



NATIONAL OPEN UNIVERSITY OF NIGERIA
University Village, Plot 91, Cadastral Zone, Nnamdi Azikiwe Express
Way, Jabi, Abuja
FACULTY OF SCIENCES
JULY 2017 EXAMINATION

Course Code: CIT 445 **Time:** 2½ hrs
Course Title: Principles & Techniques of Compilers Marking Scheme
Course Credit Unit: 3
Instruction: Answer Question One (1) and other any four (4) questions.

- 1)
 - a) With the aid of illustrative diagram describe the phases of a compiler. (14 marks)
 - b) Consider the grammar G below:
$$G: E \rightarrow E + T / T$$
$$T \rightarrow T * F / F$$
$$F \rightarrow (E) / i$$

Generate the non-left recursive version of the grammar (5 marks)
 - c) Explain what is meant by the term Viable Prefix? (3 marks)

2.
 - a) What are the benefits of LR parsing?) 4 marks
 - b) List the common techniques for building tables for an “LR” parser stating the characteristics of each? (6 marks)
 - c) Consider the grammar,
$$G: E \rightarrow E + T \mid T$$
$$T \rightarrow T * F \mid F$$
$$F \rightarrow (E) \mid i$$

What is the augmented grammar for this grammar (2 marks)

- 3
 - a) Briefly describe the operation performed by the shift-reduce parser (6 marks)
 - b) State three of the uses of formal languages (3 marks)
 - c) Why do we need a translator? (3 marks)

- 4
 - a) What is a translator? (2marks)
 - b) Consider the grammar, $G: S \rightarrow a \mid aS \mid bS$
Find the LR(0) items for this grammar (10 marks)

- 5
 - a) Enumerate the functions performed by the lexical analyser (4 marks)
 - b) Enumerate any **three** of the errors which can be detected during lexical analysis (6 marks)

- 6)
 - a) Define formal language (3 marks)

- b) Find FOLLOW of all the nonterminal symbols in the non-left recursive version of the grammar (9 marks)