



NATIONAL OPEN UNIVERSITY OF NIGERIA
University Village, Plot 91, Cadastral Zone, Nnamdi Azikiwe Express
Way, Jabi, Abuja
Faculty of Science

Course: CIT 445 - Principles and Techniques of Compilers

Time Allowed: 3 Hours

Instructions: Answer Question 1 and three (4) other questions

- Q1 a. Define the following terms. (2 marks)
- (i) Formal grammar (2 marks)
 - (ii) Parsing marks)
 - (iii) Strings (2 marks)
- b. Enumerate three components that make up the syntax of grammars (6 marks)
- c. List two types of grammars. (2 marks)
- Q2 a. Given the grammar G with following production rules, $S \rightarrow a \mid aS \mid bS$, determine whether the following strings can be generated by the grammar.
- (i) babaab
 - (ii) aaabbbab
 - (iii) bbaaba
- (4 marks)
- b. With the aid of a diagram describe the levels of grammar as described by the Chomsky hierarchy. (8 marks)
- c. Explain one of the uses of formal languages. (2 marks)
- Q3. a. In the context of formal language describe the following terms.
- (i) Alphabet
 - (ii) Word

- (iii) Letters (6 marks)
- b. Define format Languages. (4 marks)
- c. What is the relationship between grammar and language. (4 marks)
- Q4. a. Define the term compiler and state its importance in the programming world. (4 marks)
- b. Distinguish between a translator, compiler and an interpreter. (6 marks)
- c. Outline some specific knowledge require for building a compiler. (4 marks)
- Q5. a. List and explain any three (3) components of a compiler. (6 marks)
- b. Explain why the error handler is important in a compiler. (4 marks)
- c. Enumerate the functions performed by the lexical analyser. (4 marks)
- Q6. a. Define context-free grammars (CFGs). (4 marks)
- b. Explain the role of the parser in (CFGs). (4 marks)
- c. Discuss the concept of parse tress. (6 marks)
- Q7. a. Briefly itemise and describe the different stages at which errors might occur during compilation. (4 marks)
- b. Outline the different ways that error of division by 0 can be reported. (4 marks)
- c. Distinguish between run-time errors and compile time errors. (4 marks)
- d. Briefly describe some ways to check for 'undefined'. (2 marks)