NATIONAL OPEN UNIVERSITY OF NIGERIA
14/16 AHMADU BELLO WAY, VICTORIA ISLAND, LAGOS
SCHOOL OF SCIENCE AND TECHNOLOGY
JUNE/JULY EXAMINATION
COURSE CODE: CIT445
COURSE TITLE: Principles & Techniques of Compilers
TIME ALLOWED: 2½ hrs
**INSTRUCTION: Answer any five (5) questions. Each question
           carries 14 marks**

1) With the aid of an illustrative diagram describe the phases of a compiler.
14 marks

2a) What are the benefits of LR parsing?
4½ marks
 b) List the common techniques for building tables for an "LR" parser stating the
     characteristics of each?

     6½ 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.
     3 marks

3a) Briefly describe the operations performed by the shift-reduce parser
6 marks
 b) Given the context-free grammar G below:
           G: $E \rightarrow E + E$
                  $E \rightarrow E * E$
                  $E \rightarrow (E)$
                  $E \rightarrow$ **id**

4) Consider the grammar,
     G: $S \rightarrow a \mid aS \mid bS$
 a) Find   the   LR(0)   items   for   this   grammar
     10 marks
 b) Construct an NFA whose states are the LR(0) items from (a).
4 marks

5a) Explain what is meant by the term Viable Prefix?
3 marks
 b) Given the grammar *G* with following production rules, $S \rightarrow a \mid aS \mid bS$,
determine whether the string ***aababbba*** can be generated by the grammar
5 marks
 c) Enumerate any three of the errors which can be detected during lexical
analysis   6 marks

6) Consider the grammar G below:

G: E → E + T / T
T → T * F / F
F → (E) / i

a) Generate the non-left recursive version of the grammar 5 marks

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

7a) Define formal language 3 marks

b) State three of the uses of formal languages 3 marks

c) What is a translator? 2 marks

d) Why do we need a translator? 3 marks

e) Enumerate the functions performed by the lexical analyser 4 marks