



**TECHNICAL UNIVERSITY OF KENYA
SCHOOL OF COMPUTING & INFORMATION TECHNOLOGY
BACHELOR OF TECHNOLOGY IN INFORMATION TECHNOLOGY**

ECII 3207: COMPILER DESIGN AND CONSTRUCTION

REVISION QUESTIONS

1. Describe peephole optimization and provide illustrative code
2. What does production of intermediate code refer to in the compilation process of some programming languages
3. What is Syntax directed translation? Describe the two concepts associated with syntax directed translation
4. Write some java code that given a postfix string representation of a simple mathematical equation, gives the answer. E.g.:
 - a. Input: 53-5* →output: Answer is 10
 - b. 863*+9+2- →output: Answer is 33

Show the necessary modifications such that the below output would be possible.

- c. 863*+9+-2 →output: Not well formed representation
5. Show the parse tree for a do ... while loop
6. When implementing a compiler, there is need to implement recognizers and parsers. Outline the meaning of each term. Demonstrate the implementation of recognizers for a given programming construct such as if Else ... statement.
7. In re-designing a new compiler, what are five considerations that one must deal with?
8. Compare and contrast: i) Recursive Descent parsing ii) Top-Down parsing iii) Predictive parsing
9. Construct a recursive-descent parser, starting with the grammar: **S -> + SS | -SS | a**
10. What are the benefits of the following?:
 - a. Pure machine code
 - b. Augmented machine code
 - c. Virtual machine code

11. Consider some statement like:

Salary = retainer + hoursWorked *2000

.....(Representing source code)

You are required to demonstrate the output of each of the following parts of a compiler (with code excerpts where necessary)

| Part of Compiler anatomy | Output |
|--------------------------|--------|
| Scanner | |
| Parser | |
| Semantic routines | |
| Optimizer | |
| Machine Code generator | |

12. Given some form of computation for which the expression $8+6*3+9-2$ yields 140, you are required to draw the parse tree, whose yield results in the value of the expression being 140.
- a. Give example production rules that could guide the parse tree you have generated using the following symbols: `expr`, `+`, `*`, `-`
1. Given the following, you are required to fill the table below as much as possible (Adding rows as necessary)

| | | |
|---|--------------------------|----------------------|
| A. Lexical analysis | B. Sequence of tokens | C. Source code |
| D. Code generation | E. Abstract syntax | F. Intermediate code |
| G. Instruction scheduling and register allocation | H. Valid abstract syntax | |
| I. Semantic and type analysis | J. Lexer | |
| K. Syntax analysis | L. parser | |
| M. Machine code generation | N. Machine code | |
| O. Code optimization | P. Code generator | |

| Input | Phase/stage | tool | output |
|-------|-------------|------|--------|
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