विद्या सर्वार्थ साधिका

ANANDALAYA

PERIODIC TEST – 1

Class: XI

Subject : Mathematics (041) M.M: 40

Date : 21-07-2025 Time: 1 Hour 30 min

General Instructions:

1. The question paper consists of 22 questions divided into 3 sections A, B and C.
2. All questions are compulsory.
3. Section A comprises of 10 questions of 1 mark each.
4. Section B comprises of 6 questions of 2 marks each. Internal choice has been provided in two questions.
5. Section C comprises of 6 questions of 3 marks each. Internal choice has been provided in two questions.

SECTION – A

1. The angles of a triangle are in the ratio 3: 4: 5. The greatest angle in radians is _____. (1)

   (A) $\frac{\pi}{12}$ (B) $\frac{3\pi}{12}$ (C) $\frac{5\pi}{12}$ (D) $\frac{3\pi}{4}$

2. The set builder form of set $\{0, 3, 6, 9, 12, 15, 18 \dots \dots \dots\}$ is _____. (1)

   (A) $\{x: x = 3n, n \in N\}$ (B) $\{x: x = 3n, n \in W\}$

   (C) $\{x: x = 3n, n \in W, 0 \leq n \leq 6\}$ (D) $\{x: x = 3n, n \in N, 0 < n \leq 6\}$

3. The roster method of the set $A = \{x: x = n^3, n \in N \text{ and } x < 80\}$ is_____. (1)

   (A) $\{1, 8, 27\}$ (B) $\{1, 8, 27, 64, 125\}$ (C) $\{0, 1, 8, 27, 64\}$ (D) $\{1, 8, 27, 64\}$

4. The range of the relation R = $\{(x + 1, x + 5): x \in \{0,1,2,3,4,5\}\}$ is _____. (1)

   (A) $\{1,2,3,4,5,6\}$ (B) $\{5,6,7,8,9\}$

   (C) $\{5,6,7,8,9,10\}$ (D) $\{6,7,8,9,10\}$

5. The domain of the function $y = \frac{x^2-9}{x-3}$ is _____. (1)

   (A) R (B) $R - \{9\}$ (C) $R - \{3\}$ (D) $\{-3, 3\}$

6. The value of $\frac{sin135° - cos120°}{sin135° + cos120°} =$ _____ (1)

   (A) $3 + 2\sqrt{2}$ (B) $3 - 2\sqrt{2}$ (C) $3 + \sqrt{2}$ (D) $3 + \sqrt{3}$

7. Find the value of $cos72°\ cos42° + sin72°\ sin42° =$ _____. (1)

   (A) $\sqrt{2}$ (B) $\frac{\sqrt{3}}{2}$ (C) $\frac{1}{\sqrt{3}}$ (D) $\frac{1}{2}$

8. A and B are two nonempty sets, given that $A \subset B$ which one of the following is not true? (1)

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

9. Which one of the following is not a function? (1)

   (A) $y = |x|, for\ x \in R$ (B) $y = \sqrt{x}\ for\ x \geq 0$

   (C) $y = -x,\ for\ x \in R$ (D) $y = \frac{1}{x-1}, for\ x \geq 0$

10. In the following question, a statement of assertion (A) is followed by a statement of reason (R). (1)
    Choose the correct answer out of the following choices.

    Assertion (A): If set A = {1, 3} and set B = {4, 9}. Then relation from set A to set B "is greater than" is an empty or null relation.

    Reason (R) : A relation is an empty or null relation if it does not contain any element.

    (A) Both A and R are true and R is the correct explanation of A

    (B) Both A and R are true and R is not the correct explanation of A

    (C) A is true but R is false

    (D) A is false but R is true

SECTION – B

11. The domain of the relation $R = \{(x, y): y = x - 1\}$ is $\{x: 0 \leq x \leq 4, x \in I, set\ of\ integers\}$. Find the range. (2)

12. Prove that $\frac{\sqrt{3}\cos 23° - sin23°}{2} = \cos 53°$. (2)

13. If $A = \{x: 1 < x < 5, x \in N\}$ and $B = \{y: 3 < y < 7, y \in N\}$. Find $A - B\ and\ B - A$. (2)

14. If A, B, C are three sets such that $A \subset B$, then prove that $C - B \subset C - A$. (2)

15. If $A = \{1, 2, 3, 4, 5\}$ and $B = \{2, 4, 6, 8, 10\}$. Let $R = \{(a, b): a \in A,\ b \in B, a\ divides\ b\}$ be a relation from $A\ to\ B$. Find R. Also find domain and range of R. (2)

OR

Let A= {1,2,3,4, ... ,70} and R be the relation "is square of" in A. Find R and its domain and range.

16. If $sinx + siny = a\ and\ cosx + cosy = b$, show that $tan\left(\frac{x+y}{2}\right) = \frac{a}{b}$. (2)

OR

Prove that $cot2\alpha - tan\alpha = \frac{cos3\alpha}{cos\alpha\ sin2\alpha}$.

SECTION – C

17. Let $f = \{(1, 1), (2, 3), (3, 5), (4,7)\}$ be a function defined by $f(x) = ax + b$, for some integers a and b. Determine $a\ and\ b$. (3)

18. Let $A = \{-2, -1, 0, 1, 2\}$ and $f: A \longrightarrow Z$ given by $f(x) = x^2 - 2x - 3$. Find (3)
(i) Range of f (ii) Pre- images of 5

OR

Find the domain and range of the function $f(x) = \frac{x+3}{x-2}$.

19. If $sec\theta = \sqrt{2}\ and\ \frac{3\pi}{2} < \theta < 2\pi$, find the value of $\frac{1+tan\theta+cosec\theta}{1+cot\theta-cosec\theta}$. (3)

OR

Prove that $tan75° + cot75° = 4$

20. If A = {1, 2, 5}, B = {1, 2, 3, 4}, C = {5, 6, 2}, then verify that: (3)

(*i*) A × (B ∩ C) = (A × B) ∩ (A × C) (*ii*) (A – B) × C = (A × C) – (B × C).

21. Find the values of $sin2\theta, cos2\theta\ and\ tan2\theta$, when $tan\theta = \frac{24}{7}, \theta\ lies\ in\ the\ 3rd\ quadrant$. (3)

22. Observe the Venn diagram and write the following sets. (3)

(i) $(A \cup B) - C$
(ii) $A' \cap B$
(iii) $(A - B) \cup (C - B)$
(iv) $(A \cap C)' - B$
(v) $A' \cup B'$
(vi) $(A \cup B \cup C)'$