



# CBCS SCHEME

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.

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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)  $\cdot$  ii)  $*$  iii)  $\wedge$  iv)  $\$$  v)  $\{ \}$  vi)  $?$  (03 Marks)
- c. Discuss how Lexes and Parser communicate.

**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)
- $$\begin{array}{ll} S \rightarrow En & T \rightarrow T | F \\ E \rightarrow E + T | E - T | T & T \rightarrow F \\ T \rightarrow T * F & F \rightarrow (E) | \text{digit} | \\ & n \rightarrow ; \end{array}$$
- 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

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- 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)