

INDIAN SCHOOL SOHAR



UNIT TEST (2018-19)

MATHEMATICS

CLASS: XI

MAX. MARKS: 50

DATE: 20.05.2018

DURATION: 2hrs

General Instructions:

1. All questions are compulsory.
2. The question paper consists of 16 questions divided into three sections A, B, C and D. Section A comprises of 4 questions of one mark each, section B comprises of 4 questions of two marks each, section C comprises of 5 questions of four marks each and section D comprises of three questions of six marks each
3. All questions in Section A are to be answered in one word, one sentence or as per the exact requirement of the question.
4. There is no overall choice. However, an internal choice has been provided in 2 questions of four marks each and 1 question of six marks. You have to attempt only one of the alternatives in all such questions.
5. Use of calculators is not permitted.

SECTION – A

1. Write the following set in set builder form, $B = \{3, 9, 27, 81\}$
2. Evaluate: $\tan(-420^\circ) + \operatorname{cosec}(690^\circ)$
3. A function $f: \mathbb{R} \rightarrow \mathbb{R}$ is defined by $f(x) = 5^x$. Determine
(i) Range of f (ii) whether $f(x+y) = f(x) \cdot f(y)$
4. Determine the domain and range of the following relation:
 $R = \{(p, q) : q = |p - 1|, p \in \mathbb{Z} \text{ and } |p| \leq 2\}$

SECTION – B

5. There are 30 students in a chemistry class and 70 students in a physics class. Find the number of students which are either in physics class or chemistry class in the following cases: i) the two classes meet at the same hour ii) the two classes meet at different hours and 20 students are enrolled in both the subjects.
6. Find the range of the following function: $f(x) = 1 + 3 \sin 2x$
7. The minute hand of a watch is 3.5 cm long. How far does its tip move in 20 minutes?
8. If three angles A, B and C are in AP, prove that : $\cot B = \frac{\sin A - \sin C}{\cos C - \cos A}$

SECTION- C

9. Find the domain and range of the real valued function $f(x)$ given by; $f(x) = \frac{5}{3-x^2}$
10. Draw a rough graph of the following function and discuss about its domain and range
i) Modulus function ii) Greatest integer function
11. Prove the following by using the principle of mathematical induction for all $n \in N$:

$$10^n + 3(4)^{n+2} + 5 \text{ is divisible by } 9$$

OR

$$\frac{n^5}{5} + \frac{n^3}{3} + \frac{7n}{15} \text{ is a natural number}$$

12. Find the general solution for the following equation: $(\sqrt{3} - 1) \cos \theta + (\sqrt{3} + 1) \sin \theta = 2$

OR

Find the general solution for the following equation: $4 \cos x - 3 \sec x = 2 \tan x$

13. Prove that for any set A and B: $(A - B) \cup B = A$ if and only if $B \subset A$

SECTION- D

14. In a survey of 200 students of a school, it was found that 110 study mathematics, 100 study Physics and 70 study Chemistry, 40 study Mathematics and Physics, 40 study Physics and Chemistry, 50 study Chemistry and Mathematics and 20 study none of these subjects. Find the number of students i) who study all the three subject ii) only mathematics iii) exactly two subjects.

15. Prove the following by using the principle of mathematical induction for all $n \in N$:

$$\frac{1}{1.2.3} + \frac{1}{2.3.4} \dots + \frac{1}{n(n+1)(n+2)} = \frac{n(n+3)}{4(n+1)(n+2)}$$

16. Find the value of k, if $k = \sin \frac{\pi}{18} \sin \frac{5\pi}{18} \sin \frac{7\pi}{18}$

OR

Find the value of the expression: $\cos^4 \frac{\pi}{8} + \cos^4 \frac{3\pi}{8} + \cos^4 \frac{5\pi}{8} + \cos^4 \frac{7\pi}{8}$

**** THE END ****