Mathematics-10
Unit 5 – Review Exercise 5

Q.1 Multiple choice questions

Four possible answers are given for the following questions. Tick (✓) the correct answer.

(1) A collection of well-defined distinct objects is called; **(K.B)**

(a) Subset **(b)** Power set
(c) Set **(d)** None of these

(2) A set $Q = \left\{ \frac{a}{b} \mid a, b \in Z \wedge b \neq 0 \right\}$ **is called a set of;** **(K.B)**

(a) Whole numbers **(b)** Natural numbers
(c) Irrational numbers **(d)** Rational numbers

(3) The different number of ways to describe a set are; **(K.B)**

(a) 1 **(b)** 2
(c) 3 **(d)** 4

(4) A set with no element is called; **(K.B)**

(a) Subset **(b)** Empty set
(c) Singleton set **(d)** Super set

(5) The set $\{x \mid x \in W \wedge x \leq 101\}$ **is;** **(K.B)**

(a) Infinite set **(b)** Subset
(c) Null set **(d)** Finite set

(6) The set having only one element is called; **(K.B)**

(a) Null set **(b)** Power set
(c) Singleton set **(d)** Subset

(7) Power set of an empty set is; **(K.B)**

(a) ϕ **(b)** $\{a\}$
(c) $\{\phi, \{a\}\}$ **(d)** $\{\phi\}$

(8) The number of elements in power set $\{1, 2, 3\}$ **is;** **(K.B)**

(a) 4 **(b)** 6
(c) 8 **(d)** 9

(9) If $A \subseteq B$**, then** $A \cup B$ **is equal to;** **(K.B)**

(a) A **(b)** B
(c) ϕ **(d)** None of these

(10) If $A \subseteq B$ **and** $A \cap B$ **is equal to;** **(K.B)**

(a) A **(b)** B
(c) ϕ **(d)** None of these

(11) If $A \subseteq B$ **and** $A - B$ **is equal to;** **(K.B)**

(a) A **(b)** B
(c) ϕ **(d)** B-A

(12) $(A\cup B)\cup C$ **is equal to;** **(K.B)**

(a) $A\cap(B\cup C)$ **(b)** $(A\cup B)\cap C$

(c) $A\cup(B\cup C)$ **(d)** $A\cap(B\cap C)$

(13) $A\cup(B\cap C)$ **is equal to;** **(K.B)**

(a) $(A\cup B)\cap(A\cup B)$ **(b)** $(A\cup B)\cap C$

(c) $(A\cap B)\cup(A\cap C)$ **(d)** $A\cap(B\cap C)$

(14) **If** A **and** B **are disjoint sets, then** $A\cup B$ **is equal to;** **(K.B)**

(a) A **(b)** B

(c) ϕ **(d)** $B\cup A$

(15) **If number of elements in set** A **is** 3 **and in set** B **is** 4**, then number of elements in** $A\times B$ **is;** **(K.B)**

(a) 3 **(b)** 4

(c) 12 **(d)** 7

(16) **If number of elements in set** A **is** 3 **and in set** B **is** 2**, then number of binary relations in** $A\times B$ **is;** **(K.B)**

(a) 2^3 **(b)** 2^6

(c) 2^8 **(d)** 2^2

(17) **The domain of** $R=\{(0,2),(2,3),(3,3),(3,4)\}$ **is;** **(K.B)**

(a) $\{0,3,4\}$ **(b)** $\{0,2,3\}$

(c) $\{0,2,4\}$ **(d)** $\{2,3,4\}$

(18) **The range of** $R=\{(1,3),(2,2),(3,1),(4,4)\}$ **is;** **(K.B)**

(a) $\{1,2,4\}$ **(b)** $\{3,2,4\}$

(c) $\{1,2,3,4\}$ **(d)** $\{1,3,4\}$

(19) **point** $(-1,4)$ **lies in the quadrant;** **(K.B)**

(a) I **(b)** II

(c) III **(d)** IV

(20) **the relation** $\{(1,2),(2,3),(3,3),(3,4)\}$ **is;** **(K.B)**

(a) Onto function **(b)** Into function

(c) Not a function **(d)** One-One function

ANSWER KEY

i	c	vi	c	xi	c	xvi	b
ii	d	vii	d	xii	c	xvii	b
iii	c	viii	c	xiii	a	xviii	c
iv	b	ix	b	xiv	d	xix	b
v	d	x	a	xv	c	xx	c

Q.2 Write short answers of the following questions.

(i) Define a subset and give one example. **(K.B + U.B)**

Answer

Subset

If A and B are two sets such that every element of set A is an element of set B, then set A is called subset of set B.

For example $A=\{1,3,5,7\}$ and $B=\{1,2,3,...,10\}$ then A is subset of B and represented by $A\subseteq B$.

(ii) Write all the subsets of the set {a, b}

Answer

Let $S=\{a,b\}$

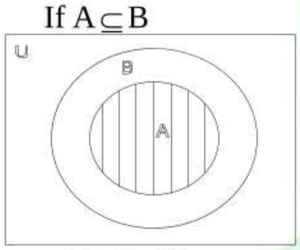
All possible subset of set S are:

$\phi, \{a\}, \{b\}, \{a,b\}$

(iii) Show $A\cap B$ by Venn diagram. When $A\subseteq B$. **(MTN 2014, SGD 2016)** **(K.B)**

Answer

If $A\subseteq B$

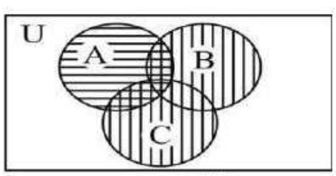


$A\cap B$ ▥

(iv) Show by Venn diagram $A\cap(B\cup C)$ **(K.B + A.B)**

Answer

Let A, B and C are overlapping (General Case)



A ≡, ⋕

$B\cup C$ |||, ⋕

$A\cap(B\cup C)$ ⋕

(v) Define intersection of two sets **(K.B)**

Answer

Intersection of Two Sets **(K.B)**

The intersection of two sets A and B, written as $A\cap B$ (read as 'A intersection B') is the set consisting of all the common elements of A and B. Thus

$A\cap B=\{x \mid x\in A \text{ and } x\in B\}$.

Clearly $x\in A\cap B \Rightarrow x\in A \text{ and } x\in B$

For example, if $A=\{a,b,c,d\}$ and $B=\{c,d,e,f\}$, then $A\cap B=\{c,d\}$

(vi) Define a function

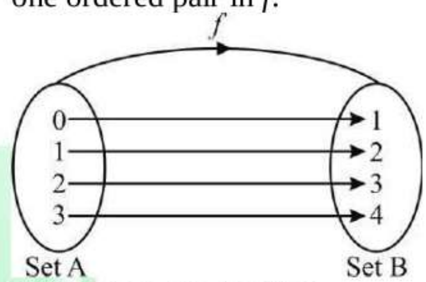
Answer

Function **(K.B)**

Suppose A and B are two non-empty sets, then relation $f: A\rightarrow B$ is called a function if

(i) Dom $f=A$

(ii) Every $x\in A$ appears in one and only one ordered pair in f.



(vii) Define one-one function

Answer

One – One Function **(K.B)**

A function $f: A\rightarrow B$ is called one-one function if all distinct elements of A have distinct images in B, i.e., $f(x_1)=f(x_2)$ $\Rightarrow x_1=x_2\in A$ or $x_1\neq x_2\in A$ $\forall x_1\in A$ $\Rightarrow f(x_1)\neq f(x_2)$.

For example, if $A=\{0,1,2,3\}$ and $B=\{1,2,3,4,5\}$, then we define a function $f: A\rightarrow B$ such that

$f=\{(0,1),(1,2),(2,3),(3,4)\}$

f is one-one function because no element in B is repeated.

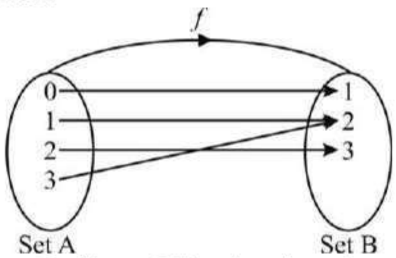
(viii) Define an Onto function or Surjective function.

Answer

Onto (Surjective) Function **(K.B)**

A function $f: A\rightarrow B$ is called an onto function, if every element of set B is an image of at least one element of set A i.e., Range of $f=B$.

For example, if $A=\{0,1,2,3\}$ and $B=\{1,2,3\}$, then $f:A\to B$ such that $f=\{(0,1),(1,2),(2,3),(3,2)\}$. Here Range $f=\{1,2,3\}=B$. Thus f so defined is an onto function.



(ix) Define a Bijective function

Answer

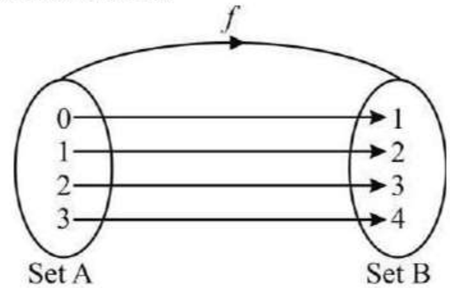
Bijective Function **(K.B)**

A function $f:A\to B$ is called bijective function iff function f is one-one and onto.

For example, if $A=\{0,1,2,3\}$ and $B=\{1,2,3,4\}$

Then $f=\{(0,1),(1,2),(2,3),(3,4)\}$

Evidently this function is one-one because distinct elements of A have distinct images in B. This is an onto function also because every element of B is the image of at least one element of A.



(x) Write De Morgan's Laws. **(K.B)**

Answer

De Morgan's Laws

For any two sets A and B belonging to universal set U,

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

(ii) $(A\cup B)'=A'\cap B'$ are called De Morgan's laws.

Q.3 Fill in the blanks

(i) If $A\subseteq B$, then $A\cup B=$_____. **(K.B + A.B)**

(ii) If $A\cap B=\phi$ then A and B are ___. **(K.B + A.B)**

(iii) If $A\subseteq B$ and $B\subseteq A$ then ____. **(K.B + A.B)**

(iv) $A\cap(B\cup C)=$______. **(K.B + A.B)**

(v) $A\cup(B\cap C)=$_____. **(K.B + A.B)**

(vi) The complement of U is ______. **(K.B + A.B)**

(vii) The complement of ϕ is _______. **(K.B + A.B)**

(viii) $A\cap A^c=$___________. **(K.B + A.B)**

(ix) $A\cup A^c=$___________. **(K.B + A.B)**

(x) The set $\{x\,|\,x\in A \text{ and } x\notin B\}=$ ____. **(K.B + A.B)**

(xi) The point $(-5,-7)$ lies in_____ quadrant. **(K.B + A.B)**

(xii) The point $(4,-6)$ lies in _______ quadrant. **(K.B + A.B)**

(xiii) The y co-ordinate of every point is ______ on-*x-axis*. **(K.B + A.B)**

(xiv) The x co-ordinate of every point is _____ on-*y-axis*. **(K.B + A.B)**

(xv) The domain of $\{(a,b),(b,c),(c,d)\}$ is ______. **(K.B + A.B)**

(xvi) The range of $\{(a,a),(b,b),(c,c)\}$ is _____. **(K.B + A.B)**

(xvii) Venn-diagram was first used by ___. **(K.B + A.B)**

(xviii) A subset of $A \times A$ is called the ___________ in A. **(K.B + A.B)**

(xix) If $f : A \to B$ and range of $f = B$, then f is an __________ function. **(K.B + A.B)**

(xx) The relation $\{(a,b),(b,c),(a,d)\}$ is _________a function. **(K.B + A.B)**

ANSWER KEY

(i) B
(ii) Disjoint sets
(iii) $A = B$
(iv) $(A \cap B) \cup (A \cap C)$
(v) $(A \cup B) \cap (A \cup C)$
(vi) ϕ
(vii) U
(viii) ϕ
(ix) U
(x) $A - B$
(xi) III^{rd} quadrant
(xii) IV^{th} quadrant
(xiii) Zero
(xiv) Zero
(xv) $\{a,b,c\}$
(xvi) $\{a,b,c\}$
(xvii) John Venn
(xviii) Binary relation
(xix) Onto
(xx) Not