| Roll Number | | |
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**SET A**

# INDIAN SCHOOL MUSCAT
# FIRST TERM EXAMINATION

## MATHEMATICS

**CLASS: XI** **Sub. Code: 041** **Time allowed: 3 Hours**
**DATE: 25.9.2018** **Max. Marks: 100**

**General Instructions:**

1. All Questions are compulsory.
2. This question Paper consists of **29** questions divided into four sections A,B,C and D.
3. **Section A** comprises of **4** questions of **1** mark each; **Section B** comprises of **8** questions of **2** marks each; **Section C** comprises of **11** questions of **4** marks each and **Section D** comprises of **6** questions of **6** marks each.
4. Use of calculator is not provided.

### SECTION- A

1. Find the value of $\sin\left(\frac{31\pi}{3}\right)$.
2. Write the domain and range of Signum function.
3. If A and B are two finite set such that n(A)=115, n(B)=326 and n(A-B)=47, find $n(A \cap B)$ and $n(A \cup B)$.
4. What is the smallest integer n, for which $(1+i)^{2n} = (1-i)^{2n}$ ?

### SECTION- B

5. If A={-3,-1,0,4} and B={1,2,3},write $AxB$ and $BxA$.
6. Convert $\frac{13\pi}{4}$ radian measure into degree measure.
7. Find the conjugate of $\frac{(1+i)(2+i))}{3+i}$.
8. If $(x+iy) = \frac{a+ib}{a-ib}$ ,then show that $x^2 + y^2 = 1$.
9. Coefficients of variation of two distributions are 70 and 75 and their standard deviations are 28 and 27 respectively. What are their arithmetic means?

10. How many 3-digit numbers can be made using the digits 2,3,4,5 ,6 if the digits can be repeated?
11. Let U={4,5,6,7,8,9 ,10}, A={7,4,6}, B=={8,9,,4,6} and C=={10,4,7} determine the following sets

    (i) $A \cup (B \cap C)$. (ii) $(B - A) \cap (A - C)$.
12. Using t-ratios evaluate cos75˚.

## SECTION-C

13. Let $A = \{1,2,3,4,6\}$ and $R$ be the relation on $A$ defined by $\{(a,b) : a,b \in A, b$ is exactly divisible by $a\}$

    (i) Write $R$ is roster form. ii) Find the Domain of $A$ iii) Find the Range of $A$.
14. The mean of 2,7,4,6,8 and p is7.Find the mean deviation about the median of observations.
15. Solve the following system of linear inequalities and represent the solution graphically.

    3x-7 $\geq$ 2(x-6), 6-x > 11-2x.
16. Use the principle of mathematical induction to prove that

    1+4+7+……..+(3n-2) $= \frac{1}{2} n(3n-1), \forall n \in N$

**OR**

Prove that $7^n - 3^n$ is divisible by 4, $\forall n \in N$

17. Find the general solution of $\sin x + \sin 3x + \sin 5x = 0$
18. Find the domain and range of the real function defined by

    (i) $f(x) = \sqrt{9 - x^2}$. (ii) $f(x) = 1 - |x - 3|$

**OR**

Define the Modulus Function and draw its graph

19. If all the permutations of the letters of the word 'AGAIN' are arranged as in a dictionary. Find the 50th word.
20. Given U={1,2,3,……,12}, A={1,3,5,6,8,9,11}, B=={2,4,5,6,9,11,12},then

    Verify: (i) $(A' \cup B') = (A \cap B)'$ (ii) $(A' \cap B') = (A \cup B)'$
21. Express $\left[\frac{1}{1-2i} + \frac{3}{1+i}\right]\left[\frac{3+4i}{2-4i}\right]$ in the form of $a + ib$ .

22. A committee of 7 has to be formed from 9 boys and 4 girls. In how many ways can this be done when the committee consists of (i) exactly 3 girls (ii) at least 3 girls?

**OR**

In how many of the distinct permutations of the letters in MISSISSIPPI do the four 'I' (i) come together, (ii) not come together?

23. Use the principle of mathematical induction to prove that

$$1.2+2.3+3.4+\ldots\ldots\ldots+n.(n+1)=\frac{n(n+1)(n+2)}{3},\ \forall n\in N$$

## SECTION-D

24. Find the square root of the complex number $-3+4i$

**OR**

Convert the complex number $z=\frac{i-1}{\cos\frac{\pi}{3}+i\sin\frac{\pi}{3}}$ in the polar form.

25. Show that: $\cos^2 x+\cos^2\left(x+\frac{\pi}{3}\right)+\cos^2\left(x-\frac{\pi}{3}\right)=\frac{3}{2}.$

26. Prove that: $\sin x+\sin 3x+\sin 5x+\sin 7x=4\cos x\cos 2x\sin 4x$..

**OR**

Find the value of $\sin\frac{x}{2},\cos\frac{x}{2}$ and $\tan\frac{x}{2}$,if $\tan x=\frac{3}{4},\pi<x<\frac{3\pi}{2}.$

27. In a group of 50 students, the number of students studying French, English and Sanskrit were found to be as follows: French=17, English=13, Sanskrit=15, French and English=9, English and Sanskrit=4, French and Sanskrit=5, English, French and Sanskrit=3. Find the number of students who study:

(i) French only (ii) English only (iii) French and Sanskrit but not English

(iv) at least one of the three languages (v) none of the three languages.

28. Calculate the mean and standard deviation for the following data :

| Class | 30 – 40 | 40 – 50 | 50 – 60 | 60 – 70 | 70 – 80 | 80 – 90 | 90 – 100 |
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| Frequency | 3 | 7 | 12 | 15 | 8 | 3 | 2 |

**OR**

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.

29. Solve the following system of inequalities graphically:
$2x+y \geq 4$, $x+ y \leq 3$, $2x - 3y \leq 6$

**End of the Question Paper**