| Roll Number |  |  |
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# INDIAN SCHOOL MUSCAT <br> FIRST TERM EXAMINATION MATHEMATICS 

CLASS: XI
25.09.2018

Sub. Code: 041

## General Instructions:

(i) All questions are compulsory.
(ii) The question paper consists of 29 questions divided into four sections A, B, C and D. Section A contains 4 questions of 1 mark each, Section B contains 8 questions of 2 marks each, Section C contains 11 questions of 4 marks each \& Section D contains 6 questions of 6 marks each.
(iii) There is no overall choice. However, an internal choice has been provided in three questions of 4 marks each and three questions of 6 marks each. You have to attempt only one of the alternatives in all such questions.
(iv) Use of calculator is not permitted.

## SECTION - A

1. Write the following set in set builder form ; $\{2,5,10,17,26,37,50\}$
2. If $(-1,1) \in A \times A$ and $n(A)=2$. Write the elements of set $A$ and the value of $n(A \times A)$.
3. Write radian measure of $40^{\circ} \quad 20^{\prime}$.
4. Find the value of $-i^{99}+i^{998}+i^{25}$

## SECTION - B

5. Using set notations, write separately for part $a$ and $b$, what does the shaded part of the following Venn diagrams represent?

6. Determine the domain and range of the relation R defined by $R=\{(x, x+6): x \in\{3,4,5,6,7,8\}\}$
7. Find the value of $\cos 15^{\circ}$.
8. Find the general solution of $\tan 2 x=-\frac{1}{\sqrt{3}}$
9. If $\left(\frac{1-i}{1+i}\right)^{10}=a+i b$, find the value of $a$ and $b$.
10. Find the conjugate of $\frac{2-i}{(1-2 i)^{2}}$
11. If ${ }^{n} P_{r}=840$ and ${ }^{n} C_{r}=35$, then find the value of $r$
12. If for a sample size of 60 observations $\sum x^{2}=18000$ and $\sum x=960$, then find its variance.

## SECTION - C

13. Verify De' Morgan's laws for the following sets where U represents universal set.
$\mathrm{U}=\{1,2,3,4,5,6,8,9\}, P=\{2,4,8,9\}$ and $\mathrm{Q}=\{1,3,5,8\}$
14. Find the domain and range of the function $\mathrm{f}: \mathrm{f}(\mathrm{x})=\sqrt{16-x^{2}}$
15. A solution is to be kept between $40^{\circ} \mathrm{C}$ and $45^{\circ} \mathrm{C}$. What is the range of temperature in degree Fahrenheit, if the conversion formula is $5 \mathrm{~F}=9 \mathrm{C}+160$ ?
16. Justify that function $\mathrm{f}:\{1,2,3,4\} \rightarrow\{1,3,5,7\}, \mathrm{f}(\mathrm{x})=\{(1,1),(2,3),(3,5),(4,7)\}$ is a function. Further if $f(x)=a x+b$, then find the values of $a$ and $b$.

## OR

A function f is defined as $\mathrm{f}(\mathrm{x})=\left\{\begin{array}{ll}1-x, & x \leq 0 \\ 1+x, & x \geq 0\end{array}\right\}$. Write the range of the function. Draw the graph of the function.
17. Prove by principle of mathematical induction that:

$$
1.2+2.3+3.4+\ldots \ldots . .+\mathrm{n}(\mathrm{n}+1)=\frac{n(n+1)(n+2)}{3}
$$

18. What is the number of ways of choosing 4 cards from a pack of 52 playing cards if
(i) All four cards belong to different suits
(ii) All four cards are face cards
(iii) one card is diamond and other three are black.

## OR

How many different words with or without meaning can be formed using any 2 distinct vowels and any 2 distinct consonants from all 26 alphabets of English language which has 5 vowels and 21 consonants?
19. Write the following complex number in the polar form $2 \mathrm{i}-2 \sqrt{3}$
20. Find the mean deviation about mean for the following data.

| $x$ | 5 | 10 | 15 | 20 | 25 |
| :--- | :--- | :--- | :--- | :--- | :--- |
| $f$ | 7 | 4 | 6 | 3 | 5 |

Find the possible number of words with or without meaning that can be formed by arranging all the alphabets of the word INDEPENDENCE such that
(i) the vowels are never together
(ii) the words begin with P and end with C .
22. Using principle of mathematical induction show that $7^{n}-3^{n}$ is divisible by 4 where n is a natural number.

## OR

Using principle of mathematical induction show that $2^{n}>n$ where n is a natural number.
23. Show that $\frac{\cos 4 x+\cos 3 x+\cos 2 x}{\sin 4 x+\sin 3 x+\sin 2 x}=\cot 3 x$

## SECTION - D

24. In a survey, it is found that 21 people like product $\mathrm{A}, 26$ people like product $\mathrm{B}, 29$ people like product $\mathrm{C}, 14$ people like product A and $\mathrm{B}, 12$ people like product A and $\mathrm{C}, 14$ people like product B and $\mathrm{C}, 8$ people like all the three products. Find how many like product C only.
25. If $\tan x=\frac{3}{4}, \pi<x<\frac{3 \pi}{2}$, find the values of a) $\sin \frac{x}{2} \quad$ b) $\cos \frac{x}{2}$
26. Solve the following system of inequalities graphically:
$\mathrm{x}+2 \mathrm{y} \leq 10, \mathrm{x}+\mathrm{y} \geq 1, \mathrm{x}-\mathrm{y} \leq 0, \mathrm{x} \geq 0, \mathrm{y} \geq 0$.
27. Find $\sqrt{-8-6 i}$.

## OR

Find real x such that $\frac{3+2 i \sin x}{1-2 i \sin x}$ is
a) purely real
b) purely imaginary
28. While calculating the mean and variance of 10 readings, a student wrongly used reading 52 for the correct reading 25 . He obtained the mean and variance as 45 and 16 respectively. Find the correct mean and variance.

## OR

Calculate mean, variance and standard deviation of the following data:-

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

29. Prove that $\cos 20^{\circ} \quad \cos 40^{\circ} \quad \cos 60^{\circ} \quad \cos 80^{\circ}=\frac{1}{16}$

## OR

Prove that $\cos ^{2} \mathrm{x}+\cos ^{2}\left(\mathrm{x}+\frac{\pi}{3}\right)+\cos ^{2}\left(\mathrm{x}-\frac{\pi}{3}\right)=\frac{3}{2}$

## End of the Question Paper

