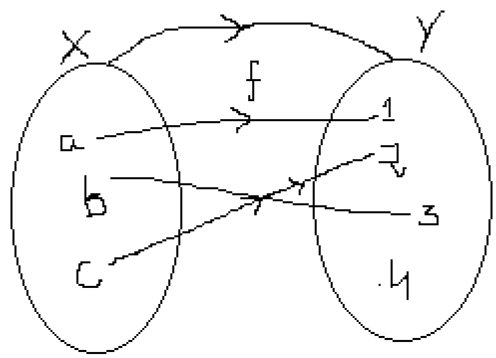
UNIT - II

(FUNCTIONS)

ONE MARKS QUESTION

1. If f : *Let* $f : N \rightarrow N$ *and* $g : N \rightarrow N$ *defined as* $f(x) = x + 1$ *and* $g(x)$ $R \rightarrow R$ is defined as $f(x) = x^2 + 1$, find $f(-2)$. 1
2. Give an example of one-one function. 1
3. Write the condition for a function $f : R \rightarrow Y$ to be injective. 1
4. Whether the function Shown in diagram in onto of not. 1



5. Let * be a binary operation on R defined as $a * b = a - b$. Determine whether * is cumulative of not. 1
6. Let $f = \{(1, 4), (2, 5), (3, 7)\}$, find f^{-1}. 1
7. Let $f : R - R$ is defined as $f(x) = x^2$, then find Range of f. 1
8. If $f(x) = 8x$ and $g(x) = x$ then find g of (x). 1
9. If $f(x) = |x|$, $|x| R$, find $f(-2)$. 1
10. Let $A = \{1, 2, 3, 4\}$ and $f = \{(1,4), (2,1), (3,3), (4,2)\}$ then write down f of (2) 1
11. If $f : R \rightarrow R$ be defined by $f(x) = \begin{cases} 2x + 3, \text{ when } x < 2 \\ x^2 - 2, \text{ when } 2 \leq x < 3 \end{cases}$ 1

    Find $f(2)$
12. It f is identity function and $f(x) = 5$ then find x. 1
13. Let * be a binary operation defined by a * b = 2a+b the find 3* 4 1
14. Write the necessary and sufficient condition for a function $f : X \rightarrow Y$ to be invertible. 1
15. Let $f = \{(1,1), (1,2), (2,4), (2,5)\}$. Whether it is a function or not. 1

16. Let $f(x)=\frac{1}{x}, x\neq 0$ then find *f* of (2) 1

17. Let $f=\{(1,2),(3,5),(4,1)\}$ *and* $g=\{(1,3),(2,3),(5,1)\}$ then find *g* of (3) 1

18. Let *f (x) = [x],* greatest integral function, find *f (-2.1)* 1

19. Whether *: $R\times R\to R$ given *a * b = a + 2b* is associative or not. 1

20. Let $f=\{(1,3),(2,3),(3,5)\}$. Find f^{-1} if exists. 1

21. If $f(x)=\sqrt{x+1}$, *x* Є*R+* find *f (3).* When *f*: $R^{+}\to R^{+}$ 1

FUNCTIONS

SIX MARKS QUESTION

1. Show that function $f: R\to\{x\,\varepsilon\, R:-1<x<1\}$ defined by $f(x)=\frac{x}{1+|x|}$; $x\,\varepsilon\, R$ is one-one and on to. 6

2. Set $f:R\to R\, and\ g:R\to R\, are\ defind\ as\ f(x)=x+|x+1|\, and\ g(x)=x+1+|x|$ find *(fog) (x)* and *(g of) (x)* 6

3. If $f:[-2,2]\to[2,2]\, defined\ as\ f(x)=\sqrt{4-x^2}$ show that *f* is injective. Also find f^{1} 6

4. Let $f(x)=2x+3\, and\ g(x)=[x]$ find 6

   (i) f og (ii) g of (iii) f of (iv) fog(3/2) (v) g of (-5/3) (vi) f of (o)

5. $Show\ that\ if\ f:R-\left\{\frac{7}{5}\right\}\to R-\left\{\frac{3}{5}\right\} is\ defined\ by\ f(x)=\frac{3x+4}{5x-7} and\ g:R-\left\{\frac{3}{5}\right\}\to R-\left\{\frac{7}{5}\right\}$ 6

   $is\ defined\ by\ g(x)=\frac{7x+4}{5x-3} then\ fog=I_A\ and\ gof=I_B\ where\ A=R-\left\{\frac{2}{5}\right\}:I_A(x)=x,$

   $\forall\, x\,\varepsilon A.I_B(x)=x,\forall\, x\,\varepsilon\, B\ are\ caused\ idendity\ functions\ on\ Sets\ A\ and\ B\ respective; y$

   $Also\ find\ fog\left(\frac{7}{5}\right) and\ gof\left(\frac{3}{5}\right)$

6. If $f:N\to R$ be a function defined as *f(x) = 4x2+12x+15* show that $f:N\to S$, Where *S* is the range of *f* is invertible. Find the inverse of *f*. 6

7. $If\ f:w\to w:f(x)=\begin{Bmatrix} x-1 & when\, x\, is\, odd \\ x+1 & when\, x\, is\, even\end{Bmatrix} Show\ that\ f\ is\ one-one\, and\, onto.\, find\ f^{-1}$ 6

8. $If\ f:\left[\frac{-\pi}{2},\frac{\pi}{2}\right]\to[-1,1]\, defined\ by\ f(x)=\sin x$ 6

   $and\ g:[0,\pi]\to[-1,1]\, defined\ by\ g(x)=\cos x$

   $Show\ that\ fog\ is\, invertible\ but\ f+g\ is\ not$

9. $Let\ f : N \to N\ and\ g : N \to N\ defined\ as\ f(x) = x+1\ and\ g(x)\begin{cases} x-1\ if\ x>1 \\ 1\quad if\ x=1 \end{cases}$ 6

Show that *fog* is onto but *f* is not onto

10. Given a non-empty set *x*, consider the binary operation $*: P(x) x P(x) \to P(x)$. Given by $A * B = A \cap B\ \forall A, B$ in *P(x)* . Where *P(x)* is the power Set of *x* .Show that *x* is the identity element for this operation and *x* is the only invertible element in *P(x)* w.r.t.o the operation * 6

11. $Define\ a\ binary\ operation\ *\ on\ the\ set \{0,1,2,3,4,5\} as\ a \times b = \begin{cases} a+b, & if\ a+b<6 \\ a+b-6 & if\ a+b \ge 6 \end{cases}$ 6

Show that Zero is the identity for this operation and each element $a \neq 0$ of the set is invertible with 6-a being the inverse of a.

FUNCTIONS

FOUR MARKS QUESTION 2

1. Set *A={1, 2, 3}*, *B={4, 5, 6, 7}* and set *f = {(1,4), (2, 5), (3, 6)}* be a function from *A* to *B* show that *f* is one-one. But not onto 1+2+1

2. $If\ f(x) = \frac{4x+3}{6x-4} : x \neq \frac{2}{3}$ 2+2

Show that *fof (x) = x*, (Identity function) $\forall x \neq \frac{2}{3}$ find the inverse of *f* ?

3. Set $Y = \{n^2 : n \in N\} \subset N . Consider\ f : N \to Y\ as\ f(n) = n^2$. Show that *f* is invertible. Find the inverse of *f.* 2+2

4. If $f : x \to Y\ and\ g : Y \to Z$ be two invertible function. Then *gof* is also invertible with $(gof)^{-1} = f^{1} o g^{-1}$ 2+2

5. Find gof and fog, if 2+2

(i) $f(x) = |x|\ and\ g(x) = \left(\frac{5x-2}{3}\right)$

6. Find g of and fog, if 2+2

$f(x) = 8x^3\ and\ g(x) = x^{1/3}$

7. Consider $f : R \to R$ given by *f(x) = 4x+3*. Show that *f* is invertible. Find the inverse of *f.* 2+2

8. Consider $f : \{1,2,3\} \to \{a,b,c\}$ given by *f(1) = a, f(2) = b* and *f(3) = c*. Find f^{-1} and show that $(f^{-1})^{-1} = f$ 2+2

9. If *f, g* and *h* be functions from *R* to *R* 2+2

(i) *(f+g)o h = f oh + g oh*

(ii) *(f. g)o h = (f oh). (g oh)*

10. Show that if $f : A \to B$ *and* $g : B \to C$ are one-one-onto then $gof : A \to C$ is also one-one-onto 1+2+1

11. Prove that the function $f : R \to R$ defined as $f(x) = x^2$ is Neither one-one nor onto 2+2

12. Prove that an invertible function has a unique inverse. 2+2

13. If $f : A \to B$ is an invertible function, then prove that *f* is one-one onto 2+2

14. Set *A* and *B* be two non-empty Sets. 2+2

    Show that the function $f : (A \times B) \to B \times A : f(a,b) = (b,a)$ is *a* bijective function.

15. Find *fog* and *gof*, if $f : R \to R$ *and* $g : \mathrm{R} \to \mathrm{R}$ are given by $f(x) = \cos x$ *and* $g(x) = 3x^2$ **1+½+1½+1**

    Show that $fog \neq gof$

BINARY OPERATION

FOUR (4) MARKS QUESTION

16. Show that subtraction and division are not binary operations on N. 2+2

17. On the Set *N* of are natural numbers, a binary operation * defined as *m * n = 1cm (mn).* 2+2

    Show that * is commutative and also associative.

18. Set $A = NxN$ *and* * be the binary operation on A defined by **1+½+1½+1**

    *(a, b) * (c, d) = (a +c, b + d).*

    Show that * is commutative and associative. Find the identity element for * on *A*. If any.

end