 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 EXAMINATION 2018/2019 SESSION

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

**Time Allowed: 1Hr.45mins** 29/06/2019

INSTRUCTION(s): ANSWER QUESTION1 AND ANY OTHER TWO (2) QUESTIONS.

*Question 1*

1. 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]**
2. Given a set of elements “A”, what does a relation on that Set means. **[5mark]**
3. For each of the following, decide whether the statement is true or false, and justify your assertion: **[6mark]**
4. If p is true, q is false and r is false, then p∨(q∧r) is true.
5. The sentence (p ↔ q) ↔ (q ↔ p) is a tautology.
6. The sentences p∧ (q∨r) and (p∨q) ∧ (p∨r) are logically equivalent. **[3mark]**
7. Translate the following statements into logical expressions: **[4mark]**
8. You can access the FUO internet from Campus only if you are a computer major, or you are not a fresh student.
9. If you work hard, then you will be rewarded.
10. What is the truth value of the proposition in 1d (i)?
11. Determine whether or not 1d (ii) is logically equivalent to “If you will not work hard, then you will not be rewarded”.
12. Write the set builder notation for the following sets of numbers: N, R, Q and Z**. [4mark]**

*Question 2*

1. Given the statement "I don't drink and drive":
2. Is this a compound proposition? If yes, Give its atomic propositions. **[1mark]**
3. Express the propositional statement in propositional logic. **[1mark]**
4. Write the negation of the logical expression and translate the negation into English.

**[1.5mark]**

1. Prove or otherwise if proposition in (a) is logically equivalent to “If I drink, then I don’t drive ".  **[3mark]**
2. What do you understand by Equivalence relation? **[3mark]**
3. Let R be the relation {(a, b) | a - b = 3k)} for some k ∈Z.
4. Determine with proof, whether R is an equivalence relation? **[4mark]**
5. If yes, what is the equivalence class of the set defined in (i) above? **[4mark]**

*Question 3*

1. What is a partition of a set? Give examples.  **[5mark]**
2. Let S be a non-empty set, and let P(S) denote the set of all S (i.e. power set of S), P(S) = {A | A *C* S}. The relation R on P(S) is defined by:

R = {(A, B) | A, B *Є* P(S) and A *C* B}

Determine with proof whether is reflexive, symmetric and transitive. **[6mark]**



1. Find the matrix representing R2 of the MR given above. [**3mark]**
2. Give the relation R of the MR given in (c) above. **[1.5mark]**
3. Obtain the diagraph of the relation obtained in c (ii). **[2mark]**

*Question 4*

1. Show by constructing truth tables or otherwise, that the following propositions are logically equivalent. [**6mark]**
2. p => q and ̴ ( ̴ p Ʌ q) Ʌ p.
3. (p => r ) Ʌ (q => r) and (p v q) => r.
4. Show, by the Element method and Venn diagram method that, for all subsets P, Q, and R of U, (P − Q) ∩ (R − Q) = (P ∩ R) − Q. [**6mark]**
5. Determine whether the relation for the diagraph shown below is reflexive, symmetric, antisymmetric and /or transitive. [**3mark]**
6. Using the relation obtained in (c), represent the relation in form of MR. [**2.5mark]**