NATIONAL OPEN UNIVERSITY OF NIGERIA
14-16 AHMADU BELLO WAY, VICTORIA ISLAND, LAGOS
SCHOOL OF SCIENCE & TECHNOLOGY
JANUARY/FEBRUARY 2013 EXAMINATION

Course Code: CIT 445 ***Time:*** 2½ hrs

Course Title: Principles & Techniques of Compilers

***Course Credit Unit*:** 3

Instruction: Answer any five (5) questions. Each question carries 14 marks

1a) Explain what is meant by the term **handle**?) 2 marks

b) Consider the following grammar for list structure:

S → a | ^ | (T)

T → T,S | S

i) find the rightmost derivations for:) 7marks

(i) (a, (a, a))

(ii) (((a, a), ^, (a)), a)

ii) Indicate the handle of each right sentential form for the derivations in (a) above) 5 marks

2a) Briefly describe the operation performed by the shift-reduce parser) 6 marks

b) Given the context-free grammar G below:

G: E → E + E

E → E * E

E → (E)

E → **id**

State the steps performed by the shift-reduce parser when analyzing the input string:

id$_1$ + **id**$_2$ * **id**$_3$) 8 marks

3a) Explain what is meant by the term Viable Prefix?) 3 marks

b) Given the grammar *G* with following production rules, S → a | aS | bS, determine whether the string ***aababbba*** can be generated by the grammar) 5marks

c) Enumerate any three of the errors which can be detected during lexical analysis) 6 marks

4a) Explain what is meant by top-down parsing technique) 2 marks

b) State the difficulties in top-down parsing) 6 marks

c) Using examples, state and illustrate how to minimized) 6 marks

5) Consider the grammar Ggiven below:

G: E → E + T / T

T → T * F / F

F → (E) / i

a) Find all the first and last terminals in this grammar) 5 marks

b) Generate the operator precedence passing table for this grammar) 9 marks

6a) Define the following for any given grammar?) 5 marks

i) FOLLOW A

ii) FIRST(α)

b) Consider the grammar,

G: E → E + T | T

T → T*F | F

F → (E) | i

i) Find the FOLLOW(A) for all the terminal in G) 4 marks

ii) Find the FIRST(α) for any string derivable from G) 5 marks

7a) Consider the grammar

$S \rightarrow L = R \mid R$

$L \rightarrow *R \mid i$

$R \rightarrow L$

a) Compute all the LR(0) items for the above grammar)10 marks

b) Construct an NFA whose states are the LR(0) items from (a))4 marks