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INDIAN SCHOOL SOHAR

UNIT TEST (2019-20)

MATHEMATICS

CLASS: XI **MAX. MARKS: 40**

DATE: 13.05.2019 **DURATION: 2hrs**

General Instructions:

1. All questions are compulsory.
2. The question paper consists of 18 questions divided into three sections A, B,C and D. Section A comprises of 10 questions of one mark each, section B comprises of 3 questions of two marks each, section C comprises of 3 questions of four marks each and section D comprises of 2 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. You have to attempt only one of the alternatives in all such questions.
5. Use of calculators is not permitted.

SECTION – A

1. Is it true that for any sets A and B, P (A) ∪ P (B) = P (A ∪ B)? Justify your answer.
2. Evaluate: tan (- 600^0) + cosec (690^0) + cos (-660^0) + sin (330^0)
3. A function f : R→ R is defined by f(x) = 2^x. Determine

   (i) Range of f (ii) whether f(x - y) = f(x) ÷f(y)
4. Determine the range of the following i) f(x) = 1 - $|x-5|$ ii) f (x) = $\frac{|x+7|}{x+7}$

   OR

   Draw a rough sketch of greatest integer function and write its domain and range.
5. Let U= {1,2,3,…..10} , A= { 1,2,3,4}, B= {1,2,3} ,C = { 2, 4} , D= { 5,7,9}

   i) Find all sets X such that X ⊂ B and $X \subset C$ ii) find A'∩D'
6. Find the degree measure of the angle subtended at the centre of a circle of radius 100 cm by an arc of length 22 cm.
7. Find the value of 3 cosec 20° – sec 20°
8. If $A = \{x : x \in Z, x^2 < 25\}$, $B = \{x: x \text{ is prime number less than } 13\}$,

   C= { x; x ∈ $Z, -3 \le x \le 3$}. Find i) $A \cap B$ $ii)$ $A - C$
9. Given R= {(x,y): x, y ∈ Z, $x^2 + y^2 = 169$} , find domain and range of R. Also state whether R is a function?

10. Find the domain of the function f given by f (x) = $\frac{1}{\sqrt{[x]^2-[x]-6}}$

SECTION – B

11. Let A, B and C be three sets such that A∪ B =C and A ∩B = ∅. Then, prove that A = C – B

12. For every positive integer n, prove that $7^n - 3^n$ is divisible by 4.

13. For any real numbers x and y, Prove that: sin x = sin y implies x = nπ + $(-1)^n$ y, where n ∈ Z

OR

Prove that: cos x + cos y = 2 cos $\frac{(x+y)}{2}$ cos $\frac{(x-y)}{2}$

SECTION- C

14. Find the domain and range of :

a) the real valued function f (x) given by; f(x) = $\frac{x^2}{2+x^2}$

b) the relation R = { (a,b) : b = $|a-2|$, a∈ Z and $|a| \leq 2$}

15. Find the general solution and the principal solution for the following equation:
Cos x -2 cos 2x + cos 3x = 0

16. Prove the following by using the principle of mathematical induction for all n∈ N:

$$\frac{1}{1.2.3}+\frac{1}{2.3.4}+\frac{1}{3.4.5}+\cdots..\frac{1}{n(n+1)(n+2)}=\frac{n(n+3)}{4\,(n+1)(n+2)}$$

OR

$$1+\frac{1}{1+2}+\frac{1}{1+2+3}+\ldots\ldots+\frac{1}{1+2+3+\cdots n}=\frac{2n}{n+1}$$

SECTION- D

17. Of the members of three sports teams in a certain school 23 are in the cricket team, 27 in the hockey team and 30 in the football team. 15 play both hockey and cricket, 16 play both hockey and football, 14 play football and cricket and 9 play all the three games.
i) find the number of students who play hockey and football but not cricket.
ii) find the number of students who play only one game.
iii) find the number of students who play only football.
iv) find the number of students who play atleast one game.

18. i)Prove that cos (x + y) = cosx cosy – sinx siny, using unit circle.

ii) If sin x + sin y = a and cos x + cos y = b, find cos (x- y)

OR

Evaluate : i) sin $\frac{\pi}{18}$ $sin\frac{5\pi}{18}sin\frac{7\pi}{18}$ ii) 2 cos $\frac{\pi}{13}$ $cos\frac{9\pi}{13}+cos\frac{3\pi}{13}+cos\frac{5\pi}{13}$

**** THE END ****