(50)

(*Knowledge for Development*)

KIBABII UNIVERSITY

(KIBU)

UNIVERSITY EXAMINATIONS
2017/2018 ACADEMIC YEAR
END OF SEMESTER EXAMINATIONS
YEAR ONE SEMESTER ONE EXAMINATIONS

FOR THE DEGREE OF
BACHELORS OF SCIENCE
(INFORMATION TECHNOLOGY)

COURSE CODE : BIT 114

COURSE TITLE : MATHEMATICS FOR IT

DATE: 16/01/2018 18/01/2018 **TIME: 9.00-11.00AM**

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTION ONE AND ANY OTHER TWO QUESTIONS

QUESTION ONE [COMPULSORY] [30MARKS]

a. Define the following terms:-

(i) Singleton **[1mark]**

(ii) Finite set **[1mark]**

(iii) Empty set **[1mark]**

b. In a college of 100 students,35 play football,36 row and 24 play tennis ball.13 play football and row,2 play football and tennis ball but never row,12 row and play tennis while 4 practice all the three activities. How many students participate in none of the activities of football, rowing and tennis ball? **[3marks]**

c. Let A = {1, 2, ---, 10} and define the relation R on A by xRy iff x is a multiple of y. Show that R is a partial order on A and draw its diagram. **[7marks]**

d. Consider the function $f: A \to B$, where $A = \{1, -1, 0, -2\}$ is the domain of f, $B = \{-1, 01, -8\}$ is its codomain.

(i) Draw a function arrow diagram for $f = \{\langle -2, -8\rangle, \langle -1, -1\rangle, \langle 1, 1\rangle, \langle 0, 0\rangle\}$.

[4marks]

(ii) Describe the function for all $x \in A$. **[1mark]**

e. Given the functions $f: R \to R$, $f(x) = \cos x$, $g: R \to R$, $g(x) = \frac{x}{3}$, find gof and fog

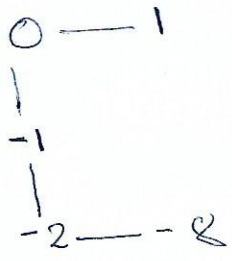
[2marks]

f. Find the derivatives of the following functions.

(i) $y = \ln(x^2 + 1)$ **[3marks]**

(ii) $f(x) = \frac{x^2 + 1}{x^3}$ **[3marks]**

g. Evaluate $\int 3x^2 \sin(x^3 + 1)dx$ **[4marks]**



QUESTION TWO [20MARKS]

a. Find the power set of C = {1, 3, 5} and give the number of elements that it has. **[2marks]**

b. Let A = {a, b, c} and B = {d, f}.Find A x B and B x A. **[2marks]**

c. Let A, B, C be any 3 sets. Prove that $A \cap (B - C) = (A \cap B) - (A \cap C)$ **[7marks]**

d .Prove the first Distributive law using the method of tables i.e.

$$A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$$ **[9marks]**

QUESTION THREE [20MARKS]

a. Given $P(r) = r^3 + 6r^2 + 9r - 4$, find $P^1(r)$. **[3marks]**

b. Let $f : x \to \frac{x}{3}$ and $g : x \to 3x$ .Find the value of $gof(x)$. **[3marks]**

c. Evaluate the following functions:

(i) $\int_2^{10} 3(\sqrt{z-1})dz$ **[4marks]**

(ii). $\int \frac{dx}{\sqrt{1-4x^2}}$ **[5marks]**

(ii) $\int \frac{dx}{25+9x^2}$ **[5marks]**

QUESTION FOUR [20MARKS]

a. Explain the procedure of inserting a data value into a Binary Search Tree (BST) **[4marks]**

b. Find all partitions of {1, 2, 3} **[5marks]**

c. Prove the first De Morgan rule using the method of tables **[5marks]**

d. Evaluate $\int_0^1 x^2 \ln x dx$ **[6marks]**

QUESTION FIVE [20MARKS]

a. Evaluate (i) $\int_{\frac{-\pi}{2}}^{\frac{\pi}{2}} Sin\theta Cos\theta d\theta$ **[5marks]**

(ii) $\int_{-1}^{1} \frac{y^5}{y^2+1} dy$ **[7marks]**

b. Given the function $f(x) = 2x^2 - 2$, find $f^1(x)$ using the limit definition of the derivative. **[8marks]**

$(2 \times 2)\, x$

$4x$

$\int \frac{dx}{25+9x^2}$

$\frac{1}{25+9x^2}$

$\frac{1}{25x+9x}$

$\frac{dy}{dx}$

$25x^{-1} - 9x^{-1}$

$25x^{-1} + 9x^{-1}$

$\frac{1}{25+9x}$

$\frac{1}{25x+9x^{3+1}}$

$\frac{1}{25x+9x^4} \times 4$