CBCS SCHEME

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17CS63

Sixth Semester B.E. Degree Examination, Jan./Feb. 2023
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 SIC/XE architecture. Compare SIC and SIC/XE architecture. **(10 Marks)**

b. With suitable code and data structure, explain pass 1 of two pass assembler. **(10 Marks)**

OR

2 a. Generate the object code for the following SIC/XE program. LDX = 04 , LDA = 00 , LDB = 68 , STA = 0C , ADD = 18 , TIX = 2C , JLT = 38 , RSUB = 4C

```
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
```

(10 Marks)

b. Explain in detail with suitable examples machine independent assembler features. **(10 Marks)**

Module-2

3 a. List the basic functions of loader. Write and explain the SIC/XE program for Bootstrap loader. **(10 Marks)**

b. With suitable example, explain the concept of relocation and program linking in loaders. **(10 Marks)**

OR

4 a. Outline the data structure used for pass 1 linking loader. Write algorithm for pass 1 of linking loader. **(10 Marks)**

b. Discuss the following :

i) How automatic library search is performed using loaders?

ii) Loader design options. **(10 Marks)**

Module-3

5 a. What is compiler? With a neat diagram explain the different phases of compiler with an example. **(10 Marks)**

b. Differentiate between compiler and interpreter. **(05 Marks)**

c. List and discuss the applications of compiler and compiler construction tools. **(05 Marks)**

OR

6 a. Why 2-buffer technique is used in lexical analyzer? Write an algorithm for lookahead code with sentinel. **(07 Marks)**

b. Write transition diagram for the following :
i) relop
ii) unsigned number
iii) identifiers
iv) tokens **(08 Marks)**

c. Explain error recovery in various stages of compiler design. **(05 Marks)**

Module-4

7 a. What is meant by reduction and handle? How it helps on Shift-Reduce parsing? **(08 Marks)**

b. Explain Backtracking in LL(1) parser with an example. **(04 Marks)**

c. Explain following terms with an example:
(i) Left recursion (ii) Left factoring **(08 Marks)**

OR

8 a. Write rules to compute FIRST( ) and FOLLOW( ) sets. Find FIRST and FOLLOW for the following grammar.

$S \rightarrow iEtSS_1 \mid a$

$S_1 \rightarrow eS \mid E$

$E \rightarrow b$ **(08 Marks)**

b. Construct LR(0) automaton and parsing table for the following grammar.

$S \rightarrow CC$

$C \rightarrow cC \mid d$ **(08 Marks)**

c. Write a note on parser generator – yacc. **(04 Marks)**

Module-5

9 a. Explain the following terms with an example:
i) Quadruple
ii) Triple
iii) Indirect triple
iv) Static single assignment form. **(08 Marks)**

b. Define SDD. Explain synthesized and inherited attributes with an example. **(06 Marks)**

c. Write SDD for the simple desk calculator and show annotated parse tree for the expression
3 * 5 + 4n **(06 Marks)**

OR

10 a. Obtain DAG for the expression (a + a *(b – c) + (b – c) * d) and write 3AC for the same. **(06 Marks)**

b. Discuss various issues in the code generation phase. **(10 Marks)**

c. Construct Syntax tree for the expression a – 4 + c by using suitable SDD. **(04 Marks)**

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