



# NATIONAL OPEN UNIVERSITY OF NIGERIA

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

## FACULTY OF SCIENCE AND TECHNOLOGY

**Course Title:** CIT342: Formal Languages and Automata

**Credit Unit:** 3

**Instruction:** Answer Question One and any three others

**Time:** 3hrs

### Question One

Q1a). Give the formal definition of the following:

- i. FSA (2marks)
- ii. DFA (2marks)
- iii. NFA (2marks)

Q1b) Briefly discuss the Chomsky hierarchy. What is the relationship among the various types of grammars described in the Chomsky hierarchy (10marks)

Q1c) Define the following terms:

- i. Strings (2marks)
- ii. Alphabets (2marks)
- iii. Vocabulary (2marks)

Q1d) Define Turing Machines. (3marks)

### Question Two

Q2a) What you understand by unrestricted grammars in Formal Language (5marks)

Q2b) Briefly describe the following concepts:

- i. semantics of a grammar (5marks)
- ii. Automata theory (5marks)

### Question Three

Q3a) What is a pigeonhole? (2marks)

Q3b) Describe an algorithm for the Operation of a DFA (5marks)

Q3c) Briefly describe the pigeonhole principle. How is it related to them pumping lemma for regular languages? (8marks)

#### **Question Four**

Q4a) What do you understand by formal languages and Give any three examples of languages (6marks)

Q4b) Is formal language finite or infinite? Discuss (4marks)

Q4c) State five what pumping lemma say. (5marks)

#### **Question Five**

Q5a) What do you understand by halting problem? (6marks)

Q5b) Define context-sensitive grammars (4marks)

Q5c) What do you understand by decision problems?. (5marks)

#### **Question Six**

Q6a) PDA is defined as a collection of seven things mention (7marks)

Q6b) The context-free languages are closed under the formation of? (3marks)

Q6c) State the two type of PDAs (5marks)