



K.S. SCHOOL OF ENGINEERING AND MANAGEMENT, BENGALURU - 560109

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SESSION: 2022-2023 (EVEN SEMESTER)

QUESTION BANK- 1

Module 1- Introduction to System Software

1. Make use of following hardware features explain SIC-XE machine (a) Data formats (b) Instruction formats (c) Addressing modes (d) Memory (e) Registers.
2. Design an algorithm for Pass-2 of assembler.
3. Make use of pass 1 and pass 2 functions, explain three Data structure used in designing assembler.
4. What is Program relocation? With an example Show how program relocation is achieved for any object program.
5. Identify the fundamental functions of any assembler directives and explain types of directives used in SIC m/c.
6. Obtain the complete object program for the following program

```
SUM   START   4000
FIRST LDX     ZERO
      LDA     ZERO
LOOP  ADD     TABLE, X
      TIX    COUNT
      JLT    LOOP
      STA    TOTAL
      RSUB
TABLE RESW   2000
COUNT RESW  1
ZERO   WORD  0
TOTAL  RESW  1
      END    FIRST
```

Assume the following codes: LDX=04, LDA=00, ADD=18, TIX=2C, JLT=38, STA=0C, RSUB=4

7. **Outline** Basic Loader function and **design** an algorithm for Absolute loader.
8. **Explain** Literals and Control sections in details

Module 2- Lexical Analysis

1. **What** are compilers? **Explain** briefly application of compiler technology..
2. **Interpret** the structure of compiler with 7 phases.
3. **Explain** in detail the various phases of compilation for the input string
$$\text{position} = \text{initial} + \text{rate} * 60$$
4. **Differentiate** between compilers and Interpreters '
5. **Explain** role of lexical analyzer.
6. **Discuss** different compiler construction tool used in the design of compilers?
7. **Explain** language processing system with a diagram.
8. **List** and **explain** the applications of Compiler Technology.



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QUESTION BANK- 2

Module 2- Lexical Analysis(contd)

1. Explain input buffering with 2 buffering scheme.
2. Explain definition of operations on languages
3. Explain extensions of regular expression
4. Explain 4 parts of induction by taking languages $L(r)$ and $L(s)$ respectively.

Module 3- Syntax Analysis

5. Explain the role of a parser with neat diagram and error recovery strategies in syntax analysis
6. What is ambiguity in syntax analysis? Explain with an example.
7. Write a short note on formal definition of a context free grammar.
8. Explain left most and right most derivations with an example.
9. Write a short note on left recursion and left factoring and obtain left factoring for
 $S \rightarrow iEtS \mid iEtSeS \mid a$
 $E \rightarrow b$
10. Construct first and follow for the given grammar
 - i) $S \rightarrow ACB \mid CbB \mid Ba$
 $A \rightarrow a \mid \epsilon$
 $B \rightarrow b \mid \epsilon$
 $C \rightarrow c$
 $D \rightarrow d \mid \epsilon$
 $E \rightarrow e \mid \epsilon$
 - ii) $S \rightarrow ACB \mid CbB \mid Ba$
 $A \rightarrow da \mid BC$
 $B \rightarrow g \mid \epsilon$
 $C \rightarrow h \mid \epsilon$
11. What is top-down parsing and also obtain parse tree for input $id+id*id$
12. What is syntax error handling and explain common programming errors that occur at different levels.



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QUESTION BANK-3

Module 4- Lex and Yacc

1. Explain the communication between Parser and Lexer with neat block diagram.
2. Write the structure of a Yacc program.
3. Write a program using YACC tool to recognize all strings ending with b preceded by n a's using the grammar $a^n b$.
4. Explain Definition section and Rules section in YACC program.
5. Write a short on what YACC cannot parse with an example.
6. Write a structure of Lex specification.
7. Explain shift-reduce conflicts for "id*id" for grammar
 $E \rightarrow E+T \mid T$
 $T \rightarrow T * F \mid F$
 $F \rightarrow (E) \mid id$
8. Write a lex program to count number of lines, words, blanks and characters in a text file without command line and from command line.
9. Explain LEX v/s Handwritten Lexes with an example.
10. Explain Lex variables and Functions.
11. Explain Shift-reduce parser with 4 actions.
12. Explain compiling and running simple parser.
13. a) Write a lex program to count number of positive, negative integers/fractions.
b) Write a lex program to find length of each word.

Module 5- SDT, Intermediate code generation and code generation

1. Construct annotated parse tree and its syntax directed definition to obtain

a) $1 * 2 * 3 * (4 + 5) n$ for

$$\begin{aligned} L &\rightarrow E n \\ E &\rightarrow E + T \mid T \\ T &\rightarrow T * F \mid F \\ F &\rightarrow (E) \mid digit \end{aligned}$$

b) $3 * 5 + 4 n$ for

$$\begin{aligned} L &\rightarrow E n & F &\rightarrow (E) \\ E &\rightarrow E + T & F &\rightarrow (digit) \\ E &\rightarrow T \\ T &\rightarrow T * F \end{aligned}$$

2. Translate arithmetic expression $a * -(b+c)$ into
i) Quadruples ii) triples iii) Indirect triples
3. Discuss various issues in design of code generation.

4. By considering an array type $\text{int}[2][3]$, write SDT with semantic rules and its annotated parse tree.
5. Obtain directed acyclic graph for expression $a+a*(b-c)+(b-c)*d$ along with steps.
6. Mention the applications of Syntax directed translation and construct the syntax tree for "a-4+C"
7. Explain synthesized and inherited attributes with an example.
8. Construct dependency graph for declaration $\text{float id}_1, \text{id}_2, \text{id}_3$.