SETS, RELATIONS & FUNCTIONS - SET 2

1. If A $= \{x : x^2 = 1\}$, $B = \{x : x^4 = 1\}$, then $A \triangle B$ is equal to
   (a) $\{i, -i\}$
   (b) $\{-1, 1\}$
   (c) $\{-1, 1, i, -i\}$
   (d) none of these
2. If $A \subseteq B$, then $A \triangle B$ is equal to :
   (a) $(A - B) \cap (B - A)$
   (b) A-B
   (c) B-A
   (d) none of these
3. $(A \cap B)^c \cap A$ is equal to
   (a) B
   (b) A $\cap B$
   (c) A B
   (d) A-B
4. $A - (B \cap C)$ is equal to
   (a) $(A - B) \cap (A - C)$
   (b) $(A - B) \cup (A - C)$
   (c) $(A \cap B) - C$
   (d) none of these
5. If A $= \{1, 2, 3\}$ and B $= \{3, 4\}$, then $(A \cup B) \times (A \cap B)$ is
   (a) $\{3, 3\}$
   (b) $\{(1, 3)(2, 3)(3, 3)(1, 4)(2, 4)(3, 4)\}$
   (c) $\{(1, 3)(2, 3)(3, 3)\}$
   (d) $\{(1, 3)(2, 3)(3, 3)(4, 3)\}$
6. If A $= \{x : x = n^2, n = 1, 2, 3\}$, then number of proper subsets
   (a) 3
   (b) 8
   (c) 7
   (d) none of these
7. Let R and S be two relations on a set A. Then which is not correct
   (a) R and S are transitive, then $R \cup S$ is also transitive
   (b) R and S are transitive, then $R \cap S$ is also transitive
   (c) R and S are reflexive, then $R \cap S$ is also reflexive
   (d) R and S are symmetric, then $R \cup S$ is also symmetric

8. In a battle 70% of the combatants lost one eye, 80% an ear, 75% an arm, 85% a leg, x% lost all the four limbs. The minimum value of x is

   (a) 10
   (b) 15
   (c) 12
   (d) none

9. Which of the four statements given below, is different from the other

   (a) f: $A \to B$
   (b) $f : x \to f(x)$
   (c) f is a mapping from A to B
   (d) f is a function from A to B

10. Solution set of $x \equiv 3(mod 7), p \in I$ is given by

    (a) 3
    (b) $\{7p - 3 : p \in I\}$
    (c) $\{7p + 3 : p \in I\}$
    (d) none of these

11. If m elements are in set A and n elements are in set B, then number of elements in set A X B is

    (a) m
    (b) n
    (c) mn
    (d) less than mn

12. Let R and S be two relations on a set A. Then

    (a) R and S are transitive, then $R \cup S$ is also transitive
    (b) R and S are reflexive, then $R \cup S$ is equivalence
    (c) R and S are symmetric, then $R \cup S$ is equivalence
    (d) R and S are reflexive, then $R \cup S$ is reflexive

13. The relation R from A = $\{11, 12, 13\}$ to $\{B = 8, 10, 12\}$ defined by y = x-1 is

    (a) $\{(11, 10)(13, 12)\}$
    (b) $\{(10, 11)(12, 13)\}$
    (c) $\{(10, 11)(12, 13)(13, 12)\}$
    (d) none

14. If $A = \{(x, y) : y = e^x, x \in R\} \& B = \{(x, y) : y = e^{-x}, x \in R\}$, then $A \cap B$ is :

    (a) empty set
    (b) singleton set
    (c) not a set
    (d) none of these

15. Two finite sets A and B having m and n elements. The total number of relations A to B is 64, then possible values of m and n are :

    (a) 2 and 4
    (b) 2 and 3
    (c) 2 and 1
    (d) 64 and 1

16. If $f(x) = 64x^3 + \frac{1}{x^3}$ and a,b are the roots of $4x + \frac{1}{x} = 3$, then

    (a) $f(a) = f(b)$
    (b) $f(b) = 11$
    (c) $f(a) = 12$
    (d) none of these

17. The distinct linear function(s) which map(s) [-1,1] onto [0,2] is (are)

    (a) x +1, x -1
    (b) x +1, -x+1
    (c) -x+1
    (d) x+1, -x-1

SET 2 - COMPREHENSION AND MATRIX MATCH

For problems 1 - 3: Consider the function f(x) satisfying the identity $f(x) + f(\frac{x-1}{x}) = 1 + x, \forall x \in R - \{0, 1\}$ and g(x) $=2f(x) - x + 1$

1. The domain of y $=\sqrt{g(x)}$ is

    (a) $(-\infty, \frac{1-\sqrt{5}}{2}] \cup [1, \frac{1+\sqrt{5}}{2}]$
    (b) $(-\infty, \frac{1+\sqrt{5}}{3}] \cup [1, \frac{1+\sqrt{5}}{2}]$
    (c) $(-\infty, \frac{1-\sqrt{3}}{2}] \cup [1, \frac{1+\sqrt{3}}{2}]$
    (d) $(-\infty, -1) \cup (1, \infty)$

2. The range of y =g(x) is

    (a) $(-\infty, 5]$
    (b) $(-\infty, 1] \cup [5, \infty)$
    (c) $(-\infty, 1]$
    (d) $(-\infty, -1]$

3. The number of roots of the equation $g(x) = 1$ is

    (a) 0
    (b) 1
    (c) 2
    (d) 3

4.

Column I : Function	Column II: Values of x for which both the functions in any option of the column I are identical
(a) f(x) $= tan^{-1}(\frac{2x}{1-x^2}), g(x) = 2tan^{-1}x$	(p) $x \in \{-1, 1\}$
(b) $f(x) = sin^{-1}(sinx)$ and g(x) $= sin(sin^{-1}x)$	(q) $x \in [-1, 1]$
(c) $f(x) = log_{x^2}25$ and $g(x) = log_x 5$	(r) $x \in (-1, 1)$
(d) $f(x) = sec^{-1}x + cosec^{-1}x, g(x) = sin^{-1}x + cos^{-1}x$	(s) $x \in (0, 1)$

5. Let f(x) $= 3x^2 - 7x + c$ where c is a variable coefficient and $x > \frac{7}{6}$ Then the value of [c] such that f(x) touches f^{-1}(x) is (where [.] represents greatest integer function) .....

6. The domain of definition of the function $y = \frac{1}{log_{10}(1-x)} + \sqrt{x+2}$ is equal to :

   (a) $(-3, -2)$ excluding -2.5

   (b) $[0, 1]$ excluding 0.5

   (c) (-2,1) excluding 0

   (d) none of these

7. Let $f : (0, \infty) \to R$ and $F(x) = \int_0^x f(t)dt$. If $f(x^2) = x^2(1 + x)$ then f(4) equals

   (a) $\frac{5}{4}$

   (b) 7

   (c) 4

   (d) 2