NATIONAL OPEN UNIVERSITY OF NIGERIA
University Village, 91 Cadastral Zone, Nnamdi Azikwe Expressway, Jabi, Abuja
FACULTY OF SCIENCES
COMPUTER SCIENCE DEPARTMENT
2023_1 POP EXAMINATION

COURSE CODE: CIT316   **Credit:** 3 unit

COURSE TITLE: Principles & Techniques of Compilers/Compiler Construction

TIME ALLOWED: 3 Hours

INSTRUCTION: Answer Question 1 and any other THREE (3) Questions

1a) To increase the compiler's portability and simplify retargeting, a typical real-world compiler usually has multiple phases, which are divided into front-end and back-end. Briefly describe each phase comprised by each division. *(10½ marks)*
b) Briefly describe the utilities provided by the operating system to execute the object code generated by the compiler. *(7 marks)*
c) Discuss Nondeterministic Finite Automaton (NFA). *(7½ marks)*

2a) Write short notes on:
   i)   Top-down Parsing *(3 marks)*
   ii)   Bottom-up Parsing *(3 marks)*
b) Differentiate between code optimization and code generation *(4 Marks)*
c) State the most difficult part of a compiler designer. *(2 Marks)*
d) State the characteristics of canonical LR parsing *(3 marks)*

3a) Consider the grammar G given below:
   G: $E \rightarrow E + T \mid T$
             $T \rightarrow T * F \mid F$
             $F \rightarrow (E) \mid a$
Generate the operator precedence passing table for this grammar *(9 marks)*
b) Explain the three (3) main techniques for loop optimization *(3 Marks)*
c) What are the characteristics of Simple LR   parsing *(3 marks)*

4a) What are the benefits of LR Parsing? *(4 Marks)*
b) In the context of grammar, describe with examples, Terminals and Non-terminal notational convention *(8 Marks)*
c) Define Formal Grammar *(3 Marks)*

5a) Briefly describe the concept of Transition Diagram *(6 marks)*

b) Discuss the concept of LL (K) Grammars *(6 Marks)*
c) Explain the Dead Code Elimination Concept *(3 Marks)*

6a) Describe the operations of the following concepts:
      i) Re-hashing *(4 Marks)*
      ii) Chaining *(5 Marks)*
b) How does Regular Expressions (REs) work? *(6 Marks)*