INDIAN SCHOOL SOHAR
PRE FINAL EXAMINATION (2017 -2018)
MATHEMATICS

Class: XI   **Time: 3 Hrs**
Date:06/02/2018   **Max. Marks: 100**

General Instructions
a. *All questions are compulsory.*
b. *The question paper consist of 29 questions divided into four sections A, B,C and D. Section A comprises of 4 questions of one mark each, section B comprises of 8 questions of two marks each and section C comprises of 11 questions of four marks each. And section D comprises of 6 questions of six marks each.*
c. *All questions in Section A are to be answered in one word, one sentence or as per the exact requirement of the question.*
d. *There is no overall choice. However, internal choice has been provided in 03 questions of four marks each and 03 questions of six mark each. You have to attempt only one of the alternatives in all such questions.*
e. *Use of calculators is not permitted.*

SECTION A

1. Write the following set in roster form " The set of all integers 'x' such that $\left| x - 3 \right| < 8$ "

2. Find the modulus of the complex number $\dfrac{(1+i)(2+i)}{(3+i)}$

3. Find the points which trisecting the line joining (1 , 4 , 7) and (4 ,1, 4)

4. Let p stand for the statement " Meena speaks Hindi " , q stand for " Heena speaks English " .Describe the following conditional statement $q \Leftrightarrow p$

SECTION B

5. A train travelling on a curve 1500 m radius at the rate of 66 km / hr. Through what angle will it turn in 20 seconds?

6. If $\dfrac{a + ib}{c + id} = x + iy$, find the value of $x^2 + y^2$

7. If the different permutations of the word **ATLANTIC** are listed as per the dictionary , how many items are there in the list before the first word starting with **L.**

8. Show that the points (1, 4) (3, -2) and (8 , 2) are collinear .

9. Find the axis of the parabola $x^2 + 2y - 3x + 5 = 0$

10. Find the point on y axis which is at a distance of $\sqrt{10}$ from the point (1 , 2 , 3)

11. Differentiate $\dfrac{\sin(x+a)}{\cos x}$ with respect to 'x'

12. Two dice are thrown once .Find the probability of getting an even number on the first die or a total of 8.

SECTION C

13. If $A \subseteq B$, prove the following i) $A - B = \phi$ ii) A n B = A.

14. Let R be the relation on N X N defined by (a , b) R (c , d) $\Leftrightarrow$ a + d = b + c for all (a, b)

   and (c , d) $\in$ N X N , show that

   i) (a, b) R (a , b) for all (a , b) $\in$ N X N

   ii) (a , b) R (c , d) $\Rightarrow$ (c , d) R (a , b) for all (a , b) , (c , d) $\in$ N X N

   iii) (a , b) R (c , d) and (c , d) R (e , f) $\Rightarrow$ (a , b) R (e , f)

      for all (a , b), (c , d) and (e , f) $\in$ N X N

15. Show that $\cos\left(\dfrac{3\pi}{4} + x\right)$ - $\cos\left(\dfrac{3\pi}{4} - x\right) = -\sqrt{2}\sin x$

OR

Express $\sqrt{3}\sin\theta - \cos\theta$ as a single term consisting of i) sine only ii) cosine only

16. By using PMI prove that $1\cdot 3 + 2\cdot 3^2 + 3\cdot 3^3 + \dots\dots + n\cdot 3^n = \dfrac{(2n-1)3^{n+1} + 3}{4}$, $n\in N$

17. Find the square root of $2 - 2\sqrt{3}\,i$

18. Find the number of different signals that can be generated by arranging at least 2 flags in order (one below other)on a vertical staff , if five different flags are available. Write the benefits of exhibiting our knowledge.

OR

A man has 10 friends and wants to arrange them on chairs taking 6 at a time .Find the number

of arrangements ,such that i) two particular friends are always taken ii) four particular friends

are never taken. Why do we need friends   ?

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19. Show that the middle term in the expansion of $\left(x - \dfrac{1}{x} \right)^{2n}$ is $\dfrac{1 \times 3 \times 5 \times ......(2n-1)}{n!} (-2)^n$

20. The sum of first two terms of an infinite GP is 5, and each term is three times the sum of the succeeding terms .Find the GP.

OR

The Pth term of an AP is 'a' and q^{th} term of an AP is ' b' .Show that the sum of its (p + q)

terms is $\dfrac{p+q}{2}\left[a+b + \dfrac{a-b}{p-q} \right]$

21. An arch is in the form of a semi ellipse .It is 8m wide and 2m high at the centre .Find the

height of the arch at a point 1.5m from one end .

22. Find the derivative of the function $\sqrt{\cos x}$ with respect to x using the first principle.

23. A bag contains 50 tickets numbered 1 , 2 , 3 , …………50 of which 5 tickets numbered x_1, x_2 ,

x_3 , x_4 , x_5 are drawn at random and arranged in ascending order $x_1 < x_2 < x_3 <, x_4 <, x_5$ .Find

the probability that i) $x_2 = 20$ ii) $x_3 = 30$.

SECTION D

24. In a class of 60 students , 23 play hockey , 15 play basket ball , 20 play cricket ,7 play hockey

and basketball , 5 play cricket and basketball , 4 play hockey and cricket and 15 students do not

play any of these games. Find

i) How many play Hockey, Basket ball and cricket

ii) How many play hockey and cricket but not Basket ball

iii) List the values learned through sports and games

25. In a triangle the sines of the angles are 4 : 5 : 6 , show that the cosines of the angles are as

12 : 9 : 2.

OR

In triangle ABC prove that ($b^2 - c^2$) cotA + ($c^2 - a^2$) cot B + ($a^2 - b^2$) cot C $-$ 0

26. Graphically solve the system of linear inequality $x + 2y \le 10$, $x + y \ge 1$, $x - y \le 0$, ,

   $x \ge 0$ and $y \ge 0$.

27. Find the standard deviation of the following data

Class	$0-5$	$5-10$	$10-15$	$15-20$	$20-25$	$25-30$	$30-35$	$35-40$	$40-45$
No of items	20	24	32	28	20	16	34	10	16

28. Find the sum of the series $(3^3 - 2^3) + (5^3 - 4^3) + (7^3 - 6^3) + \cdots$ to i) n terms ii) 10 terms

OR

   Find the sum of first n terms of the sequence $\left(x + \dfrac{1}{x} \right)^2 , \left(x^2 + \dfrac{1}{x^2} \right)^2 , \left(x^3 + \dfrac{1}{x^3} \right)^2 , \ldots\ldots$

29. Find the equation of the line which is mid parallel to the lines 9x + 6y -7 = 0 and

   3x + 2y + 6 = 0

OR

   If p and q be the length of the perpendiculars from origin to the lines $x \sec\theta + y \cos ec\,\theta = k$

   and $x \cos\theta - y \sin\theta = k \cos 2\theta$ respectively , then prove that $4p^2 + q^2 = k^2$