



GRE TSA UNIVERSITY - THIKA

UNIVERSITY EXAMINATION JANUARY – APRIL 2025 SEMESTER

BACHELOR OF SCIENCE IN COMPUTER SCIENCE

COURSE CODE: BSCS 408

COURSE TITLE: COMPILER CONSTRUCTION AND DESIGN

DATE: APRIL 2025

TIME: 2 HOURS

INSTRUCTIONS TO CANDIDATES

1. SECTION A IS **COMPULSORY**.
2. SECTION B: ANSWER ANY OTHER **TWO** QUESTIONS.
3. **DO NOT** WRITE ANYTHING ON THIS QUESTION PAPER AS IT WILL BE AN EXAM IRREGULARITY.
4. ALL ROUGH WORK SHOULD BE AT THE BACK OF YOUR ANSWER BOOKLET AND CROSSED OUT.

CAUTION: All exam rooms are under CCTV surveillance during the examination period.

SECTION A: COMPULSORY

Question One

- a) By use of an example briefly analyse the compiler phases. (6 marks]
- b) Differentiate tokens, patterns and lexeme. [3 marks]
- c) List and explain at least three recovery strategies for lexical analysis giving an example of each. [3 marks]
- d) i. List and explain the properties of LR passer. [2 marks]
ii. Define symbol table and state its function. [4 marks]
- e) Explain the role of lexical Analysis in detail [3 marks]
- f) Draw DAG for following statements. [5 marks]

t0 = a + b

t1 = t0 + c

d = t0 + t1

- g) Use a well labelled diagram to explain a typical language processing system [4 marks]

SECTION B: ANSWER ANY TWO QUESTIONS

Question Two

- a) Consider a for loop structure in either C++ or Java language.
 - i. Give the general structure of the loop. [1 mark]
 - ii. Generate grammar for the loop structure. [4 marks]
 - iii. Show that the statement below is a sentence in the language of your grammar.
For (x=3; x<=20; x=x+2) y=x7; [5 marks]
- b) Construct a passé tree for the statement in (iii) above. [4 marks]
- c) Describe the three main tasks that comprise the code generation stage of a compiler. [6 marks]

Question Three

- a) Describe two techniques used to eliminate ambiguity in a grammar. [4 marks]

b) Given the following grammar

$$S = A B \mid S A B.$$

$$A = a \mid a a b.$$

$$B = b \mid b b a.$$

Use it to pass the following input string

[8 marks]

a b b a a b

c) State and explain the fundamental requirements of a compiler [4 marks]

d) What is an activation record? Explain how they are used to access various local and global variables. [4 marks]]

Question Four

a) Describe the Analysis Synthesis model compiler structure [8 marks]

b) Describe three attributes that must be found in a programming language to allow compilation [6 marks]

c) Explain THREE techniques that Loops can be optimized [6 marks]

Question Five

a) Use a well labelled diagram to explain a typical language processing system [6 marks]

b) Define a three address code? Mention its types. Elaborate your understanding by translating the arithmetic expression $a = b + c * d$; into a three address code type of your choice.

[8 marks]

c) Explain any THREE operations on regular languages (use appropriate notations and examples for each)

[6 marks]