विद्या सर्वार्थ साधिका

ANANDALAYA

PERIODIC TEST – 1

Class: XI

Subject : Mathematics (041) M.M: 40

Date : 19– 07–2024 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. Given U = {0, 1, 2, 3, 4, 7, 8} and set A′ = {1, 2, 3} then set A is _____. (1)

(A) $\{0, 7, 8\}$ (B) $\{4, 7, 8\}$ (C) $\{1, 4, 7, 8\}$ (D) $\{0, 4, 7, 8\}$

2. Let A = {2}, B = {3, 4, 5} and C = {5, 6} then number of elements in A × (B – C) = _____ (1)

(A) 2 (B) 1 (C) 3 (D) 4

3. If A= $\{1, \{2, 3\}\}$ which of the following is not true? (1)

(A) $\{2,3\} \in A$ (B) $1 \in A$ (C) $\{2,3\} \subset A$ (D) $\{1\} \subset A$

4. Given relation R = {(5, 6), (7, 9), (5, 9), (5, 10)}. Then range of the relation contains_____ elements. (1)

(A) 2 (B) 3 (C) 4 (D) 0

5. If $tan\theta = 3\ and\ \theta$ lies in the third quadrant, then the value of $\sin\theta =$ ____ (1)

(A) $\frac{-3}{\sqrt{10}}$ (B) $\frac{3}{\sqrt{10}}$ (C) $\frac{\sqrt{10}}{3}$ (D) $\frac{-3}{\sqrt{8}}$

6. The value of $sin\ (45° + \theta) - cos\ (45° - \theta)$ is _____ (1)

(A) 1 (B) 0 (C) $\frac{1}{2}$ (D) $\frac{1}{\sqrt{2}}$

7. Find the domain of the following function given by : $f(x) = \frac{1}{\sqrt{x + |x|}}$. (1)

(A) $(-\infty, \infty)$ (B) $(0, \infty)$ (C) $(-\infty, 0)$ (D) $[0, \infty)$

8. The value of $tan\ 20°\ tan\ 45°\ tan\ 70°$ is equal to _____ (1)

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

9. Range of the function $f(x) = \frac{x+4}{|x+4|}$ is _____ (1)

(A) $\{4, -4\}$ (B) $\{-4\}$ (C) $\{-1, 1\}$ (D) R

In the following Q.10, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.

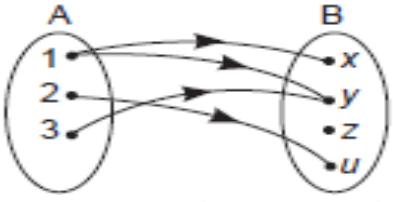
(A) Both A and R are true and R is the correct explanation of A.

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

(C) A is true but R is false.

(D) A is false but R is true.

10 Assertion (A): In the given arrow diagram domain of relation from set A to set B is set A. (1)



Reason (R): First entries of ordered pairs in given relation are its domain.

SECTION – B

11. Find the domain and range of the real function $f(x) = x^2 + 2$. (2)

12. *If* $A = \{x : x \in W, x < 2\}$, $B = \{x : x \in N, 1 < x < 5\}$, $C = \{3, 5\}$, (2)
find (i) $A \times (B \cap C)$ (ii) $A \times (B \cup C)$

OR

Let $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$, $A = \{1, 2, 3, 4\}$, $B = \{2, 4, 6, 8\}$ *and* $C = \{3, 4, 5, 6\}$.
Find (i) A' (ii) $(A \cap C)'$ (iii) C' (iv) $(B - C)'$

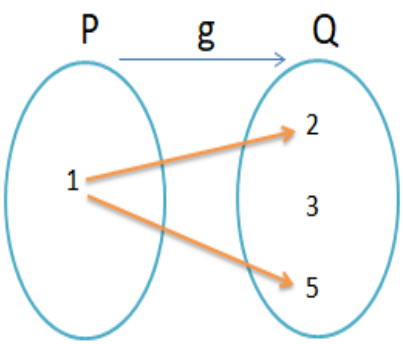
13. Let $f : R \to R$ be given by $f(x) = x^2 + 3$; (2)
Find (*i*) $\{x : f(x) = 28\}$
(*ii*) The pre-images of 39 and 2 under 'f'.

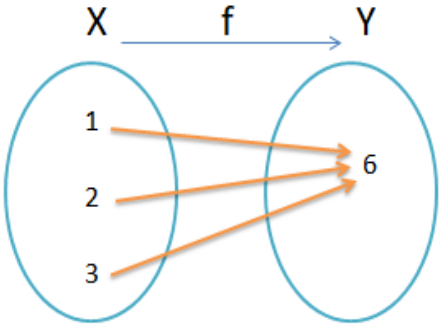
14. If $\tan A = \frac{1}{2}$ *and* $\tan B = \frac{1}{3}$, then find the value of $tan(2A + B)$. (2)

OR

Show that $sin\alpha + \sin\left(\alpha + \frac{2\pi}{3}\right) + \sin\left(\alpha + \frac{4\pi}{3}\right) = 0$

15. From the given arrow diagrams find whether the relation a function or not? Justify. (2)





(2)

16. Prove that: $sin\,x + sin\,3x + sin\,5x + sin\,7x = 4\,cos\,x\,cos\,2x\,sin\,4x$. (2)

SECTION – C

17. If U = $\{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11\}$, $A = \{2, 5, 9, 10\}$, $B = \{1, 4, 7, 9\}$ then verify that: (3)

i) $(A \cup B)' = A' \cap B'$ ii) $(A \cap B)' = A' \cup B'$.

OR

If $A = \{x : x \in Z \text{ and } x^2 \leq 16\}$, $B = \{x : x \in N \text{ and } 2x + 3 \leq 13\}$, $C = \left\{x : x \in W \text{ and } 0 \leq x < \frac{7}{2}\right\}$
verify $A - (B - C) = (A - B) \cup (A \cap C)$.

18. Prove that : $\frac{tan5\theta + tan3\theta}{tan5\theta - tan3\theta} = 4\,cos2\theta\,cos4\theta$ (3)

19. Find domain and range of $f(x) = \frac{x-2}{x-1}$. (3)

20. Let f = $\{(1, 1), (2, 3), (0, -1), (-1, -3)\}$ be a function from Z to Z defined by f(x) = ax + b, for some integers a and b. Determine a and b. (3)

21. Find the value of $sin^2\left(\frac{3\pi}{4}\right) + 2cos\left(\frac{3\pi}{4}\right) + \frac{1}{2}\,tan\left(\frac{3\pi}{4}\right)$. (3)

OR

Show that $\frac{cos^3\theta - cos3\theta}{cos\theta} + \frac{sin^3\theta + sin3\theta}{sin\theta} = 3.$

22. Find the value of $sin\left(\frac{x}{2}\right)$ *and* $cos\left(\frac{x}{2}\right)$ if $tanx = -\frac{4}{3}$, where x lies in the 2nd quadrant. (3)