3x + y = 7$
   3) $3x + y = 3;\ x + y = 7$ 4) $x + 3y - 3 = 0;\ x - y - 7 = 0$
10. The tower is 60m heigh. Its shadow is x metre shorter when the sun's altitude is 45° than when it ha been 30°, then x is equal to
    1) 41.92m 2) 43.92m 3) 43m 4) 45.6m
11. The total surface area of a hemi sphere is how much times the square of its radius
    1) π 2) 4π 3) 3π 4) 2π
12. The ratio of the volume of a cylinder, a cone, and a sphere , if each has the same diameter and same height is
    1) 1:2:3 2) 2:1:3 3) 1:3:2 4) 3:1:2
13. Variance of first 20 natural number is
    1) 32.25 2) 44.25 3) 33.25 4) 30
14. Which of the following is incorrect
    1) $P(A) > 1$ 2) $0 \leq P(A) \leq 1$
    3) $P(\emptyset) = 0$ 4) $P(A) + P(\bar{A}) = 1$

SECTION - B

II Answer any Ten Questions (Q.NO:28 is compulsory) 10x2=20

15. If $B \times A = \{(-2,3), (-2,4), (0,3), (0,4), (3,3), (3,4)\}$ find A and B
16. If $f(x) = 3x - 2$, $g(x) = 2x + k$ and if $f \circ g = g \circ f$, then find the value of k
17. Which term of an A.P 16,11,6,1,… is -54?
18. Find the sum of $9^3 + 10^3 + \ldots + 21^3$
19. Determine the nature of the root for $x^2 - x - 20 = 0$
20. If $A = \begin{bmatrix} 0 & 4 & 9 \\ 8 & 3 & 7 \end{bmatrix}$, $B = \begin{bmatrix} 7 & 3 & 8 \\ 1 & 4 & 9 \end{bmatrix}$, find 3A-9B
21. In $\triangle ABC$, if $DE \parallel BC$, $AD = x$, $DB = x - 2$, $AE = x + 2$ and $EC = X = 1$, then find the lengths of the side AB and AC
22. Find the equation of a straight line passing through $(5, -3)$ and $(7, -4)$.
23. Prove : $\sqrt{\frac{1+\sin\theta}{1-\sin\theta}} = sec\,\theta + tan\,\theta$
24. A kite is flying at a height of 75m above the ground. The string is attached to the kite is temporarily tied to a point on the ground. The inclination of the string with the ground is 60°. Find the length of the string, assuming that there is no slack in the string
25. If the base area of a hemispherical solid is 1386 sq.m., then find its total surface area.
26. Find the standard deviation first 21 natural number
27. What is the probability that a leap year selected at random will contain 53 Saturdays?
28. Show that the given points are collinear $(-3, -4)(7,2)$ and $(12,5)$.

SECTION - C

III Answer any Ten of the following (Q.No 42 is compulsory) 10x5=50

29. Let $A = \{x \in W / x < 2\}$, $B = \{x \in N / 1 < x \leq 4\}$, $C = \{3,5\}$. Verify that $(A \cup B) \times C = (A \times C) \cup (B \times C)$
30. If $f(x) = 2x - 3, g(x) = 1 - 2x$ and $h(x) = 3x$. Prove that $f \circ (g \circ h) = (f \circ g) \circ h$
31. The sum of three consecutive terms that are in A.P. is 27 and their product is 288. Find the three terms
32. Rekha has 15 square colour papers of sizes 10cm, 11cm,12cm,…, 24cm. How much area can be decorated wit these colour papers?
33. If $9x^4 + 12x^3 + 28x^2 + ax + b$ is perfect square, find the values of a and b
34. State and prove Pythagoras Theorem
35. Find the area of the quadrilateral whose vertices are $(-9,0), (-8,6), (-1,-2), (-6,-3)$
36. A line makes positive intercepts on co-ordinate axes whose sum is 7 and it passes through (-3,8). find its equation
37. A pole 5m high is fixed on the top of a tower. The angle of elevation of the top of the pole observed from a point A on the ground is 60° and the angle of depression to the point A from the top of the tower is 45°. Find the height of the tower. $(\sqrt{3} = 1.732)$
38. A container open at the top is in the form of a frustum of a cone of height 16cm,with radii of its lower and upper ends are 8cm and 20cm respectively. Find the cost of milk which can completely fill a container at the rate of Rs. 40 per litre.

39. A right circular cylindrical container of base radius 6cm and height 15cm full of ice-cream. The ice-cream is to be filled in cones of height 9cm and base radius 3cm having a hemispherical cap. Find the number of cones needed to empty the cone.

40. Find the mean and variance of the first *n* natural numbers.

41. Two dice are rolled together. Find the probability of getting a doublet or sum of faces as 4.

42. If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$, show that $A^2 - 5A + 7I_2 = 0$

SECTION- D

IV Answer any one of the following **2x8=16**

43. a) Construct a triangle similar to a given triangle PQR with its sides equal to $\frac{7}{3}$ of the corresponding sides of the triangle PQR (scale factor $\frac{7}{3} > 1$)

(or)

b) Draw a circle of diameter 6cm from a point P, which is 8cm away from its centre. Draw two tangents PA and PB to the circle and measure their lengths

44. a) Draw a graph of $xy = 24, x, y > 0$. using the graph find
i) *y* when *x=3* ii) *x* when *y=6*

(or)

b) Discuss the nature of the solution of $x^2 + x - 12 = 0$.