(Knowledge for Development)

KIBABII UNIVERSITY COLLEGE

A CONSTITUENT COLLEGE OF
MASINDE MULIRO UNIVERSITY OF
SCIENCE AND TECHNOLOGY

UNIVERSITY EXAMINATIONS

2014/2015 ACADEMIC YEAR

THIRD YEAR SECOND SEMESTER

MAIN EXAMINATION

FOR THE DEGREE OF

BACHELOR OF SCIENCE COMPUTER SCIENCE

COURSE CODE: CSC 320

COURSE TITLE: COMPILER DESIGN

DATE: 5TH MAY, 2015 **TIME:** 8.00-10.00AM

Instructions to candidates:

This paper consists of FIVE Questions.
Answer Question ONE [30 Marks] and any other TWO Questions [20 Marks Each].
Write your college number on the answer sheet.

This paper consists of 3 printed pages

Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

SECTION A

Question 1: [30 MARKS] Compulsory

a)
i. Distinguish between an alphabet and a language (4 marks)
ii. Explain the activities that fall in front-end of a compilation process (6 marks)
iii. Distinguish between context-free grammar and context-sensitive grammar (4 Marks)
iv. What is a Compiler (2 Marks)

b)
i. Describe Three areas where compiler technology is applied (6marks)
ii. Describe THREE general tools that have been created for design of compiler (6 marks
iii. Explain the purpose of the Symbol table and Error handler in compiler design(2 Marks)

SECTION B: Answer any Two Questions from this section

Question 2: [20 Marks]

Give a regular expression for each of the regular sets described below. (10marks)

i) All strings of lower-case letters that either begin or end in a. Some example strings in the language: a, accc, abax, abaxa. Note: You may make a regular definition for lower-case letters.

ii) All strings of a's and b's that contain no three consecutive b's. Some example strings in the language: abab, abbaaa, eps (the empty string), baabb.

iii) Show that the following grammar is ambiguous (10 Marks)

A --> A x B
| x
B --> x B
| x

Question 3: [20 Marks]

a) List any THREE rules that must be followed during the code optimizing process (3 Marks)
b) Describe FOUR components of a context-free grammar (8 Marks)
c) Briefly discuss what the potential advantages/disadvantages are of bottom-up versus a top-down parser generators. (9 Marks)

Question 4: [20 Marks]

a) Given the following grammar:
Draw the parse tree for the following program (10Marks)
Module::= statement
statement ::= PRINT expression_list
expression_list ::= expression | expression COMMA expression_list
expression ::= INT | MINUS expression | expression PLUS expression

b) List the TWO ways intermediate codes can be represented (2 Marks)
c) Explain FOUR reason why reasons why we need an intermediate code. (8 Marks)

Question 5: [20 Marks]

a) Outline SIX semantic errors that the semantic analyzer is expected to recognize. (6 Marks)
b) Differentiate between a linker and a loader (4Marks)
c) Differentiate between machine dependent and machine independent code optimizations (5Marks)
d) Analyze the code below and come up with hierarchical structure of symbol tables. (10 marks)

```
. . .
int value=10;
void pro_one()
  {
  int one_1;
  int one_2;
       {          \
    int one_3;     |_  inner scope 1
    int one_4;     |
    }          /
      int one_5;
       {          \
    int one_6;     |_  inner scope 2
    int one_7;     |
    }          /
  }

void pro_two()
  {
  int two_1;
  int two_2;

    {          \
    int two_3;     |_  inner scope 3
    int two_4;     |
    }          /

  int two_5;
  }
. . .
```