OFFICE OF THE DEPUTY PRINCIPAL
ACADEMICS, STUDENT AFFAIRS AND RESEARCH

UNIVERSITY EXAMINATIONS

2021 /2022 ACADEMIC YEAR

THIRD YEAR SECOND SEMESTER REGULAR EXAMINATION

FOR THE DEGREE OF BACHELOR OF SCIENCE (COMPUTER SCIENCE)

MAIN EXAMINATION

COURSE CODE: **COM 321**

COURSE TITLE: **COMPILER DESIGN**

DATE: 31ST MAY, 2022   **TIME: 0900 – 1200 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]**

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