ALUPE UNIVERSITY
COLLEGE
...Bastion of Knowledge...
P. O.Box 845-50400 Busia(K)
principal@auc.ac.ke
Tel: +254 741 217 185
+254 736 044 469
off Busia-Malaba road

OFFICE OF THE DEPUTY PRINCIPAL
ACADEMICS, STUDENT AFFAIRS AND RESEARCH

UNIVERSITY EXAMINATIONS

2020 /2021 ACADEMIC YEAR

THIRD YEAR SECOND SEMESTER REGULAR EXAMINATION

FOR THE DEGREE OF BACHELOR OF SCIENCE (COMPUTER SCIENCE)

COURSE CODE: **COM 321**

COURSE TITLE: **COMPILER DESIGN**

DATE: 13/07/2021 **TIME: 0800 – 1100 HRS**

INSTRUCTION TO CANDIDATES

a. **SEE INSIDE**

THIS PAPER CONSISTS OF 3 PRINTED PAGES **PLEASE TURN OVER**

REGULAR EXAM

COM 321: COMPILER DESIGN

STREAM: COM **DURATION: 3 Hours**

INSTRUCTION TO CANDIDATES

Answer **ALL** questions from section A and any **THREE** from section B.

SECTION A [24 MARKS] ANSWER ALL QUESTIONS.

QUESTION ONE [12 MARKS]

a. Explain the meaning of a compiler and why we need study it? **[3 marks]**

b. State at least six (6) parts that define the phases of a compiler. **[3 marks]**

c. What are the Error-recovery actions in a lexical analyzer? **[2 marks]**

d. Using a well labelled diagram describe two parts to compilation **[4 marks]**

QUESTION TWO [12 MARKS]

a. Why do you think compiler designers need some understanding of memory management? **[3 marks]**

b. Consider the code extract (statement) below:

result = exam + cat * 4;

i. Explain what happens to the statement during Lexical Analysis process? **[3 marks]**

ii. Explain what happens to the statement during syntax analysis (parsing) process. **[3 marks]**

iii. Construct and output the statement on a syntax tree after analysis. **[3 marks]**

SECTION B [36 MARKS]. ANSWER ANY THREE QUESTIONS.

QUESTION THREE [12 MARKS]

a. What is meant by ambiguous grammar? **[1 marks]**

b. Differentiate **tokens**, **patterns**, and **lexeme**. **[3 marks]**

c. What is a regular expression? State the rules, which define regular expression? **[4 marks]**

d. Explain with example any two flow of control statements involved in translation of Boolean expressions into 3-address code. **[4 marks]**

QUESTION FOUR [12 MARKS]

a. Distinguish between predictive parsers and LR parsers. **[4 marks]**

b. With the aid of diagrams, illustrate how predictive parsers and LR parsers would recognize a string based on a particular grammar. Give any grammar and string as examples. **[8 marks]**

QUESTION FIVE [12 MARKS]

a. Write the definition of symbol table and procedure to store the names in symbol table **[4 marks]**

b. Write the production rules to eliminate the left recursion and left factoring problems. **[4 marks]**

c. Construct a DAG for the expression: a+a*(b-c)+(b-c)*d **[4 marks]**

QUESTION SIX [12 MARKS]

a. You are about to write a parser for a small Java-like language that you are developing as part of your final year project. Would you prefer bottom-up or top-down parsing methods and why? **[6 marks]**

b. Explain in brief the various issues of design of a code generator **[6 marks]**

QUESTION SEVEN [12 MARKS]

a. What is type checking? **[1 marks]**

b. Explain using specific examples the differences between static checking and dynamic checking. **[3 marks]**

c. Differentiate between the concept **environment** and **state** in the context of a programming language. **[2 marks]**

d. Explain how declarations are processed by the computer taking care of nested procedures. Explain clearly the attributes used and show with an example how the symbol tables are formed. **[6 marks]**

****