NATIONAL OPEN UNIVERSITY OF NIGERIA
Plot 91, Cadastral one, Nnamdi Azikiwe Expressway, Jabi, Abuja
Faculty of Computing
Computer Science Department

2025_2 EXAMINATIONS

PROGRAMME: **B.Sc.**
COURSE TITLE: **Principles of Compilers and Construction**
COURSE CODE: **CIT316**
CREDIT UNIT: **3**
DURATION: **2½ HRS**

Instructions: Answer Question ONE (1) and any other three questions

1(a)   Outline the four basic types of grammars. (4 marks)

(b)   Consider the concatenation of two set of strings, 'bab' and 'aba'. What will be the resulting string? (1 mark)

(c)   With examples, define a lexeme? (4 marks)

(d)   What are the roles of the parser? (6 marks)

(e)   Given the expression:

$$X = (a + (b*c))/(a-(b*c))$$

Generate the corresponding parse tree. ***(10 marks)***

2(a)   What are the specific areas that causes problems during measurement on the performance of actual complier? (5 marks)

(b)   With diagrammatic representation, give a description of the directed acyclic graph. (8marks).

(c)   How is directed acyclic graph different from the parse tree (2 marks)

3(a)   What is the output from an intermediate phase of a compiler? (4 marks)

(b)   Given the following source code statement:

$$c = a + b * 5;$$

show the phases of compilation process and their results from initial phase up to the intermediate code level. (10 marks)

(c)   What is the intermediate code called (1 mark)

4(a)   Given the expression:

d:= (a-b) + (a-c) + (a-c)

Write the three address code.   (2 marks)

(b)   Generate the corresponding target machine code for the expression in 4(a). (5 marks)

(C)   Complete the table by writing out the corresponding semantic rules for each of the production rule.

$$E \rightarrow E + T$$
$$E \rightarrow T$$
$$T \rightarrow T * F$$
$$T \rightarrow F$$
$$F \rightarrow (F)$$
$$F \rightarrow num \qquad \textbf{(6 marks)}$$

5(a)   What are the drawbacks of syntax analyzers that makes the semantic analysis phase very important? (3 marks)

(b)   Differentiate between the Deterministic and Non-deterministic Finite automata (8 marks)

(c)   How is a Finite automaton different from the Transition tree (4 marks)

6(a)   Write down what is involved when considering code generation task. (3 marks)

(b)   Differentiate between the Kleene star and Kleene plus closure (4 marks)

(c)   Define Dead Code Elimination and give example with explanation (8 marks)