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15CS63

Sixth Semester B.E. Degree Examination, Dec.2018/Jan.2019 System Software and Compiler Design

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Explain in detail SIC/XE machine architecture. (08 Marks)
- b. Write an SIC/XE program to calculate $\Delta = \alpha + \beta * \gamma - 10$ (08 Marks)

OR

- 2 a. Write an algorithm for Pass – 1 of an assembler. (08 Marks)
- b. Generate the object code for the following SIC/XE source program.

```

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

Mnemonic	ADD	JLT	LDA	LDB	LDX	RSUB	STA	TIX	JSUB	J	LDT	CLEAR
opcode	18	38	00	68	04	4C	0C	2C	08	3C	74	B4

(08 Marks)

Module-2

- 3 a. Write PASS-1 and PASS-2 algorithm for a linking loader. (08 Marks)
- b. Explain dynamic linking, automatic library search, loader design options with suitable examples. (08 Marks)

OR

- 4 a. Write the SIC/XE program for a bootstrap loader with suitable comments. Explain in brief the algorithm of a bootstrap loader. (08 Marks)
- b. Explain in brief (i) MS-DOS linker and (ii) CRAY MPP linker. (08 Marks)

Module-3

- 5 a. List and explain the various phases of a compiler and show the output of each phase for the expression $a := b + c * 25$ (08 Marks)
- b. Construct transition diagram for recognizing relational operators. Sketch the program segment to implement it, showing the first state and one in final state. (08 Marks)

OR

- 6 a. Explain input buffering strategy used in lexical analysis phase. (06 Marks)
 b. Write the regular definition for unsigned number, also write the transition diagram. (06 Marks)
 c. Construct the transition diagrams for a set of keywords like begin, end, if then and else and identifiers and constants along with a minimum set of relational operators. (04 Marks)

Module-4

- 7 a. What is shift reduce parser? Explain the conflicts that may occur during shift reduce parsing. (04 Marks)
 b. Construct LALR parsing tables for the grammar shown below using LR(1) items.

$$S' \rightarrow S$$

$$S \rightarrow Cc$$

$$C \rightarrow cC \mid d$$
 (08 Marks)
 c. How left recursion can be eliminated from grammars? Write down the simple arithmetic expression grammar and rewrite the grammar after removing left recursion. (04 Marks)

OR

- 8 a. What is left factoring? Rewrite the following grammar after “left factored”

$$S \rightarrow iEts \mid iEtSeS \mid a$$

$$E \rightarrow b$$
 (04 Marks)
 b. Write a note on the parser generator – yacc. (04 Marks)
 c. Construct canonical LR(1) items for the augmented grammar

$$S' \rightarrow S ;$$

$$S \rightarrow Cc$$

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

Module-5

- 9 a. Define synthesized and inherited attributes with examples. (04 Marks)
 b. Briefly explain the main issues in code generation. (08 Marks)
 c. Explain in brief dead code elimination. (04 Marks)

OR

- 10 a. Construct DAG for the expression

$$a + b * (a + b) + c + d$$
 (04 Marks)
 b. Give SDD of a simple calculator. (04 Marks)
 c. Write a note on common sub expression. (04 Marks)
 d. What are the steps involved in optimization of basic blocks. Explain any 2 steps in brief. (04 Marks)

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