



NATIONAL OPEN UNIVERSITY OF NIGERIA
University Village, 91 Cadastral Zone, Nnamdi Azikwe Expressway, Jabi, Abuja
FACULTY OF SCIENCES
COMPUTER SCIENCE DEPARTMENT
2020_1 EXAMINATIONS

CIT 445 – Principles & Techniques of Compilers.

Credit: 3 units

TIME ALLOWED: 2½ Hours

INSTRUCTION: Answer Question 1 and any other FOUR (4) Questions

- 1a) Outline three (3) typical questions asked about formalisms. (3mks)
- 1b) Suppose L_1 and L_2 are languages over some common alphabet; state two (2) standard operations that can be performed on the languages. (4mks)
- 1c) Identify three (3) types of Intermediate Representation (3mks)
- 1d) Why Do We Need Translators? (3mks)
- 1e) Outline the operations of the shift-reduce parser (4mks)
- 1f) Define finite automata. (3mks)
- 1g) Illustrate two properties entailed in using an intermediate language representation. (2mks)

- 2a) Examine the context-free grammar G with the productions
$$E \rightarrow E + E \mid E * E \mid (E) \mid id$$
Generate possible leftmost derivations for $id + id * id$ (10mks)
- 2b) Mention the two (2) ways of resolving collision ? (2mks)

- 3a) Consider the context-free grammar G with the productions
$$\begin{aligned} E &\rightarrow E + T \mid T \\ T &\rightarrow T * F \mid F \\ F &\rightarrow (E) \mid id \end{aligned}$$
Generate the following:
 - i) Terminal symbols (3mks)
 - ii) Nonterminal symbols (3mks)
 - iii) Start symbol. (2mks)
- 3b) Outline the algorithm for constructing precedence functions (4mks)

- 4a) List and explain the components of the structure of a compiler(8mks)
- 4b) Identify the attributes of symbol table (4 mks)

- 5a) Construct the Operator precedence parsing algorithm (7mks)
5b) Explain the need for lexical analyser. (5mks)

6a) Suppose we have a Grammar G:

$E \rightarrow E + T$

$E \rightarrow T$

$T \rightarrow T * F$

$T \rightarrow F$

$F \rightarrow (E)$

$F \rightarrow a$

- Find the left parse of the sentence $a^*(a+a)$ (9mks)
6b) What is Type-3: Regular Grammars (3mks)