NATIONAL OPEN UNIVERSITY OF NIGERIA
14-16 AHMADU BELLO WAY, VICTORIA ISLAND LAGOS
MARCH/APRIL 2016 EXAMINATION

SCHOOL OF SCIENCE AND TECHNOLOGY

COURSE CODE: **CIT445**
COURSE TITLE: **Principles & Techniques of Compilers**

Time: **2½ hrs** ***Course Credit Unit*:** **3**
Instruction: **Answer any five (5) questions. Each question carries 14 marks**

1) Consider the grammar

S → L = R | R
L → *R | i
R → 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)

2a) 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 minimize them (6 marks)

3a) Explain what is meant by the term Viable Prefix? (3 marks)
b) Given the grammar *G* with following production rules,F → c | cF | dF, determine whether the string ***ccdcdddc*** can be generated by the grammar (5marks)
c) Enumerate any three of the errors which can be detected during lexical analysis (6 marks)

4a) 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 → E + T | T

T → T*F | F
F → (E) | i

What is the augmented grammar for this grammar. (3 marks)

5) Consider the grammar G given 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 terminals in G (4 marks)
ii) Find the FIRST(α) for any string derivable from G (5 marks)

7a) Explain what is meant by the term **handle**? (2 marks)

Consider the following grammar for list structure:

S → a | ^ | (T)
T → T,S | S

b) Find the rightmost derivations for: (7 marks)

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

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