Code : 041

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 $\left(\frac{x}{3}+1, y-\frac{2}{3}\right) = \left(\frac{5}{3}, \frac{1}{3}\right)$, find the values of x and y .

2. Express in a+ib form : $\frac{5+i\sqrt{2}}{1-i\sqrt{2}}$

3. Find the equation of ellipse if length of major axis is 26 and foci $(\pm 5, 0)$.

4. Find the component statements of the following compound statement:
   The sky is blue and the grass is green.

SECTION – B

5. If A , B and C are three sets and U is the universal set such that n(U) = 700 , n(A) = 200 , n(B) = 300 and n(A∩ B) = 100 . Find $n(A^c \cap B^c)$.

6. Prove that $\frac{cos\ 7\ x+cos5x}{sin7x-\sin 5x}$ = cot x .

7. How many chords can be drawn through 21 points on a circle ?

8. How many terms of the A.P. -6, -11/2 , -5, ------ , are needed to give the sum -25 ?

9. i) Is , There are 35 days in a month , a statement ?
ii) Write the negation of the following statement
Both the diagonals of a rectangle have the same length .

10. Find the mean deviation about the mean for the following data :
6,7,10,12,13,4,8,12,

11. Find the probability that when a hand of 7 cards is drawn from a well shuffled deck of 52 cards , it contains
i) all kings ii) 3 kings .

12. If 4 -digit numbers greater than 5000 are randomly formed from the digits 0,1,3,5 and 7 , what is the probability of forming a number divisible by 5 when , i)the digits are repeated ? ii) the repetition of digits is not allowed ?

SECTION – C

13. In a survey of 60 people , it was found that 25 people read newspaper H , 26 read newspaper T , 26 read newspapaer I , 9 read both H and I , 11 read both H and T , 8 read T and I , 3 read all three newspaper . Find :
i) the number of people who read at least one of the newspapers.
ii) the number of people who read exactly one newspaper .

14. In a town of 10,000 families it was found that 40% families buy newspaper A, 20% families buy newspaper B and 10% families buy newspaper C . 5% families buy newpaper A and B , 3% buy newspaper B and C and 4% buy newspaper A and C . If 2% families buy all three newspapaer , find the number of families which buy i) A only ii) B only and iii) none of A , B and C .

15. Find the domain and range of the function $f(x) = \frac{1}{2-sin3x}$.

16. Prove the following by using the principle of mathematical induction for all n∈ N.
$1^2 + 3^2 + 5^2 + \text{------} + (2n-1)^2 = \frac{n(2n-1)(2n+1)}{3}$.

17. Solve: $x^2 - (7-i)x + (18-i) = 0$.

18. Find the number of words with or without meaning which can be made using all the letters of the word AGAIN . If these words are written as in a dictionary, what will be the 50^{th} word ?

19. The 2^{nd} , 3^{rd} and 4^{th} terms in the binomial expansion $(x+a)^n$ are 240,720 and 1080 respectively . Find x, a and n .

20. The digits of a positive integer, having three digits are in A.P. and their sum is 15. The number obtained by reversing the digits is 594 less than the original number. Find the number .

21. Two lines passing through the point (2,3) intersect each other at an angle of 60° . If slope of one line is 2 , find the equation of the other line .

22. A circle has radius 3 units and its centre lies on the line y = x-1 . Find the equation of the circle , if it passes through (7,3) .

23. Find the coordinates of the points which trisect the line segment AB , given that A (2,1,-3) and B(5,-8,3) .

SECTION – D

24. Prove that: $\frac{\sec 8\theta - 1}{sec4\theta - 1} = \frac{tan8\theta}{tan2\theta}$

25. Solve the following equation:
$\tan\theta + \tan\left(\theta + \frac{\pi}{3}\right) + \tan\left(\theta + \frac{2\pi}{3}\right) = 3$

26. Exhibit graphically the solution set of the linear inequations
$x+y \leq 5$, $4x+ y \geq 4$, $x+ 5y \geq 5$, $x \leq 4$, $y \leq 3$.

27. Find the sum to 7 terms of the sequence
$\left(\frac{1}{5} + \frac{2}{5^2} + \frac{3}{5^3}\right)$, $\left(\frac{1}{5^4} + \frac{2}{5^5} + \frac{3}{5^6}\right)$, $\left(\frac{1}{5^7} + \frac{2}{5^8} + \frac{3}{5^9}\right)$, ------

28. For a group of 200 candidates the mean and S.D. were found to be 40 and 15 respectively . Later on it was found that the score 43 was misread as 34 . Find the correct mean and correct S.D.

29. i) Evaluate : $\lim_{x \to 0} \frac{tan2x - sin2x}{x^3}$
ii) Evaluate the derivative of sec x using first principle .

END OF EXAMINATION