(KNOWLEDGE FOR DEVELOPMENT)

KIBABII UNIVERSITY
(KIBU)
UNIVERSITY EXAMINATIONS
2020/2021 ACADEMIC YEAR

END OF SEMESTER EXAMINATIONS
FIRST YEAR FIRST SEMESTER

FOR THE DEGREE IN
(INFORMATION TECHNOLOGY)

COURSE CODE: **BIT 114**

COURSE TITLE: MATHEMATICS FOR IT

DATE: 12/05/2021 ~~06/04/2021~~ **TIME:** 8.00 A.M. – 10.00 A.M.

INSTRUCTIONS

ANSWER QUESTIONS ONE AND ANY OTHER TWO.

QUESTION ONE (COMPULSORY) [30 MARKS]

a) Given that $f(x) = 2x^2 + 1$, find $f^{1}(x)$ from first principles (5 marks)

b) Let A and B be two finite sets such that n(A) = 20, n(B) = 28 and n(A ∪ B) = 36, find n(A ∩ B). (4 marks)

c) Using truth tables evaluate $(P \rightarrow R) \wedge (Q \vee \neg R)$. (6 marks)

d) Evaluate $\int xe^{x^2} dx$ (5marks)

e) Consider the function $f(x) = \frac{7x-3}{x-1}$

(i) What is the range of f(x) (1 mark)

(ii) Find the inverse function of f(x) (4 marks)

f) Let Q (x, y, z) denote the statement "$x^2+y^2=z^2$".

- What is the truth value of Q (3, 4, 5)? (2 marks)
- What is the truth value of Q (2, 2, 3)? (3 marks)

QUESTION TWO (20 MARKS)

(a) Show that $((P \rightarrow Q) \wedge (Q \rightarrow R)) \rightarrow (P \rightarrow R)$ is a tautology (12 marks)

(b) Let P(x) be the statement "x spends more than five hours every weekday in class," where the domain for x consists of all students. Express each of these English statements using the notation formats (8 marks).

(i) There exists a student who spends more than five hours every weekday in class.

(ii) Every student spends more than five hours every weekday in class.

(iii) There exists a student who does not spend more than five hours every weekday in class.

(iv) Every student does not spend more than five hours every weekday in class.

QUESTION THREE (20 MARKS)

If f(x) = −2x and g(x) =x^2 −1, evaluate f(g(3)) and g(f(3)).

(a) Evaluate

(i) f(g(3)) (4 marks)

(ii) g(f(3)) (4 marks)

(b) Evaluate $(gf)^{-1}(x)$ (12 marks)