DELHI PUBLIC SCHOOL SURAT

MATHEMATICS

Roll No: [|] **Class: XI**

Marks: 100 *Time Allowed: 3Hrs*

---

*Instructions***:**

(i) All questions are compulsory.

(ii) This question paper contains **29** questions.

(iii) Question **1- 4** in **Section A** are very short-answer type questions carrying **1** mark each.

(iv) Question **5-12** in **Section B** are short-answer type questions carrying **2** marks each.

(v) Question **13-23** in **Section C** are long-answer-**I** type questions carrying **4** marks each.

(vi) Question **24-29** in **Section D** are long-answer-**II** type questions carrying **6** marks each.

(vii) This question paper contains 3 pages.

SECTION – A

1. If A = {1, 2, 4} and B = {1, 3}, find B X A.

2. Express $\dfrac{\left(\sqrt{5}+\frac{i}{2}\right)\left(\sqrt{5}-i2\right)}{6+i5}$ in the form of a + ib.

3. Find the equation of the parabola with vertex at (0, 0) and focus at (0, 2).

4. Write the component statements of the given compound statement : A line is straight and extends indefinitely in both directions.

SECTION – B

5. Let U = {1, 2, 3, 4, 5, 6, 7, 8, 9}, A = {1, 2, 3, 4}, B = {2, 4, 6, 8} and C = {3, 4, 5, 6}.
   Find (i) $(A \cup B)^{/}$ and (ii) $(B - C)^{/}$.

6. A wheel makes 360 revolutions in one minute. Through how many radians does it turn in one second.

7. How many numbers greater than 56000 can be formed by using the digits 4, 5, 6,7, 8; no digit being repeated in any number?

8. If the sum of a certain number of terms of the A.P. 25, 22, 19,…is 116. Find the last term.

9. Write the contrapositive and converse of the statement : "If x is a prime number, then x is odd".

10. The following values are calculated in respect of heights and weights of the students of a section of Class XI:

	Height	Weight
Mean	162.6 cm	52.36 kg
Variance	127.69 cm^2	23.1361 kg^2

Can we say that the weights show greater variation than the heights?

11. The number lock of a suitcase has 4 wheels, each labeled with ten digits i.e. from 0 to 9. The lock opens with a sequence of four digits with no repeats. What is the probability of a person getting the right sequence to open the suitcase?

12. Two students A and B appeared in an examination. The probability that A will qualify the examination is 0.005 and that B will qualify the examination is 0.10. The probability that both will qualify the examination is 0.02. Find the probability that
    (a) Both A and B will not qualify the examination.
    (b) Only one of them will qualify the examination.

SECTION – C

13. In a survey of 100 persons it was found that 28 read magazine A, 30 read magazine B, 42 read magazine C, 9 read magzines A and B, 11 read magzines A and C, 6 read magzines B and C and 4 read all the three magzines. Find
    (i)   How many read none of the three magzines?
    (ii)   How many read magazine C only?

14. A college awarded 38 medals in football, 15 in basketball and 20 in cricket. If these medals went to a total of 58 men and only three men got medals in all the three sports, how many received medals in exactly two of the three sports?

15. Find the domain and range of the function $f(x) = \sqrt{x^2 - 3x + 2}$.

16. Prove by PMI that n(n + 1)(2n + 1) is a multiple of 6 for all n $\in$ N.

17. Find the modulus and argument of the complex number $\frac{1+2i}{1-3i}$.

18. There are 15 points in a plane, no three of which lie on a straight line excepting 4 which lie on a straight line. How many (i) straight lines (ii) triangles can be formed by joining them?

19. If the term free from x in the expansion of $\left(\sqrt{x} - \frac{k}{x^2}\right)^{10}$ is 405, find the value of k.

20. If a and b are the roots of $x^2 - 3x + p = 0$ and c, d are roots of $x^2 - 12x + q = 0$, where a, b, c, d form a G.P. Prove that $(q + p) : (q - p) = 17 : 15$.

21. Find the equation of the perpendicular from the point (1, -2) on the line $3y = 4x - 5$. Also find the coordinates of the foot of the perpendicular.

22. Find the coordinates of the foci, the vertices, the lengths of major and minor axes and the eccentricity of the ellipse $9x^2 + 4y^2 = 36$.

23. Show that the points A(4, 7, 8), B(2, 3, 4), C(-1, -2, 1) and D(1, 2, 5), taken in order, are the vertices of a parallelogram. Do they make a rectarngle?

SECTION – D

24. (i) Prove that $\sin 3x + \sin 2x - \sin x = 4 \sin x \cos (x/2) \cos (3x/2)$.

(ii) If $\sin x = 3 / 5$, $\cos y = -12 / 13$, where x and y both lie in second quadrant, find the value of $\sin (x + y)$.

25. If $A + B + C = 180^0$, prove that

$$cos^2 \frac{A}{2} + cos^2 \frac{B}{2} - cos^2 \frac{C}{2} = 2 \cos\frac{A}{2}\cos\frac{B}{2}\sin\frac{C}{2}.$$

26. Exhibit graphically the solution set of the following systems of inequations:

$2x + 3y \geq 3, \ x - 6y \leq 3, \ -7x + 4y \leq 14, \ 3x + 4y \leq 18, \ x, y \geq 0.$

27. (i) Find the sum to n terms of the series : $5 + 11 + 19 + 29 + 41 \ldots$

(ii) How many terms of the G.P. $3, \frac{3}{2}, \frac{3}{4}, \ldots \ldots$are needed to give the sum $\frac{3069}{512}$?

28. (i) Find $\frac{dy}{dx}$ when $y = \frac{x^2 sinx}{1-x}$.

(ii) Evaluate $\lim_{x \to -3} \frac{x^3+27}{\sqrt{x^2+7}-4}$.

29. From a frequency distribution consisting of 18 observations, the mean and the standard deviation were found to be 7 and 4 respectively. But on comparison with the original data, it was found that a figure 12 was miscopied as 21 in calculations. Calculate the correct mean and standard deviation.

END OF EXAMINATION