FOUNTAIN UNIVERSITY OSOGBO, NIGERIA

P.M.B.4491, OSOGBO, OSUN STATE.

COLLEGE OF NATURAL AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICAL AND COMPUTER SCIENCES

SECOND SEMESTER MOCK EXAMINATION 2019/2020 SESSION

CPS 204: DISCRETE STRUCTURES **Credit Unit/Status: 2 (C)**

Time Allowed: 1Hr.45mins 10/08/2020

INSTRUCTION(s): ATTEMPT QUESTION 1 AND ANY OTHER QUESTION..

Question 1

a. As a student studying Computer Science in Fountain University, What is the relevance of this course titled "Discrete Structures" to your course of study? **[3mark]**

b. Given a set of elements “A”, what does a relation on that Set means? **[3mark]**

c. Translate the following statements into logical expressions: **[11mark]**

i. You can access the FUO internet from Campus only if you are a computer major, or you are not a fresh student. **[1mark]**

ii. If you are studying Computer Science, then you must partake in the online mock examination

iii. What is the truth value of the proposition in **1c (i)**? **[1mark]**

iv. Write the contrapositive of the logical implication of **1c (ii)** and translate into English. **[2.5mark]**

v. Write the converse of the logical implication of **1c(ii)** and translate into English.

vi. Determine whether or not **1c (ii)** is logically equivalent to “If you are not studying Computer Science, then you must not partake in the online mock examination”.

d. Consider the relation R = {(1,1),(1,2),(2,3),(2,1),(3,2),(3,4)}. Find

(i) The domain of R

(ii) The range of R

(iii) The matrix of R. **[4mark]**

e. Write the set builder notation for the following sets of numbers: N, R, Q and Z**. [4mark]**

Question 2

a. Let R be the relation {(a, b) | a - b = 5k)} for some k ∈Z.

i. Determine with proof, whether R is an equivalence relation? **[2mark]**

ii. If yes, what is the equivalence class of the set defined in (i) above? **[3.5 mark]**

b. Represent the following propositional statements using universal and existential quantifiers. **[4.5mark]**

i. At least one FUO student is a genious.

ii. All FUO Professors are genius.

iii. Every even number is a sum of two odd numbers.

Question 3

a.

$$M_R = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 1 & 1 \\ 1 & 0 & 0 \end{bmatrix}$$

i. Find the matrix representing R^2 of the M_R given above. [**2.5mark]**

ii. Give the relation R of the M_R given in (c) above. **[1mark]**

iii. Obtain the diagraph of the relation obtained in c (ii). **[2mark]**

b. Show, by the Element method that for all subsets X, Y, and Z of U, $(X - Y) \cap (Z - Y) = (X \cap Z) - Y$. [**2.5mark]**

c. Determine whether the relation for the diagraph shown below is reflexive, symmetric, antisymmetric and /or transitive. [**2mark]**