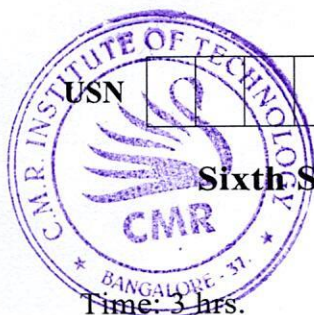


# CBCS SCHEME



18CS61

## Sixth Semester B.E. Degree Examination, Dec.2024/Jan.2025 System Software and Compilers

Max. Marks: 100

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

### Module-1

- 1 a. Define System Software. Distinguish between system software and application software. (06 Marks)
- b. Explain SIC/XE architecture (08 Marks)
- c. Write an algorithm for pass 2 assembler of SIC assembler. (06 Marks)

OR

- 2 a. Explain the data structure and pass 1 algorithm of SIC assembler. (08 Marks)
- b. List all assembler independent and dependent features and explain program relocation. (06 Marks)
- c. What is loader? What are the basic functions the loader has to perform? (06 Marks)

### Module-2

- 3 a. What is compiler? Explain various phases of compiler with the help of neat diagram. (10 Marks)
- b. Explain the concept of input buffering with sentinels in the lexical analysis. (06 Marks)
- c. List the formal definitions of operations on languages with notations. (04 Marks)

OR

- 4 a. Write the regular definition using extended regular expression notation and also draw the transition diagram to recognize the following tokens:  
(i) Identifier (ii) Unsigned (10 Marks)
- b. Explain three types of software productivity tools. (05 Marks)
- c. Enlist algebraic laws for regular expressions. (05 Marks)

### Module-3

- 5 a. Define left-recursion grammar, also write an algorithm to eliminate left recursion from a grammar. (05 Marks)
- b. How to verify whether grammar is LL(1) or not? Show that :  
 $S \rightarrow AaAb \mid BbBa$   
 $A \rightarrow E$   
 $B \rightarrow E$   
is LL(1), without constructing any table. (10 Marks)
- c. For the grammar  $A \rightarrow (A) \mid a$ , construct LR(0) set of items (05 Marks)



OR

- 6 a. Explain the working of shift reduce parser. Parse the input string  $id * id$  using the grammar.
- $$E \rightarrow E + T \mid T$$
- $$T \rightarrow T * F \mid F$$
- $$F \rightarrow (E) \mid id$$
- (08 Marks)
- b. With a diagram, explain the model of an LR parser. (04 Marks)
- c. For the given grammar  $E \rightarrow E + n/n$  construct parsing table of LL(1). Verify  $3+4+7$  and show each step of verification with reference to parsing table. (08 Marks)

**Module-4**

- 7 a. Explain the structure of LEX program, with an example. (06 Marks)
- b. Write a LEX program for the tokens given below:

Lexemes	Token Name	Attribute value
Any WS	-	-
if	if	-
then	then	-
else	else	-
Any id	id	Ptr to table entry
Any number	number	Ptr to table entry
<	relop	LT
<=	relop	LE
=	relop	EQ
<>	relop	NE
>	relop	GT
>=	relop	GE

- c. Write a LEX program to count the number of vowels and consonants in a given input string. (10 Marks)
- (04 Marks)

OR

- 8 a. List and explain with an example the different wildcard characters used in LEX. (08 Marks)
- b. Write a YACC program to evaluate the arithmetic expression. (06 Marks)
- c. Explain the structure of YACC program. (06 Marks)

CMRIT LIBRARY  
BANGALORE - 560 037

**Module-5**

- 9 a. Write annotated parse tree for  $3 * 5 + 4n$  using top down approach. Write semantic rules for each step. (10 Marks)
- b. Define (i) Synthesized attribute (ii) Inherited attribute. (06 Marks)
- c. Explain the concept of syntax directed definition. (04 Marks)

OR

- 10 a. Construct DAG and three address code for the following expression:  
 $a + a * (b - c) + (b - c) * d$  (04 Marks)
- b. Explain the following with an example:  
 i) quadruples ii) triples (08 Marks)
- c. Discuss the various issues in the design of a code generator. (08 Marks)

\*\*\*\*\*