INFORMATION AND COMMUNICATION UNIVERSITY

ICE0112: HIGHER MATHEMATICS 1: ASSIGNMENT 1

Lecturer's Name and Contact Details: Henry Sinkala, Mobile*: 0978316789*

Instructions:

Answer ALL Questions

1- Use the Assignment cover page provided below

*2- You are expected to type your assignment (or handwritten and save as **ONE** pdf file)*

3-Answer all questions and Label all your Solutions according to the Question Number

4- Use Times New Roman font type, font size 12 and 1.5-line spacing.(if typed)

5 – Deadline: The Assignment is due on 20th May 2023.

*6- Assignment should be uploaded on the Portal by due date.***

N.B: *Save the Assignment as: surname_firstname _ student #_module name_Assignment #*

E.g: Hamududu John_202112345_Higher Mathematics1_Assignment 1

Total Marks: 15 Marks

STUDENTS' COVER PAGE

INFORMATION AND COMMUNICATION UNIVERSITY

School:……

Degree Programme:…….

Course name and Code…….……..……

Assignment No.(1)

Student's Surname: ………

Student's First name: ……

Student number: ……..……..

Mode of Study: ……*(FT/DL)..(your mode of study)*

E-mail Address: ……*your email*

Phone Number: ……*your number*

Lecturer's name: ……..

Due Date: ***20th May 2023……***

ASSIGNMENT JAN -JULY 2023

ANSWER ALL QUESTIONS

QUESTION 1

a) Rationalize the denominators

$$\frac{5+\sqrt{3}}{5-\sqrt{3}}$$

[5 Marks]

b)

The quadratic equation $2x^2 - 7x - 5 = 0$ has roots α and β. Find:

(a) $\alpha + \beta$

(b) $\alpha\beta$

(c) $\alpha^2 + \beta^2$

(d) $\frac{1}{\alpha} + \frac{1}{\beta}$

[10 Marks]

b) Evaluate the followings: *show your working.*

i) lg10000 ii) $\log_3(1/9)$ iii) $\log_5 3+\log_5 50-\log_5 4$ iv) $\log_2 20 - \log_2 5$ **[10 Marks]**

QUESTION 2

a) Given that $\boldsymbol{\theta}$ is acute and that $\tan \emptyset = 4/3$, Find values of $\sin \emptyset, \cos \emptyset, \csc \emptyset \sec \emptyset, \cot \emptyset$ leave your answers in surd form. **[6 Marks]**

b) Graph the following quadratic equation $y = -x^2+2X+3$; showing all your working. **[9 Marks]**

c)
Consider the subsets A = [-3, 7], B = (-2, 5) and C = (-6, 10] of the universal set (-7, 10]. Find each of the following sets and display them on the number line.
i) (A ∩ B) ii) C' iii) B' U A iv) (A U C)' **[10 Marks]**

QUESTION 3

a) Convert $5\angle 60^\circ$ into a + j b form, correct to 4 significant figures. **[5 Marks]**

b) Determine, in polar form: $6\angle 40^\circ \times 2\angle 50^\circ$ **[5 Marks]**

c) Given Z_1=3+ *j*5 and Z_2=4- *j2* determine (i) Z_1+ Z_2, (ii) Z_1 - Z_2, (iii) Z_2 - Z_1 and show the results on an Argand diagram. **[7 Marks]**

d) Determine the modulus and argument of the complex number Z = -8+ j6, and express Z in polar form. **[8 Marks]**

QUESTION 4

a) Find the remainder when $6x^3+7x^2-15x+4$ is divided by x-1 **[5 Marks]**

b) Given that $\boldsymbol{p} = 2\boldsymbol{i} + 0.5\boldsymbol{j} - 3\boldsymbol{k}$, $\boldsymbol{q} = -\boldsymbol{i} + \boldsymbol{j} + 4\boldsymbol{k}$ and $\boldsymbol{r} = 6\boldsymbol{j} - 5\boldsymbol{k}$, evaluate and simplify the following vectors in *i*, *j*, *k* form: i) $\boldsymbol{p} + \boldsymbol{r}$ ***ii)*** $2\boldsymbol{q} + 3\boldsymbol{r}$ iii) $2\boldsymbol{p} + \boldsymbol{q} + \boldsymbol{r}$ **[10 Marks]**

c) Given that $f(x) = x^2-3$, $g(x) = 3x+4$ find:

i) (f o g(x)) ii) (g o f(x)) iii) (f o f(x)) iv) confirm that $f^{-1}(f(x))=x$ **[10 Marks]**

QUESTION 5

a) Using the synthetic division find the quotient and the remainder when x^3-2x^2+9 is divided by x+2 **[5 Marks]**

b)

If A= $\begin{pmatrix} 2 & 3 \\ 1 & -4 \end{pmatrix}$ and B = $\begin{pmatrix} -5 & 2 \\ -3 & 4 \end{pmatrix}$ Find i) B x A ii) 2A - 3B **[10 Marks]**

c) Prove the following identities

i) $\dfrac{1}{\sec A+1}+\dfrac{1}{\sec A-1}=2\operatorname{cosec}A\cot A$

ii) $(\sin x+\cos x)^2 = 1+\sin 2x$ **[10 Marks]**