विद्या सर्वार्थि साधिका

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PERIODIC TEST – 1

Class: XI

Subject : Mathematics (041) M.M :30

Date : 19-07-2023 Time : 1hour 30 min

General Instructions:

1. The question paper consists of 16 questions divided into 3 sections A, B, and C.
2. All questions are compulsory.
3. Section A comprises of 7 questions of 1 mark each.
4. Section B comprises of 4 questions of 2 marks each. Internal choice has been provided in two questions.
5. Section C comprises of 5 questions of 3 marks each. Internal choice has been provided in two questions.

SECTION – A

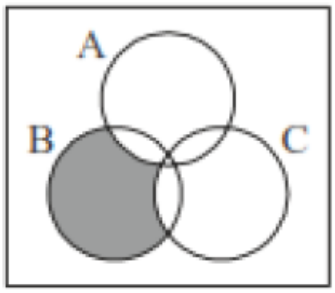
1. Find the range of the given function $f(x) = \frac{|x-4|}{x-4}$. (1)

   (A) infinity (B) $\{-1, 0, 1\}$ (C) $\{0, 1\}$ (D) $\{-1, 1\}$

2. If the arcs of the same lengths in two circles subtend angles 65°and 110° at the centre, find the ratio of their radii. (1)

   (A) 11/13 (B) 22/13 (C) 13/22 (D) 22/2

3. The shaded region in the given figure is shows which one of the following set relations? (1)



   (A) $B \cap (A \cup C)$ (B) $B \cup (A \cap C)$ (C) $B \cap (A - C)$ (D) $B - (A \cup C)$

4. Value of $\sin(150° + x) + \sin(150° - x)$ is _____. (1)

   (A) sin 30° (B) 2 sin 150° (C) cos x (D) cos 150°

5. Which of the following is a singleton set? (1)

   (A) $\{x: |x| < 4, x \in N\}$ (B) $\{x: |x| < -4, x \in N\}$

   (C) $\{x: x^2 = 4, x \in N\}$ (D) $\{x: x^2 = 4, x \in R\}$

6. Find the value of $\cos(-2070°)$. (1)

   (A) 1 (B) 0 (C) ½ (D) - 1

7. If A = {1, 2, 3, 4}, B = {2, 3, 5, 6} and C = {3, 4, 6, 7}, then which one is true? (1)

   (A) $A - (B \cap C) = \{1, 2, 3\}$ (B) $A - (B \cap C) = \{1, 2, 4\}$

   (C) $A - (B \cup C) = \{2, 3\}$ (D) $A - (B \cup C) = \emptyset$

SECTION B

8. Given f: R → R as $f(x) = 3x + 4$. If ordered pairs (a, 8) and (2, b) belong to ' f". Find a and b. (2)

9. (a) Let A = {x: x is a vowel in the word 'GEORGE CANTOR'}, then write all the subsets of A. (2)

OR

(b) Express the following in roster form: $\left\{x: x = \frac{n^2-1}{n^2+1},\ n < 4,\ n \in N\right\}$

10. A wheel makes 360 revolutions in one minute. Through how many radians does it turn in one second? (2)

11. (a) If $tanA = \frac{1}{2}$, $tanB = \frac{1}{3}$, find the value of $\tan(2A + B)$. (2)

OR

(b) Prove that $\sin 4A = 4 \sin A \cos^3 A - 4 \cos A \sin^3 A$.

SECTION C

12. If A = $\{x: x \in N, 1 < x \leq 6\}$, B = $\left\{x: x \in Z \text{ and } \frac{-5}{2} \leq x \leq \frac{5}{2}\right\}$, (3)

Find (i) $B - A$ (ii) $A \cap B$

13. (a) If $tanx = \frac{3}{4}$, $\pi < x < \frac{3\pi}{2}$, find the value of $\sin\frac{x}{2}$. (3)

OR

(b) If $sin(A - B) = \frac{1}{\sqrt{10}}$ and $\cos(A + B) = \frac{2}{\sqrt{29}}$ $where\ A, B\ lie\ between\ 0\ and\ \frac{\pi}{4}$, find $tan2A$.

14. If U = {x: x ∈ N and x ≤ 10}, A = {x: x is prime} and B = {x: x is a factor of 24}, verify the following results: (3)

(i) A – B = A ∩ B′ (ii) (A ∪ B)′ = A′∩ B ′

15. (a) Let A = {– 1, 0, 2, 3}, B = {1, 2, 5, 8, 9, 10} and f= {(x, y) : $y = x^2 + 1$, x ∈ A and y ∈ B}. List the elements of f. (3)

OR

(b) Find the domain and range of the function $f(x) = 3x^2 - 5$. Also find f(-3) and the numbers which are associated with the number 43 in its range.

16. Let $A = \{8, 9, 10, 11, 12, 13\}$ and $f: A \to N$ be defined by $f(n)$= highest prime factor of n, for all $n \in A$, find the range of f. (3)