SETS, RELATIONS & FUNCTIONS - SET 1

1. If $n(A) = 8, n(A \cap B) = 2$, then n(A-B) is equal to
   (a) 8
   (b) 2
   (c) 4
   (d) 6
2. Which of the following is null set
   (a) $\{x : |x| < 1, x \in N\}$
   (b) $\{x : |x| = 5, x \in N\}$
   (c) $\{x : x^2 = 1, x \in Z\}$
   (d) $\{x : x^2 + 2x + 1 = 0, x \in R\}$
3. If A = $\{x : x = 4n + 1, 2 \leq n \leq 5\}$, then number of subsets of A is :
   (a) 16
   (b) 15
   (c) 4
   (d) none of these
4. $A - (B \cup C)$ 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. The relation "congruence modulo m" is :
   (a) reflexive only
   (b) transitive only
   (c) symmetric only
   (d) an equivalence relation
6. If $f : R \to R$ is defined by f(x) = sinx and $g : (1, \infty) \to R$ is defined by g(x) = $\sqrt{x^2 - 1}$, then gof(x) is
   (a) $\sqrt{sin(x^2 - 1)}$
   (b) $sin\sqrt{x^2 - 1}$
   (c) cosx
   (d) not defined
7. Let A = $\{2, 3, 4, 5\}$ and R = $\{(2, 2)(3, 3)(4, 4)(5, 5)\}$ be a relation in A. Then R is
   (a) reflexive
   (b) symmetric
   (c) transitive
   (d) none of these

8. If A $= \{5, 6, 7\}, \& B = \{1, 2, 3, 4\}$ then number of elements in set A $\times B \times B$ is equal to

   (a) 36
   (b) 48
   (c) 16
   (d) none of these

9. If R is a relation on set A such that R $= R^{-1}$ then R is

   (a) reflexive
   (b) symmetric
   (c) transitive
   (d) none of these

10. A set contains n elements. Then the power set contains

    (a) n^2 elements
    (b) n elements
    (c) (2n-1) elements
    (d) 2^n elements

11. Let R and S be two equivalence relations in a set A. Then

    (a) $R \cup S$ is an equivalence relation in A
    (b) $R \cap S$ is an equivalence relation in A
    (c) $R - S$ is an equivalence relation in A
    (d) none of these

12. If two sets A and B are having 99 elements in common, then the number of elements common to each of the sets A X B and B X A are

    (a) 2^{99}
    (b) 99^2
    (c) 100
    (d) 18

13. The function $f(x) = log(x-1) - log(x-2)$ and $g(x) = log(\frac{x-1}{x-2})$ are identical when x lies in the interval

    (a) $(2, \infty)$
    (b) $(-2, \infty)$
    (c) $(0, \infty)$
    (d) $[1, \infty)$

14. If $N_a = \{an : n \in N\}$, then $N_3 \cap N_4$ is equal to :

    (a) N_7
    (b) N_{12}
    (c) N_3
    (d) N_4

15. R is a relation over the set of real numbers and it is given $nm \geq 0$. Then R is

    (a) symmetric and transitive
    (b) reflexive and symmetric
    (c) a partial order relation
    (d) an equivalence relation

16. Let $f : R \to R, g : R \to R$ be two functions given by f(x) =2x-3, g(x)= $x^3 + 5$ Then $(fog)^{-1}(x)$ is equal to

    (a) $(\frac{x-7}{3})^{1/4}$
    (b) $(\frac{x-5}{2})^{1/3}$
    (c) $(\frac{x-7}{2})^{1/3}$
    (d) $(\frac{2x-7}{2})^{2/3}$

17. If $2f(x) - 3f(\frac{1}{x}) = x^2$, x is not equal to zero, then f(2) is

    (a) $\frac{-7}{4}$
    (b) $\frac{-3}{4}$
    (c) $\frac{5}{4}$
    (d) $\frac{-7}{9}$

SET 1 - MIXED QUESTION TYPES

1. Let $f(x) = 3x - 5$, then $f^{-1}(x)$:

    (a) is given by $\frac{1}{3x-5}$
    (b) is given by $\frac{x+5}{3}$
    (c) does not exist because f is not one one.
    (d) does not exist because f is not onto.

2. Number of values of x for which $|||x^2 - x + 4| - 2| - 3| = x^2 + x - 12$ is .....

3. The function $f(x) = log(x-1) - log(x-2)$ and $g(x) = log(\frac{x-1}{x-2})$ are identical when x lies in the interval

    (a) $(2, \infty)$
    (b) $(-2, \infty)$
    (c) $(0, \infty)$
    (d) $[1, \infty)$

4. Let $f : [1, \infty) \to [2, \infty)$ is given by f(x) =x + $\frac{1}{x}$ then $f^{-1}x$ is equal to :

    (a) $\frac{x+\sqrt{x^2-4}}{2}$
    (b) $\frac{x}{1+x^2}$
    (c) $\frac{x-\sqrt{x^2-4}}{2}$
    (d) $1 + \sqrt{x^2 - 4}$

5. The values of f(x) =$3sin(\sqrt{\frac{\pi^2}{16} - x^2})$ lie in the interval..

6. Let f be a real valued invertible function such that $f(\frac{2x-3}{x-2}) = 5x - 2, x \neq 2$, Then value of $f^{-1}(13)$ is .....

7. If $f(x) = cos(lnx)$, then $f(x)f(y) - \frac{1}{2}[f(\frac{x}{y}) + f(xy)]$ has the value :

   (a) -1

   (b) $\frac{1}{2}$

   (c) -2

   (d) none of these

8. Let $f : R^+ \to R$ be a function which satisfies $f(x)f(y) = f(xy) + 2(\frac{1}{x} + \frac{1}{y} + 1)$ for x,y > 0 then possible value of $f(1/2)$ is .....