

**Important Questions 2010**  
**Class-XII- Maths**  
**Relations and Functions**

**Q.1.** Define Modulus function. Draw its graph & mapping. What is its domain & range?;

**Q.2.** Define Signum function. Draw its graph & mapping. What is its domain & range?

**Q.3.** Let  $A = \{1, 2, 3\}$   $B = \{3, 4\}$ ; ; and  $C = \{4, 5, 6\}$   
Find  $(A \cap B) \cap (A \cap C)$ .

**Q.4.** Let  $A = \{1, 2\}$   $B = \{1, 2, 3, 4\}$   $C = \{5, 6\}$   $D = \{5, 6, 7, 8\}$   
Verify  $A \cap C$  is a subset of  $B \cap D$ .

**Q.5.** If  $P = \{1, 2\}$ , form the set  $P \times P \times P$ .

**Q.6.** If  $f(x) = x^3$  Find;  $\frac{f(1.1) - f(1)}{(1.1 - 1)}$

**Q.7.** Let  $A = \{1, 2\}$  and  $B = \{3, 4\}$ . Find the number of relations from A to B.

**Q.8.** Let  $A = \{1, 2, 3, \dots, 14\}$ . Define a relation R from A to A by  $R = \{(x, y) : 3x - y = 0, \text{ where } x, y \in A\}$ .  
Write down its domain, co-domain and range.;

**Q.9.** Find the domain of the function :

(a).  $f(x) = \frac{x^2 + 3x + 5}{x^2 - 5x + 4}$

(b).  $f(x) = \frac{x^2 + 2x + 1}{x^2 + 12x + 35}$

**Q.10.** Find the domain of the following function given by

1.  $f(x) = x \cdot \frac{1}{x} \cdot \frac{1}{x}$

2.  $f(x) = \frac{1}{\sqrt{x + |x|}}$

3.  $f(x) = [x] + x$

**Q.11.** Find the range of following functions:

(i).  $f(x) = |x - 3|$

(ii).  $f(x) = \frac{x}{1 + x^2}$

(iii).  $f(x) = \frac{1}{\sqrt{x - 5}}$

(iv).  $f(x) = 1 - \frac{1}{x} - 2$

(v).  $f(x) = \frac{3}{2 - x^2}$

(vi)  $f(x) = x^2 + 6$

(vii)  $f(x) = \sqrt{x}$

(viii)  $f(x) = \sqrt{16 - x^2}$

**Q.12.** Let  $f = \left\{ \left( x, \frac{x^2}{1+x^2} \right) : x \in \mathbb{R} \right\}$  be a function from  $\mathbb{R}$  into  $\mathbb{R}$ . Determine the range of  $f$ .

**Q.13.** The function  $f$  is defined by :  $f(x) = \begin{cases} 1-x, & x \leq 0 \\ 1, & x = 0 \\ x+1, & x > 0 \end{cases}$  Draw the graph of  $f(x)$ .

**Q. 14.** Find the domain and range of;  $f(x) = \lfloor x \rfloor$ .

**Q. 15.** Draw graph of following functions:

(i)  $f(x) = \frac{1}{x}$

(ii)  $f(x) = x - [x]$

(iii)  $f(x) = \frac{1}{x^2} + x - 3$

(iv)  $f(x) = \begin{cases} 1, & \text{if } x \leq 0 \\ x^2 + 1, & \text{if } 0 < x < 2 \end{cases}$

(v) if;  $x \in [2, 5]$   $f(x) = \begin{cases} 3-x, & \text{if } x > 1 \end{cases}$

(vi) 1, if  $x = 1$

(vii)  $2x$ , if  $x < 1$

**Q.16.** Determine the domain and range of the relation  $R$  defined by  $R = \{(x, x+5) : x \in \{0, 1, 2, 3, 4, 5\}\}$ .

**Q.17.** Let  $f(x) = x^2$  and  $g(x) = 2x + 1$  be two real functions. Find  $(f \circ g)(x)$  and  $(g \circ f)(x)$ .

**Q.18.** Let  $f, g : \mathbb{R} \rightarrow \mathbb{R}$  be defined, respectively by  $f(x) = x + 1, g(x) = 2x - 3$ . Find  $f + g$ .

**Q.19.** If  $f(x) = [x]$  and  $g(x) = |x|$ ; where  $[x]$  is the greatest integer function and  $|x|$  is the modulus function then find:  $\left( f \circ g \right) \left( \frac{7}{2} \right) - g \circ f \left( \frac{-7}{2} \right)$ .

**Q.20.** Let  $f = \{(1, 2); (3, 4); (-5, 6) (0, 2)\}$  be a linear function from  $\mathbb{Z}$  into  $\mathbb{Z}$ . Find  $f(x)$ .

**Q.21.** Let  $f = \{(1,1), (2,3), (0,-1), (-1, -3)\}$  be a function from  $\mathbb{Z}$  to  $\mathbb{Z}$  defined by:  $f(x) = ax + b$ , for some integers  $a, b$ . Determine  $a, b$ .

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