



NATIONAL OPEN UNIVERSITY OF NIGERIA
University Village, 91 Cadastral Zone, Nnamdi Azikwe Expressway, Jabi, Abuja
FACULTY OF SCIENCES
COMPUTER SCIENCE DEPARTMENT
APRIL 2022_1 EXAMINATIONS

COURSE CODE: CIT445/CIT316

Credit: 3 unit

COURSE TITLE: Principles & Techniques of Compilers/Compiler Construction

TIME ALLOWED: 3 Hours

INSTRUCTION: Answer Question 1 and any other THREE (3) Questions

- 1a) Explain what is meant by top-down parsing technique (2 marks)
b) State the properties of LR parser. (3 marks)
c) List the types of LR parser. (3 marks)
d). State any three difficulties in top-down parsing (6 marks)
e) Given the production, $A \rightarrow A\alpha$,
i) Identify the problem with this production (1 mark)
ii) Show how the problem can be removed (3 marks)
f) In top-down parsing, order of trying the alternatives may influence getting the input or not.
i) State the method that can be used to overcome this. (1 mark)
ii) Hence given the grammar,
 $G: A \rightarrow \alpha\beta$
 $A \rightarrow \alpha\gamma$
How do we get rid of this dilemma using the method stated in (i) above? (2 marks)
g) What do you understand by the term Viable Prefix? (4 marks)
- 2) Consider the grammar,
G: $S \rightarrow L = R \mid R$
 $L \rightarrow *R \mid i$
 $R \rightarrow L$
a) Compute all the LR(0) items for the above grammar (11 marks)
b) Construct an NFA whose states are the LR(0) items from (a) (4 marks)
- 3a) Define the following for any given grammar?
i) FOLLOW A (4 marks)
ii) FIRST(α) (4 marks)
b) Given the grammar G with following production rules, $F \rightarrow c \mid cF \mid dF$, determine whether the string $ccdcdddc$ can be generated by the grammar (7 marks)

4a) Enumerate the errors which can be detected during lexical analysis **(8 marks)**

b) List the common techniques for building tables for an “LR” parser stating the characteristics of each? **(7 marks)**

5a) What are the benefits of LR parsing? **(4½ marks)**

b) Given the grammar,

$$G: \quad E \rightarrow E + T \mid T$$

$$T \rightarrow T * F \mid F$$

$$F \rightarrow (E) \mid i$$

enumerate the augmented grammar for this grammar. **(2 marks)**

c) Consider the following grammar for list structure:

$$S \rightarrow a \mid \wedge \mid (T)$$

$$T \rightarrow T, S \mid S$$

Find the rightmost derivations for:

(i) (a, (a, a)) **(3½ marks)**

(ii) (((a, a), ^, (a)), a) **(5½ marks)**

6a) Consider the grammar G given below:

$$G: E \rightarrow E - T \mid T$$

$$T \rightarrow T / F \mid F$$

$$F \rightarrow (E) \mid i$$

Find all the first and last terminals in this grammar **(4½ marks)**

b) Give algorithm for the operator precedence parser. **(10½ marks)**