



(University of Choice)

**MASINDE MULIRO UNIVERSITY OF
SCIENCE AND TECHNOLOGY
(MMUST)**

MAIN CAMPUS

**UNIVERSITY EXAMINATIONS
2020/2021 ACADEMIC YEAR
THIRD YEAR FIRST SEMESTER EXAMINATIONS
FOR THE DEGREE
OF
BACHELOR OF SCIENCE IN (COMPUTER SCIENCE)**

COURSE CODE: BCS 310

COURSE TITLE: COMPILER CONSTRUCTION AND DESIGN

DATE: Thursday 21/01/2021

TIME: 12:00noon-2:00p.m

INSTRUCTIONS TO CANDIDATES

Answer Questions ONE and ANY OTHER TWO questions

TIME: 2 Hours

MMUST observes ZERO tolerance to examination cheating

This Paper Consists of 3 Printed Pages. Please Turn Over.

QUESTION ONE (30 MARKS)-COMPULSORY

a) Consider the following grammar:

$$S \rightarrow A$$

$$A \rightarrow A+A \mid B++$$

$$B \rightarrow y$$

- i. Draw the parse tree for the input "y + + + y + +" (3 marks)
 - ii. Show a leftmost derivation of "y + + + y + +" (3 marks)
- b) Giving examples discuss the following statement: No algorithm exists for an "ideal translation". (3 marks)
- c) Using any standard derivation, draw a parse tree for the expression $x+2-y$ (3 marks)
- d) Briefly elaborate five typical transformations performed by the optimizer. (5 marks)
- e) Discuss the construction of an ad-hoc lexer giving its major limitations (5 marks)
- f) Draw the pictorial representation of the following
- i. A FA that accepts only "1" (2 marks)
 - ii. A FA that accepts any number of 1's followed by a single 0 (2 marks)
 - iii. A FA that accepts ab^*a (2 marks)
- g) Discuss the use of a transition table as used in a finite automation (2 marks)

QUESTION TWO (20 MARKS)

- a) Discuss the phases of a compiler in compiler design. (10 marks)
- b) Discuss the role of semantic analysis in compiler design and construction. (5 marks)
- c) Discuss the role of the run-time environment phase in compiler design and construction. (5 marks)

QUESTION THREE (20 MARKS)

- a) Discuss the role of Lexical Analysis phase in compiler design and construction. (6 marks)
- b) Discuss the role of regular expressions in compiler design and construction. (7 marks)

- c) Discuss the role of finite automata in compiler design and construction. (7 marks)

QUESTION FOUR (20 MARKS)

a).Discuss the role of syntax analysis in compiler design and construction in relation to the following: (12 marks)

i. Context-Free Grammar

ii. Syntax Analyzers

iii. Derivation

iv. Parse Tree

v. Ambiguity

vi. Precedence and Associativity

b) Discuss the four error recovery strategies in compiler design and construction. (8 marks)

QUESTION FIVE (20 MARKS)

a) Discuss the two types of parsing in compiler design and construction. (6 marks)

b) Discuss the role of symbol table in compiler design and construction. (7 marks)

c) Discuss the role intermediate code generation in compiler design and construction. (7 marks)

