**DMI-ST.EUGENE UNIVERSITY, CHIBOMBO-ZAMBIA**

**SCHOOL OF SCIENCE AND HUMANITIES**

**Assignment I**

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| **Programme:** | BE. Cs, BS. Cs & B. Ed.  |
| **Semester :** | II |
| **Module Code:**  | 800MA202 |
| **Module Name:**  | MATHEMATICS-II |
| **Session :** | NOV 2020 |
| **Module Lecturer:** **HOD Name :** | Mr. FRANCK IRADUKUNDAMR. PAUL CHIUNDIRA |

**Question No – 1 (UNIT-I)**

1. What is meant by equivalence relation?
2. Define one-one function.
3. State the term composition function.
4. Define Bijective function.
5. Show that the function f : R → R, defined as f(x)= x2, is neither one-one nor onto.
6. Find *gof* and *fog*, if *f* :**R** $\rightarrow $**R** and *g* : **R** $\rightarrow $**R** are given by *f* (*x*) = cos *x* and *g*(*x*) = 3*x*2. Show that *gof* $\ne $*fog*.

**Question No – 2 (UNIT-I)**

* 1. Let $f:\left\{2,3,4,5\right\}⟶\left\{3,4,5,9\right\} and g:\left\{3,4,5,9\right\}⟶\left\{7,11,15\right\}$ be functions defined as $f\left(2\right)=3, f\left(3\right)=4, f\left(4\right)=f\left(5\right)=5$ and $g\left(3\right)=g\left(4\right)=7$ and $g\left(5\right)=g\left(9\right)=11.$ Find $g∘f.$
	2. Let S = {1, 2, 3}. Determine whether the functions *f* : S → S defined as below have inverses. Find *f* –1, if it exists.
* *f* = {(1, 1), (2, 2), (3, 3)}
* (b) *f* = {(1, 2), (2, 1), (3, 1)}
* (c) *f* = {(1, 3), (3, 2), (2, 1)}
	1. Determine weather of the following binary operation on the set R $ ,a\*b=\frac{a+b}{2} ∀ a,b\in R$ is:
1. Associative
2. Commutative.
	1. Consider *f* : **N** $⟶$ **N**, *g* : **N** $⟶$ **N** and *h* : **N** $⟶$ **R** defined as *f* (*x*) = 2*x*, *g*(*y*) = 3*y* + 4 and *h*(*z*) = sin *z*. *x*, *y* and *z* in N. Show that *ho*(*g*o*f* ) = (*h*o*g*)o*f.*
	2. . Solve the following linear programming problem by using graphical method.

Minimize Z = 200 *x* + 500 *y*

Subject to the constraints:

*x* + 2*y* ≥ 10

3*x* + 4*y* ≤ 24

X, Y ≥ 0

* 1. A dietician wishes to mix two types of foods in such a way that vitamin contents of the mixture contain at least 8 units of vitamin A and 10 units of vitamin C. Food ‘I’ contains 2 units/kg of vitamin A and 1 unit/kg of vitamin C. Food ‘II’ contains 1 unit/kg of vitamin A and 2 units/kg of vitamin C. It costs Rs 50 per kg to purchase Food ‘I’ and Rs 70 per kg to purchase Food ‘II’. Formulate this problem as a linear programming problem to minimize the cost of such a mixture.

**Question No – 3 (UNIT-II)**

1. Define a matrix with example.
2. If a matrix has 8 elements, what are the possible orders it can have?
3. 
4. Define equal matrices with example.
5. If $\left[\begin{array}{c}x+3 z+4 2y-7\\-6 a-1 0\\b-3 -21 0 \end{array}\right]=\left[\begin{array}{c}0 6 3y-2\\-6 -3 2c+2\\2b+4 -21 0\end{array}\right]$
6. Given that $A=\left(\begin{array}{c}\sqrt{3} 1 -1\\2 3 0 \end{array}\right) and B=\left(\begin{array}{c}2 \sqrt{5} 1\\-2 3 \frac{1}{2}\end{array}\right)$, find *A+B.*

**Question No – 4 (UNIT-II)**

1. Construct a 3 × 2 matrix whose elements are given by:

$$ a\_{ij}=\frac{1}{2}\left|i-3j\right|$$

1. 
2. If $A=\left[\begin{array}{c}8 0\\4 -2\\3 6 \end{array}\right] and B=\left[\begin{array}{c}2 -2\\4 2\\-5 1 \end{array}\right]$, then find the matrix X such that 2A+3X=5B.
3. Obtain the inverse of the following matrix using elementary operations, $A=\left[\begin{array}{c}0 1 2\\1 2 3\\3 1 1\end{array}\right]$.
4. 
5. 

**Question No – 5 (UNIT-III)**

1. When do we say that a function is continuous at a point c?
2. Define chain rule?
3. Differentiate the following w.r.t. *x*:

$$y=e^{\cos(x)}$$

1. State the Mean value theorem.
2. Discuss the continuity of the function *f* given by *f*(*x*) = | *x* | at *x* = 0.
3. Examine whether the function *f* given by *f* (*x*) = *x*2 is continuous at *x* = 0.

**Module Lecturer sign HOD sign**