# INDIAN SCHOOL SOHAR <br> UNIT TEST 2017-2018 <br> MATHEMATICS 

## Class: XI

Date: 22/05/17

Time: 2 Hrs
Marks: 50

## General Instructions

* All questions are compulsory.
* Please check that this Question Paper contains 16 Questions.
* Questions 1 to 4 in Section-A are Very Short Answer Type Questions carrying one mark each.
* Questions 5 to 8 in Section-B are Short AnswerI Type Questions carrying 2 marks each.
* Questions 9 to 13 in Section-C are Long Answer I Type Questions carrying 4 marks each
* Questions 14 to 16 in Section-C are Long Answer II Type Questions carrying 6 marks each
* Please write down the serial number of the Question before attempting it.
* 10 minute time has been allotted to read this question paper. The students will read the question paper only and will not write any answer on the answer-book during this period.


## SECTION A

1. Represent the following set in roster form $\mathrm{A}=\left\{x: x^{4}-5 x^{2}+6=0, x \in R\right\}$
2. Let $\mathrm{A}=\{\mathrm{x}: \mathrm{x}$ is a positive prime number less than 10$\}$ and $\mathrm{B}=\{\mathrm{x}: \mathrm{x} \in N, 0<\mathrm{x} \leq 6\}$

Find A - B
3. Let $\mathrm{P}(\mathrm{n}):$ " $2 \mathrm{n}<(1 \times 2 \times 3 \times \ldots \times \mathrm{n})$ ". Ffind the smallest positive integer for which $\mathrm{P}(\mathrm{n})$ is true.
4. Find the linear relation between the components of the ordered pairs
$R=\{(2,1)(4,7)(1,-2) \ldots \ldots\}$

## SECTION B

5. Let $U=\{x: x$ is a letter in the word "AN EXCELLENT BOOK" $\}, P=\{x: x$ is a letter in the word " TALENT" $\}, \mathrm{Q}=\{\mathrm{x}: \mathrm{x}$ is a letter in the word "BANANA" $\}$.Find (PUQ)'
6. If $A \subset B$, then show that $C-B \subset C-A$
7. If $P(n): " 2.4^{2 n+1}+3^{3 n+1}$ is divisible by $\lambda$ for all $n \in N$ " is true, then find the value of $\lambda$
8. Find the domain of the function $\mathrm{f}(\mathrm{x})=\frac{x+7}{x^{2}-8 x+4}$

## SECTION C

9. Prove by induction that $(2 n+7)<(n+3)^{2}$ for all $n \in N$.
10. Using the principles of mathematical inductions, prove the following

$$
3 \cdot 2^{2}+3^{2} \cdot 2^{3}+3^{3} \cdot 2^{4}+\ldots \ldots \ldots \ldots \ldots \ldots \ldots+3^{n} 2^{n+1}=\frac{12}{5}\left(6^{n}-1\right) \text { where } \mathrm{n} \in \mathrm{~N}
$$

11. Find the domain and range of the function $f(x)=\frac{1}{\sqrt{121-x^{2}}}$

## [OR]

Find the domain and range of $f(x)=\sqrt{64-x^{2}}$
12. Find the domain and range of the function $\mathrm{f}(\mathrm{x})=\frac{x^{2}}{3+x^{2}}$
13. Let $A, B$ and $C$ be sets. Then show that $A \cup(B \cap C)=(A \cup B) \cap(A \cup C)$ using the properties of sets.
[OR]
Using the properties of sets for all sets $A, B$ and $C$, show that $(A-B) \cap(A-C)=A-(B \cup C)$

## SECTION D

14. Using the principles of mathematical inductions, prove the following for all $\mathrm{n} \in \mathrm{N}$ $1^{2}+2^{2}+3^{2}+4^{2}+\ldots+n^{2}=\frac{n(n+1)(2 n+1)}{6}$

## [ OR]

Prove that $7+77+777+\ldots \ldots .+777777 \ldots . \mathrm{n}$ terms $=\frac{7}{81}\left(10^{n+1}-9 n-10\right)$ for all $\mathrm{n} \in \mathrm{N}$ by mathematical induction
15. In an university out of 100 students 15 offered mathematics only, 12 offered statistics only , 8 offered only physics , 40 offered physics and mathematics, 20 offered physics and statistics, 10 offered mathematics and statistics , 65 offered physics .By drawing a venn diagram ,find the number of students who
i) offered mathematics
ii) offered statistics
iii) did not offer any of the above three subjects
16. Sketch the graph of the following functions in the given domain ,hence find the range .
$f(x)=2-x^{2}$, $-5<x<5$
$\mathrm{f}(\mathrm{x})=|x-4| \quad, 0<\mathrm{x}<6$
$f(x)=[x] \quad-3<x<6$ (Greatest integer function )

