

QB365 Question Bank Software Study Materials

Sets, Relations and Functions 50 Important 1 Marks Questions With Answers (Book Back and Creative)

11th Standard

Maths

Total Marks : 50

Multiple Choice Question

50 x 1 = 50

- 1) The number of constant functions from a set containing m elements to a set containing n elements is
 (a) mn (b) m **(c) n** (d) $m+n$
- 2) The function $f: [0, 2\pi] \rightarrow [-1, 1]$ defined by $f(x) = \sin x$ is
 (a) one-to-one **(b) on to** (c) bijection (d) cannot be defined
- 3) If the function $f: [-3, 3] \rightarrow S$ defined by $f(x) = x^2$ is onto, then S is
 (a) $[-9, 9]$ (b) \mathbb{R} (c) $[-3, 3]$ **(d) $[0, 9]$**
- 4) Let $X = \{1, 2, 3, 4\}$, $Y = \{a, b, c, d\}$ and $f = \{(1, a), (4, b), (2, c), (3, d), (2, d)\}$. Then f is
 (a) an one-to-one function (b) an onto function (c) a function which is not one-to-one **(d) not a function**
- 5) The inverse of $f(x) = \begin{cases} x & \text{if } x < 1 \\ x^2 & \text{if } 1 \leq x \leq 4 \\ 8\sqrt{x} & \text{if } x > 4 \end{cases}$ is
(a) $f^{-1}(x) = \begin{cases} x & \text{if } x < 1 \\ \sqrt{x} & \text{if } 1 \leq x \leq 16 \\ \frac{x^2}{64} & \text{if } x > 16 \end{cases}$ (b) $f^{-1}(x) = \begin{cases} -x & \text{if } x < 1 \\ \sqrt{x} & \text{if } 1 \leq x \leq 16 \\ \frac{x^2}{64} & \text{if } x > 16 \end{cases}$
 (c) $f^{-1}(x) = \begin{cases} x^2 & \text{if } x < 1 \\ \sqrt{x} & \text{if } 1 \leq x \leq 16 \\ \frac{x^2}{64} & \text{if } x > 16 \end{cases}$ (d) $f^{-1}(x) = \begin{cases} 2x & \text{if } x < 1 \\ \sqrt{x} & \text{if } 1 \leq x \leq 16 \\ \frac{x^2}{8} & \text{if } x > 16 \end{cases}$
- 6) Let $f: \mathbb{R} \rightarrow \mathbb{R}$ be defined by $f(x) = 1 - |x|$. Then the range of f is
 (a) \mathbb{R} (b) $(1, \infty)$ (c) $(-1, \infty)$ **(d) $(-\infty, 1]$**
- 7) The function $f: \mathbb{R} \rightarrow \mathbb{R}$ be defined by $f(x) = \sin x + \cos x$ is
 (a) an odd function **(b) neither an odd function nor an even function** (c) an even function
 (d) both odd function and even function
- 8) The function $f: \mathbb{R} \rightarrow \mathbb{R}$ is defined by $f(x) = \frac{(x^2 + \cos x)(1 + x^4)}{(x - \sin x)(2x - x^3)} + e^{-|x|}$ is
 (a) an odd function (b) neither an odd function nor an even function **(c) an even function**
 (d) both odd function and even function.
- 9) If $A = \{(x, y) : y = e^x, x \in \mathbb{R}\}$ and $B = \{(x, y) : y = e^{-x}, x \in \mathbb{R}\}$ then $n(A \cap B)$ is
 (a) Infinity (b) 0 **(c) 1** (d) 2
- 10) If $A = \{(x, y) : y = \sin x, x \in \mathbb{R}\}$ and $B = \{(x, y) : y = \cos x, x \in \mathbb{R}\}$ then $A \cap B$ contains
 (a) no element **(b) infinitely many elements** (c) only one element (d) cannot be determined
- 11) The relation R defined on a set $A = \{0, -1, 1, 2\}$ by xRy if $|x^2 + y^2| \leq 2$, then which one of the following is true?
 (a) $R = \{(0, 0), (0, -1), (0, 1), (-1, 0), (-1, 1), (1, 2), (1, 0)\}$ (b) $R^{-1} = \{(0, 0), (0, -1), (0, 1), (-1, 0), (1, 0)\}$
 (c) Domain of R is $\{0, -1, 1, 2\}$ **(d) Range of R is $\{0, -1, 1\}$**

12) If $f(x) = |x - 2| + |x + 2|$, $x \in \mathbb{R}$, then

(a) $f(x) = \begin{cases} -2x & \text{if } x \in (-\infty, -2] \\ 4 & \text{if } x \in (-2, 2] \\ 2x & \text{if } x \in (2, \infty) \end{cases}$ (b) $f(x) = \begin{cases} 2x & \text{if } x \in (-\infty, -2] \\ 4x & \text{if } x \in (-2, 2] \\ -2x & \text{if } x \in (2, \infty) \end{cases}$ (c) $f(x) = \begin{cases} -2x & \text{if } x \in (-\infty, -2] \\ -4x & \text{if } x \in (-2, 2] \\ 2x & \text{if } x \in (2, \infty) \end{cases}$

(d) $f(x) = \begin{cases} -2x & \text{if } x \in (-\infty, -2] \\ 2x & \text{if } x \in (-2, 2] \\ 2x & \text{if } x \in (2, \infty) \end{cases}$

13) Let R be the set of all real numbers. Consider the following subsets of the plane $\mathbb{R} \times \mathbb{R}$: $S = \{(x, y) : y = x + 1 \text{ and } 0 < x < 2\}$ and $T = \{(x, y) : x - y \text{ is an integer}\}$ Then which of the following is true?

- (a) **T is an equivalence relation but S is not an equivalence relation** (b) Neither S nor T is an equivalence relation
 (c) Both S and T are equivalence relation (d) S is an equivalence relation but T is not an equivalence relation.

14) Let A and B be subsets of the universal set N, the set of natural numbers. Then $A \cup [(A \cap B) \cup B^c]$ is

- (a) A (b) A^c (c) B (d) **N**

15) The number of students who take both the subjects Mathematics and Chemistry is 70. This represents 10% of the enrollment in Mathematics and 14% of the enrollment in Chemistry. The number of students take at least one of these two subjects, is

- (a) 1120 (b) **1130** (c) 1100 (d) insufficient data

16) If $n((A \times B) \cap (A \times C)) = 8$ and $n(B \cap C) = 2$, then $n(A)$ is

- (a) 6 (b) **4** (c) 8 (d) 16

17) If $n(A) = 2$ and $n(B \cup C) = 3$, then $n[(A \times B) \cup (A \times C)]$ is

- (a) 2^3 (b) 3^2 (c) **6** (d) 5

18) If two sets A and B have 17 elements in common, then the number of elements common to the set $A \times B$ and $B \times A$ is

- (a) 2^{17} (b) **17^2** (c) 34 (d) insufficient data

19) For non-empty sets A and B, if $A \subset B$ then $(A \times B) \cap (B \times A)$ is equal to

- (a) $A \cap B$ (b) **$A \times A$** (c) $B \times B$ (d) none of these.

20) The number of relations on a set containing 3 elements is

- (a) 9 (b) 81 (c) **512** (d) 1024

21) Let R be the universal relation on a set X with more than one element. Then R is

- (a) not reflexive (b) not symmetric (c) **transitive** (d) none of the above

22) Let $X = \{1, 2, 3, 4\}$ and $R = \{(1, 1), (1, 2), (1, 3), (2, 2), (3, 3), (2, 1), (3, 1), (1, 4), (4, 1)\}$. Then R is

- (a) reflexive (b) **symmetric** (c) transitive (d) equivalence

23) The range of the function $\frac{1}{1-2\sin x}$ is

- (a) $(-\infty, -1) \cup (\frac{1}{3}, \infty)$ (b) $(-1, \frac{1}{3})$ (c) $[-1, \frac{1}{3}]$ (d) **$(-\infty, -1] \cup [\frac{1}{3}, \infty)$**

24) The range of the function $f(x) = |[x] - x|$, $x \in \mathbb{R}$ is

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

25) The rule $f(x) = x^2$ is a bijection if the domain and the co-domain are given by

- (a) \mathbb{R}, \mathbb{R} (b) $\mathbb{R}, (0, \infty)$ (c) $(0, \infty), \mathbb{R}$ (d) **$[0, \infty), [0, \infty)$**

26) The shaded region in the adjoining diagram represents.



- (a) $A \setminus B$ (b) A^c (c) B^c (d) **$B \setminus A$**

- 27) For real numbers x and y , define xRy if $x - y + \sqrt{2}$ is an irrational number. Then the relation R is _____
(a) reflexive (b) symmetric (c) transitive (d) none of these
- 28) Let R be the relation over the set of all straight lines in a plane such that $l_1 R l_2 \Leftrightarrow l_1 \perp l_2$. Then R is _____
(a) symmetric (b) reflexive (c) transitive (d) an equivalent relation
- 29) Which of the following is not an equivalence relation on z ?
 (a) $aRb \Leftrightarrow a+b$ is an even integer (b) $aRb \Leftrightarrow a-b$ is an even integer **(c) $aRb \Leftrightarrow a$** (d) $aRb \Leftrightarrow a=b$
- 30) If $f: \mathbb{R} \rightarrow \mathbb{R}$ is given by $f(x) = 3x - 5$, then $f^{-1}(x)$ is _____
 (a) $\frac{1}{3x-5}$ **(b) $\frac{x+5}{3}$** (c) does not exist since f is not one-one (d) does not exist since f is not onto
- 31) If $f(x) = 2x - 3$ and $g(x) = x^2 + x - 2$ then $g \circ f(x)$ is _____
(a) $2(2x^2 - 5x + 2)$ (b) $(2x^2 - 5x - 2)$ (c) $2(2x^2 + 5x + 2)$ (d) $2x^2 + 5x - 2$
- 32) Let $f: \mathbb{R} \rightarrow \mathbb{R}$ be given by $f(x) = x + \sqrt{x^2}$ is _____
 (a) injective (b) Surjective (c) bijective **(d) none of these**
- 33) The number of relations from a set containing 4 elements to a set containing 3 elements is:
 (a) 2^{16} (b) 2^5 (c) 2^7 **(d) 2^{12}**
- 34) Which of the following functions is an even function?
 (a) $f(x) = \frac{2^x + 2^{-x}}{2^x - 2^{-x}}$ (b) $f(x) = \frac{3^x + 1}{3^x - 1}$ **(c) $f(x) = \frac{x \cdot 3^x - 1}{3^x + 1}$** (d) $f(x) = \log(x + \sqrt{x^2 + 1})$
- 35) The domain of the function $f(x) = \sqrt{\log_{10} \frac{3-x}{x}}$ is
 (a) $(0, \frac{3}{2})$ (b) $(0, 3)$ (c) $(-\infty, \frac{3}{2}]$ **(d) $(0, \frac{3}{2}]$**
- 36) The range of the function is $f(x) = \sqrt{3x^2 - 4x + 5}$ is _____
 (a) $(-\infty, \sqrt{\frac{11}{3}})$ (b) $(-\infty, -\sqrt{\frac{11}{3}})$ **(c) $(\sqrt{\frac{11}{3}}, -\infty)$** (d) none
- 37) The function $f(x) = \log(x + \sqrt{x^2 + 1})$ is _____
 (a) an even function **(b) an odd function** (c) a periodic function (d) neither an even nor an odd function
- 38) Let f and g be two odd functions then the function of $f \circ g$ is _____
 (a) an even function **(b) an odd function** (c) neither even nor odd (d) a periodic function
- 39) If $f(x) = \frac{1-x}{1+x}, x \neq 0$ then $f[f(x)] + f[f(\frac{1}{x})]$
 (a) < 2 **(b) ≥ 2** (c) > 2 (d) None
- 40) If $f(x) = \frac{1-x}{1+x}, (x \neq 0)$ then $f^{-1}(x) =$
(a) $f(x)$ (b) $\frac{1}{f(x)}$ (c) $-f(x)$ (d) $-\frac{1}{f(x)}$
- 41) For any four sets A, B, C and D , which of the following is not true?
(a) $A \times C \subseteq B \times D$ (b) $(A \times B) \cap (C \times D) = (A \cap C) \times (B \cap D)$ (c) $A \times (B \cup C) = (A \times B) \cup (A \times C)$
 (d) $A \times (B \cap C) = (A \times B) \cap (A \times C)$
- 42) The domain and range of the function $f(x) = \frac{|x-4|}{x-4}$
 (a) $\mathbb{R}, [-1, 1]$ **(b) $\mathbb{R} \setminus \{4\}; \{-1, 1\}$** (c) $\mathbb{R} \setminus \{4\}; \{-1, 1\}$ (d) $\mathbb{R}, (-1, 1)$
- 43) Match List - I with List II

LIST I	LIST II
i $\{(1, 1), (2, 2), (3, 3)\}$	a equivalence

LIST I	LIST II
ii {(1, 2), (2, 1), (2, 3), (3, 2)}	b transitive
iii {(1, 2), (2, 3), (1, 3)}	c Symmetric
iv {(1, 1), (2, 2), (3, 3), (1, 2), (2, 1), (2, 3), (1, 3)}	d reflexive

The Correct match is

(a)	(b)	(c)	(d)
i i i i i v a b c d	i i i i i v c d b a	i i i i i v d c b a	i i i i i v b a b c

- 44) Let $A = \{1, 2\}$ and $B = \{3, 4\}$. Find the number of relations from A to B _____
 (a) 2^2 **(b) 2^4** (c) 2^{16} (d) 2^8
- 45) If $f = \{(1, 1), (2, 3), (0, -1), (-1, -3)\}$ be a linear function from Z into Z then $f(x)$ _____
 (a) $2x + 1$ (b) $3x + 2$ **(c) $2x - 1$** (d) $2x$
- 46) If $f: [-2, 2] \rightarrow \mathbf{A}$ is given by $f(x) = 3x^3$ then f is into if \mathbf{A} is _____
 (a) $[3, 3]$ (b) $(3, 3)$ **(c) $[-24, -24]$** (d) $(-24, -24)$
- 47) The natural domain of the function $y = \sqrt{9 - x^2}$ is _____
(a) $-3 \leq x \leq 3$ (b) $\setminus(-3)$ (c) $\setminus(0)$ (d) $(-\infty, -3) \cup (3, \infty)$
- 48) $n(A \cap B) = 4$ and $n(A \cup B) = 11$ then $n[P(\mathbf{A} \Delta \mathbf{B})]$ is _____
 (a) 44 (b) 256 (c) 64 **(d) 128**
- 49) $f: \mathbf{R} \rightarrow \mathbf{R}$ is defined by $f(x) = |x| - 5$ then the range of f is _____
 (a) $(-\infty, -5)$ (b) $(-\infty, 5)$ **(c) $[-5, \infty)$** (d) $(-5, \infty)$
- 50) If $n(A) = 1$, then it is called a _____
(a) Empty Set (b) Singleton Set (c) Equal Set (d) Subset