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18CS61

Sixth Semester B.E. Degree Examination, July/August 2022  
**System Software and Compilers**

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

**Module-1**

- 1 a. Explain in detail SIC/XE Machine Architecture. (10 Marks)  
b. List the various machine independent assembler features. Explain the control sections how the assembler convert them into object code. (10 Marks)

OR

- 2 a. Write an algorithm for One Pass Assembler and give sample object program from One Pass Assembler. (10 Marks)  
b. What are the basic functions of loader? Explain two ways of program relocation in loaders. (10 Marks)

**Module-2**

- 3 a. Explain various phases of Compiler. Show the translations for an Assignment statement.  
Position = Initial + rate \* 60.  
Clearly indicate the output of each phase. (12 Marks)  
b. What are the applications of Compiler? Explain (08 Marks)

OR

- 4 a. Write a brief note on Language Processing System. (06 Marks)  
b. Explain the concept of input buffering in the Lexical analysis with its implementation. (10 Marks)  
c. Define Token, Lexeme and Pattern with example. (04 Marks)

**Module-3**

- 5 a. Define Context Free Grammar. Obtain CFG to generate strings of a's and b's having substring "ab". (10 Marks)  
b. Consider grammar given below from which any arithmetic expressions can be obtained.  
 $E \rightarrow E + E$      $E \rightarrow E - E$      $E \rightarrow E * E$      $E \rightarrow E / E$      $E \rightarrow id$   
Show that the grammar is ambiguous for the sentence  $id + id * id$ . (10 Marks)

OR

- 6 a. Write an algorithm to eliminate left recursion from a grammar. Eliminate left recursion from the given grammar.  $S \rightarrow Aa | b$      $A \rightarrow Ac | Sd | \epsilon$ . (10 Marks)  
b. Define Shift - Reduce Parser and Handle. What are conflicts in shift - reduce parse, explain with example. (06 Marks)  
c. List and explain different actions of shift - reducer parser (04 Marks)

**Module-4**

- 7 a. Explain the three basic section of LEX program with example. (10 Marks)  
b. Write LEX program to count word, character and line count in a given file. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

OR

- 8 a. What is YACC? Explain the different sections used in writing the YACC specification. (10 Marks)  
Explain with example program.
- b. Define Regular Expression. What is the use of following Meta characters : (07 Marks)  
i) . ii) \* iii) ^ iv) \$ v) { } vi) ?
- c. Discuss how Lexes and Parser communicate. (03 Marks)

Module-5

- 9 a. Define S – Attribute and I – Attribute with respect to SDD and construct Syntax tree, Parse tree and annotated tree for string  $5 * 6 + 7$  by using given grammar. (10 Marks)
- |                                   |                                      |
|-----------------------------------|--------------------------------------|
| $S \rightarrow E n$               | $T \rightarrow T   F$                |
| $E \rightarrow E + T   E - T   T$ | $T \rightarrow F$                    |
| $T \rightarrow T * F$             | $F \rightarrow (E)   \text{digit}  $ |
|                                   | $n \rightarrow$                      |
- b. What are the different three address code instructions? Translate the arithmetic expression  $a + b - (-c)$  into quadruples, triplets and indirect triples. (10 Marks)
- OR
- 10 a. Define SDD. Give SDD for simple type declaration. Construct a dependency graph for the declaration `int a, b ;` (10 Marks)
- b. Explain the issues in design of code generation. (10 Marks)

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