NATIONAL OPEN UNVERSITY OF NIGERIA

University Village, Plot 91, Cadastral Zone, Nnamdi Azikiwe Express Way, Jabi, Abuja

FACULTY OF SCIENCES

JULY 2017 EXAMINATION

Course Title: CIT342: Formal Languages and Automata Theory
Credit Unit: 3
Instruction: Answer Question one and three others **Time:** 3hrs

Question One

Q1a).Define the following terms:
i. Strings (2marks)
ii. Alphabets (2marks)
iii. Vocabulary (2marks)
Q1bi). What do you understand by formal languages and Give any three examples of languages (6marks)
Q1c) Is formal language finite or infinite? Discuss (5marks)
Q1d). What do you understand by automata theory and State any four classes of automata.(8marks)

Question Two

Q2a). Give the formal definition of the following:
i. FSA (3marks)
ii. DFA (3marks)
iii. NFA (3marks)
Q2b). Describe an algorithm for the Operation of a DFA (6marks)

Question Three

Q3a). Define primitive regular expressions and give the regular expression.(5marks)
Q3b) What are the hints in Building Regular Expressions (5marks)
Q3c State the rules for creating addition regular expressions from any given regular expression(s).(5marks)

Question Four

Q4a) with the aid of illustrative examples, briefly describe the three ways of defining a language. (10mrks)

Q4b) Distinguish between right-linear grammar and left-linear grammar (5marks)

Question Five

Q5a) What is a pigeonhole?(2marks)

Q5b) Briefly describe the pigeonhole principle. How is it related to them pumping lemma for regular languages?(8marks)

Q5c) State five what pumping lemma say.(5marks)

Question Six

Q6a) Define Turing Machines. (2marks)

Q6b) State Godel Incompleteness Theorem(7marks)

Q6c) What does it mean to say a formally stated problem is:

i. Unsolvable(3marks)

ii. undecidable(3marks)