**KIGALI CITY ON 20th, April, 2020**

**MINEDUC/KICUKIRO DISTRICT**

**E.S KANOMBE/EFOTEC**

**CLASS: S4 MPC, MCB, PCM & MEG**

**TEACHER: M.Pascal**

 **EXERCISES OF MATHEMATICS**

 **I. TRIGONOMETRY**

**1.**Convert **81013’08’’** to decimal degree and **2.9370** to **dom’s’**’ system

**2.** Simplify the following expressions:

a) $\frac{1}{tanθ}$(sin$θ+cosθtanθ$)

b) $\frac{ sin(90-α).cos(360-α).tanα}{\cos(\left(-α\right))\sin(\left(180-α\right))cos⁡(180+α)}$

c) tan (1800+a).sin(900+a).sec(900-a)

**3**.Prove the given identities:

a) sec4$α-tan$4$α$=sec2$α+tan$2$α$

b)(sin$ \frac{ x}{ 2}$ + cos $\frac{ x}{ 2}$)2 = 1+sinx

c)$ \frac{sin2A}{1-cos2A}$=cotA

4.An angle A is acute angle and sinA=$\frac{3}{5}$ . Angle B is obtuse angle and sinB=$\frac{4}{5}$

Find an eact expression for: a) sin( A+B)

 b) tan(A+B)

5. An aircraft flies 500km on a bearing of 100degrees and then 600km on a bearing of 160degrees. Find the distance and bearing of the finishing point from the starting point.

6.A ladder of length 8cm rests against a wall so that the angle between the ladder and the wall is 31 degrees. How far is the base of the ladder from the wall?

7. A tree is located on an incline of a hill. The tree is broken and the tip of the
tree touches the hill farther down the hill and forms an angle of 30° with the
hill. The broken part of the tree and the original tree form an angle of 50°
at the break. The original part of the tree is 3 m tall. How tall was the tree
before it broke?

 **II.MATHEMATICAL LOGIC**

1.State whether each of the following is a proposition ,Neither proposition nor a propositional function.

a) Do you want to go to the market?

b) The Earth is farther from the sun than Venus

c) Two is multiple of three

d) Clean up the room

e) Three is one of the factors of twenty

f) A$>4$

**2**.Write in symbolic form:

a) If I work heard, I will pass examination

b) A number is even if and only if it is divisible by two

c) If you go to the market you will need money or you won’t be able to buy anything

d) If it rains then he will not go to school

e) I f you have a job, then you have an income, and if you have an income, then you must pay taxes.

**3.** Use De Morgan’s law to write the negation of the following statements, simplifying so that only simple statements are negated;

a) Murerwa is not home or Iyakaremye is doing communal work.

b) If Nyirarukundo buys a banana, then Muragijimana buys an orange

c) $\~$p$\rightarrow (qvr)$

d)$∃x\in R :x+5>3$

**4.**Construct a circuit for each of the following statements:

a) (pvq)vr

b) p$Λ(qvr)$

c) (p$Λ$q)v(p$Λr)$

**5.**State whether the following statement is tautology or contradiction by using truth table: p$\leftrightarrow $ (qv$ \~$r)

 III .BINARY OPERATIONS

1.Operation T is defined in set $Z$ of the integer by xTy =2x+y2

a) Calculate 5T(3T2) and( 5T3)T2

b) Determine whether the operation is associative

**2**. Given that operation $⊥is defined$ on$ Z$ set integer by

x$⊥$y=xy+2 is the operation associative ? Prove it.

**3**.Let \* be a binary operation defined on $Z$ by a\*b=$\frac{a+b+ab}{2}$

a) Calculate i) 2\*3

 ii) (-2)\*(-6)

b) Prove whether it is associative

4. Given the set S={1,-1,i,-i} and the binary operation”•”,where i.i=-1,Construct a Cayley table for **(**S,**.)** determine whether or not the **(**S,**.)** is a commutative group.

**5.**Operation \* is defined in $R$ by x\*y=$\frac{xy}{2}$ . Show that ($R,\*)$ is abelian group.

 **IV. SET** $R$ **OF REAL NUMBERS**

1. Solve the following inequalities in $R$:
2. I 3x-9 I >4
3. I 6-3X I<12
4. 1<I X-4 I<3
5. I 2X+5 I $\leq 7$
6. 2<I X-6 I<5

 **GOOD LUCK!!!!!!!**