INDIAN SCHOOL DARSAIT
DEPARTMENT OF MATHEMATICS

Subject : MATHEMATICS Topic : RELATIONS AND FUNCTIONS	**Date :26-3-2017**
Resource Person: Premela Isac	**Date of submission :3-4-2017**
Name of the Student: _________ Class & Division:	**Roll. Number:**

Sl.No.	Questions	Marks
1.	Show that the relation R on the set A = $\{1,2,3,4,5\}$ given by R = $\{(a,b); \|a-b\| is even\}$, is an equivalence relation.Show that all the elements of $\{1,3,5\}$ are related to each other and all the elements of $\{2,4\}$ are related to each other. But, no element of $\{1,3,5\}$is related to any element of $\{2,4\}$. (RD Sharma page No; 1.17)	6
2.	Show that the relation R on the set A = $\{x \in Z : 0 \le x \le 12\}$, given byR = $\{(a,b) : \|a-b\| is multiple of 4\}$ is an equivalence relation.Find the set of all elements related to 1. (RD Sharma page No;1.18)	4
3.	Prove that the relation R on the set N x N defined by(a, b) R (c, d) $\Leftrightarrow$ a + d = b + c for all (a, b), (c, d) $\in$ N x N is an equivalence relation. (RD Sharma page No; 1.1)	6
4.	Let $*$ be the binary operation on Z given by a $*$ b = a + b – 15. (i) Is $*$ commutative? (ii)) Is $*$ associative? (iii) Does the identity element exist? If yes find it. (iv) Are the elements of Z invertible? If so , find the inverse. (Board Qn:)	4
5.	Show that the function f:R $\rightarrow R$ is given by f(x)=x²+1 is not invertible. (Board Qn:)	1
6.	If $f(x)$=x + 7 , $g(x) = x - 7$, $x = R, f$ $(f \circ g)(7)$. (Board Qn:)	1
7.	If f, g : R$\rightarrow$R be two functions defined as f(x) = $\|x\|$ + x and g(x) = $\|x\|$ - x, $\forall x \in R$ .Then find $f_o g$ and $g_o f$. Hence find $f_o g$ (-3), $f_o g$ (5) and $g_o f$ (-2). (Board paper 2016)	6
8.	Let f : N $\rightarrow$R be a function defined as f (x) = $4x^2 + 12x + 15$. Show that f :N $\rightarrow$S, where S is the range of f, is invertible. Also find the inverse (Board paper 2015)	6
9.	Let f : N $\rightarrow$R be a function defined as f (x) = $4x^2 + 12x + 15$. Show that f :N $\rightarrow$S, where S is the range of f, is invertible. Also find the inverse and $f^{-1}(31)$, $f^{-1}(87)$. (Board paper 2016)	6
10.	Let $*$ be a binary operation on the set of all non-zero real numbers,given by a $* b$ = $\frac{ab}{5}$,for all a, b$\in R - \{0\}$.Find the value of x,given that $2 * (x * 5) = 10$. (Board paper 2014)	1
11.	Let $*$ be the binary operation on the set$\{0,1,2,3,4,5\}$ given by a $*$ b = a + b ; if a+b< 6 a + b-6 ; if a+b≥ 6 Show that zero is the identity for this operation and each element a of the set is invertible with 6-a being the inverse of a. (Board Qn:2011)	4
12.	If f : R$\rightarrow$R be given by f(x) = $x^2 + 2$, a g: R$\rightarrow$R b g b g(x) = $\frac{x}{x-1}$,x$\neq -1$.Then find $f_o g$ and $g_o f$. Hence find $f_o g$ (2), $f_o g$ (5) and $g_o f$ (-3). (Board paper 2014)	4

13.	Let A=R-{3} ,B=R-{1} .Let f : A-B be defined by $f(x)=\frac{x-2}{x-3}$, $\forall x \in A$ .Show that f is bijective.Also find (1) x,if $f^{-1}(x)=4$ (2) $f^{-1}(7)$. (Board paper 2017)	6
14.	Let A= R x R and let * be a binary operation on A defined by (a,b) * (c,d) = (ad + bc, bd) for all, (a,b), (c,d) $\in$ R x R. 1) Show that * is commutative on A 2) Show that * is associative on A 3) Find the identity element of * in A (Board paper 2017)	6
15.	Consider f: R $\rightarrow$ (-9, ∞) given by $f(x) = 5x^2 + 6x - 9$. Prove that f(x) is invertible with $f^{-1}(y) = \frac{\sqrt{54+5y}-3}{5}$	6

Dear Children,
There is no substitute for hard work.
All the best. God Bless.