

INDIAN SCHOOL SOHAR UNIT TEST 2017 – 2018 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 A = $\{x : x^4 5x^2 + 6 = 0, x \in R\}$
- 2. Let A = { x : x is a positive prime number less than 10 } and B = { x : x $\in N$, 0 < x ≤ 6 } Find A – B
- Let P(n): "2n < (1 × 2 × 3 × ... × n)". Ffind the smallest positive integer for which P (n) is true.
- 4. Find the linear relation between the components of the ordered pairs

 $R = \{ (2, 1) (4, 7) (1, -2) \dots \}$

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" }, Q = { x : 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): "2.4²ⁿ⁺¹ + 3³ⁿ⁺¹ is divisible by λ for all $n \in N$ " is true, then find the value of λ
- 8. Find the domain of the function $f(x) = \frac{x+7}{x^2-8x+4}$

SECTION C

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

 $3 \cdot 2^2 + 3^2 \cdot 2^3 + 3^3 \cdot 2^4 + \dots + 3^n 2^{n+1} = \frac{12}{5} (6^n - 1)$ where $n \in \mathbb{N}$

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 $f(x) = \frac{x^2}{3+x^2}$
- 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 $n \in N$ $1^2 + 2^2 + 3^2 + 4^2 + ... + n^2 = \frac{n(n+1)(2n+1)}{6}$

[OR]

Prove that $7 + 77 + 777 + \dots + 777777\dots$ n terms $= \frac{7}{81}(10^{n+1} - 9n - 10)$ for all $n \in \mathbb{N}$ 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 .
 - $f(x) = 2 x^{2}, \qquad -5 < x < 5$ $f(x) = |x - 4| \qquad , 0 < x < 6$ $f(x) = [x] \qquad -3 < x < 6 \text{ (Greatest integer function)}$

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