



CBCS SCHEME

17CS63

Sixth Semester B.E. Degree Examination, Jan./Feb.2021 System Software and Compiler Design

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 Architecture of SIC/XE machine. (10 Marks)
b. Generate the complete object program for following source program.

```
SUM      START      0
FIRST    LDX         #0
          LDA         #0
          +LDB        #TABLE2
          BASE        TABLE2
LOOP     ADD         TABLE, X
          ADD         TABLE2, X
          TIX         COUNT
          JLT         LOOP
          +STA        TOTAL
          RSUB
          COUNT      RESW      1
          TABLE     RESW      2000
          TABLE2    RESW      2000
          TOTAL      RESW      1
          END        FIRST
```

Given : ADD = 18, JLT = 38, LDA = 00, LDB = 68, LDX = 04,
RSUB = 4C, STA = 0C, TIX = 2C

(10 Marks)

OR

- 2 a. What are the fundamental functions of assembler? With an example give the list of assembler directives. (06 Marks)
b. List all assembler dependent and independent features and explain program relocation with an example. (08 Marks)
c. Define MACRO. Explain the various data structures involved in the design of MACRO PROCESSOR. (06 Marks)

Module-2

- 3 a. What are the basic functions loader has to perform? Develop an algorithm for absolute loader. (08 Marks)
b. Give the data structure involved in linking loader. And also write Pass 1 and Pass 2 algorithm of linking loader. (12 Marks)

OR

- 4 a. Discuss machine independent loader features. (10 Marks)
b. Differentiate between linking loader and linkage editors with a neat diagram. (05 Marks)
c. Write the short note on MS DOS linker. (05 Marks)

Module-3

- 5 a. With a neat diagram, explain the various phases of compiler by considering an example $A = B + C * 50$ (10 Marks)
 b. Write the Lex program that recognizes The tokens ws, if, Then, else, id, number and relational operator. (10 Marks)

OR

- 6 a. Explain briefly the various application of compiler technology. (10 Marks)
 b. Construct a transition diagram for relational operator. Sketch the program segment to implement it showing start and one final state. (10 Marks)

Module-4

- 7 a. What is recursive descent parser? Trace and explain the working of recursive descent parser for the input "bcd" and grammar.
 $A \rightarrow bCd$
 $C \rightarrow ce|c$ (10 Marks)
 b. Construct a predictive passing table by making necessary changes to the grammar given below,

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

(10 Marks)

OR

- 8 a. What is handle pruning? Give the bottom up parse for the input string $aaa*a++$ using the grammar
 $S \rightarrow SS+ \mid SS^* \mid a$ (06 Marks)
 b. Show that following grammar is not SLR(1)
 $S \rightarrow L = R \mid R$
 $L \rightarrow *R \mid id$
 $R \rightarrow L$ (08 Marks)
 c. Define operator grammar. Construct operator precedence parser for the given grammar and parse the input $id+id*id$
 $E \rightarrow E+E \mid E * E \mid id$ (06 Marks)

Module-5

- 9 a. What is SDD? Write the SDD for simple Desk calculator and show the annotated parse tree for the expression $1*2*3*(4+5)n$. (10 Marks)
 b. What is DAG? Draw the DAG for the expression $a + a*(b-c)+(b-c)*d$ and show the steps in the construction. (10 Marks)

OR

- 10 a. Explain the various design issues in the code generation phase. (10 Marks)
 b. Translate the following arithmetic expression,
 $a = b * -c + b * -c$ into
 (i) Syntax tree
 (ii) Three address code
 (iii) Quadruples
 (iv) Triples
 (v) Indirect Triples (10 Marks)
