ST. XAVIER'S SENIOR SECONDARY SCHOOL, DELHI – 110 054

Std. 11   Time : 3 hrs.

15-9-2014   Half Yearly Examination in **MATHEMATICS**   M. Marks : 100

GENERAL INSTRUCTIONS :
i)   All questions are compulsory.
ii)   Questions 1 – 6 are of 1 mark each.
iii)   Questions 7 – 19 are 4 marks each.
iv)   Questions 20 – 26 are of 6 marks each.
v)   Use of calculator is not allowed.

SECTION - A

1.   Write the solution set of inequality $2(3 - x) \geq \dfrac{x}{5} + 4$.

2.   Write the value of $\sin\dfrac{\pi}{12}\sin\dfrac{5\pi}{12}$.

3.   Find the value of $\sin 15°$.

4.   Evaluate $\left(-\sqrt{-1}\right)^{4n+3}$, $n \in N$

5.   Find n if $(n+1)! = 12(n-1)!$

6.   Evaluate $5.5^{\frac{1}{2}}.5^{\frac{1}{4}}.5^{\frac{1}{8}}.......\infty$

SECTION - B

7.   Solve $|x - 2| \geq 5$.

8.   Using principle of mathematical induction prove that $2^{3n} - 1$ is divisible by $7 \forall\, n \in \mathbb{N}$.

9.   Solve the equation : $\cos\theta + \cos 3\theta - 2\cos 2\theta = 0$

10.   Prove : $\cos^2 A + \cos^2(A + \dfrac{2\pi}{3}) + \cos^2(A - \dfrac{2\pi}{3}) = \dfrac{3}{2}$.

11.   Prove : $\cos 40°.\cos 80°.\cos 160° = -\dfrac{1}{8}$.

12.   Find the square root of $7 - 24i$.

13.   If α and β are different complex numbers with $|\beta| = 1$, then find $\left|\dfrac{\beta - \alpha}{1 - \bar{\alpha}\beta}\right|$.

14.   Between 1 and 31, m numbers have been inserted in such a way that the resulting sequence is an A.P. and the ratio of 7th and $(m-1)^{th}$ numbers is 5:9.
Find the value of m.

15.   Find the sum of following series upto n terms : $.5 + .55 + .555 + .5555\ldots\ldots\ldots$

16.   The product of three consecutive terms of G.P. is 216 and the sum of product of numbers taken in pairs is 156. Find the common ratio.

17.   If the letters of the word 'TOUGH' are to be arranged like in a dictionary, what will be the rank of the word 'TOUGH'.

18.   If P(n , r) = P(n , r+ 1) and C(n,r) = C(n , r-1), find n and r.

19.   A committee of 5 has to be formed out of 6 men and 4 ladies. In how many ways can a committee be formed when
        a)   Atleast 2 ladies are to be included.
        b)   Atmost 2 ladies are to be included.

SECTION - C

20.   Solve the following system of inequations graphically :
                x + 2y $\leq$8, 2x+ y $\geq$ 2, x- y $\leq$1   x, y $\geq$ 0.

21.   Using principle of mathematical induction, prove the following :
        $1.2 + 2.2^2 + 3.2^3 + \ldots\ldots + n.2^n = (n-1)2^{n+1} + 2$

22.   Prove that $\dfrac{\sec 8x - 1}{\sec 4x - 1} = \dfrac{\tan 8x}{\tan 2x}$

23.   If $\tan A = \dfrac{1}{7}$ and $\tan B = \dfrac{1}{3}$, show that $\cos 2A = \sin 4B$

24.   Express the following complex number in the polar form : $\dfrac{-2 - 6\sqrt{3}i}{5 + \sqrt{3}i}$

25.   Find the sum to n terms of the series : 5 + 11 + 19 + 29 + 41 +…..

26.   Let S be the sum, P the product and R the sum of reciprocals of n terms of a G.P. , Prove that $P^2 . R^n = S^n$

-x-x-x-x-x-x-