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SAMPLE PAPER 01 : PERIODIC TEST – 1 (2019 – 20)
CLASS – XI
MATHEMATICS

T.T. 1:30   **M.M. 40**

General Instructions:
1. All questions are compulsory.
2. Question paper is divided into four sections: Section A contains 10 Objective type questions each carry 1 mark, Section B contains 3 questions each carry 2 marks, Section C contains 3 questions each carry 4 marks and Section D contains 2 questions each carry 6 marks.

SECTION – A(1 mark each)

1. In a town of 840 persons, 450 persons read Hindi, 300 read English and 200 read both. Then the number of persons who read neither is
   (a) 210   (b) 290   (c) 180   (d) 260

2. The set $(A \cup B \cup C) \cap (A \cap B' \cap C')' \cap C'$ is equal to
   (a) $B \cap C'$ (b) $A \cap C$ (c) $B \cup C'$ (d) $A \cap C'$

3. Let $n(A) = m$, and $n(B) = n$. Then the total number of non-empty relations that can be defined from A to B is
   (a) m^n (b) $n^m – 1$ (c) $m^n – 1$ (d) $2^{mn} – 1$

4. If $[x]^2 – 5[x] + 6 = 0$, where $[\ .\ ]$ denote the greatest integer function, then
   (a) $x \in [3, 4]$ (b) $x \in (2, 3]$ (c) $x \in [2, 3]$ (d) $x \in [2, 4]$

5. Two finite sets have m and n elements respectively. The total number of subsets of first set is 56 more than the total number of subsets of the second set. The values of m and n respectively are.
   (a) 7, 6   (b) 5, 1   (c) 6, 3   (d) 8, 7

6. If $f(x) = ax + b$, where a and b are integers, $f(–1) = –5$ and $f(3) = 3$, then a and b are equal to
   (a) $a = –3, b = –1$ (b) $a = 2, b = –3$ (c) $a = 0, b = 2$ (d) $a = 2, b = 3$

7. The greatest value of $\sin x \cos x$ is
   (a) 1   (b) 2   (c) $\sqrt{2}$ (d) $\dfrac{1}{2}$

8. If $\sin \theta + \csc \theta = 2$, then $\sin 2\theta + \csc 2\theta$ is equal to
   (a) 1   (b) 4   (c) 2   (d) None of these

9. If $f(x) = \cos^2 x + \sec^2 x$, then
   (a) $f(x) < 1$ (b) $f(x) = 1$ (c) $2 < f(x) < 1$ (d) $f(x) \geq 2$

10. If $\tan \theta = 3$ and θ lies in third quadrant, then the value of $\sin \theta$ is
    (a) $\dfrac{1}{\sqrt{10}}$ (b) $-\dfrac{1}{\sqrt{10}}$ (c) $-\dfrac{3}{\sqrt{10}}$ (d) $\dfrac{3}{\sqrt{10}}$

SECTION – B(2 marks each)

11. Find the domain for which the functions $f(x) = 2x^2 – 1$ and $g(x) = 1 – 3x$ are equal.

12. Prove that: $\dfrac{\cos 7x + \cos 5x}{\sin 7x - \sin 5x} = \cot x$

13. If $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$, $A = \{2, 4, 6, 8\}$ and $B = \{2, 3, 5, 7\}$.
Verify that $(A \cup B)' = A' \cap B'$

SECTION – C(4 marks each)

14. If f and g are two real valued functions defined as $f(x) = 2x + 1$, $g(x) = x^2 + 1$, then find
(i) $f + g$ (ii) $f – g$ (iii) fg (iv) $\dfrac{f}{g}$

15. Solve $\sin 2x – \sin 4x + \sin 6x = 0$.

16. Show that: $\cos 6x = 32 \cos^6 x – 48\cos^4 x + 18 \cos^2 x – 1$

SECTION – D(6 marks each)

17. Prove the following by using the principle of mathematical induction for all $n \in N$:
$$\frac{1}{1.4} + \frac{1}{4.7} + \frac{1}{7.10} + \ldots\ldots + \frac{1}{(3n-2)(3n+1)} = \frac{n}{(3n+1)}$$

18. In a survey of 60 people, it was found that 25 people read newspaper H, 26 read newspaper T, 26 read newspaper I, 9 read both H and I, 11 read both H and T, 8 read both T and I, 3 read all three newspapers. Find:
(i) the number of people who read at least one of the newspapers.
(ii) the number of people who read exactly one newspaper.
(iii) the number of people who read exactly two newspaper.