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CBCS SCHEME

USN

15CS63

Sixth Semester B.E. Degree Examination, June/July 2019
System Software and Complier 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 SIC/XE architecture.   (08 Marks)
   b. Generate the complete object program for the following SIC/XE assembly program.

WRREC	START	405D
	CLEAR	X
	LDT	LENGTH
WLOOP	TD	OUTPUT
	JEQ	WLOOP
	LDCH	BUFFER, X
	WD	OUTPUT
	TIXR	T
	JLT	WLOOP
	RSUB	
OUTPUT	BYTE	X '05'
	END	

Address of BUFFER	4033
Address of LENGTH	4036

Op Codes :
CLEAR – B4 ;   JEQ – 30;   WD – DC;   JLT – 38;
LDT – 74;   LDCH – 50;   TIXR – B8;   RSUB – 4C.   (08 Marks)

OR

2 a. List all assembler independent and dependant features and explain program relocation.
                                                                                     (05 Marks)
   b. Explain the data structures used in macro processor with example.   (03 Marks)
   c. Explain the following macroprocessor independent features.
       i) Generation of unique lables
       ii) Keyword macro parameter.   (08 Marks)

Module-2

3 a. What is loader? What are the basic functions the loader has to perform?   (04 marks)
   b. Develop an algorithm for bootstrap loader.   (07 marks)
   c. Explain dynamic linking with suitable diagram.   (05 Marks)

OR

4 a. Differentiate between a linking loader and linkage editor, with the help of suitable diagram.
                                                                                     (08 marks)
   b. Explain different loader option commands with examples.   (04 marks)
   c. Illustrate MS – DOS object module with its record types.   (04 Marks)

Module-3

5 a. With the help of a diagram, explain the various phases of complier. (08 Marks)
   b. Explain the concept of input buffering in the lexical analysis. (04 Marks)
   c. What design objectives, complier optimizations must meet. (04 Marks)

OR

6 a. Write a LEX program for the tokens given below : (08 Marks)

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
<	reloop	LT
<=	reloop	LE
=	reloop	EQ
< >	reloop	NE
>	reloop	GT
>=	reloop	GE

   b. Write regular definitions for unsigned numbers and draw the transition diagram for the same. (08 Marks)

Module-4

7 a. Define left recursion grammer, eliminate left recursion from the following grammer :

$S \rightarrow aB \mid ac \mid sd \mid se$

$B \rightarrow b\ Bc \mid f$

$C \rightarrow g.$ (03 Marks)

   b. Consider the following context free grammer $S \rightarrow SS + \mid SS * \mid a$ and the input string $aa + a*$
   i) Give LMD and RMD
   ii) Parse tree
   iii) Is the grammer ambiguous? Why
   iv) Describe the language generated by the grammer
   v) Left factor the grammer. (05 Marks)

   c. Consider the following grammer with terminals (, [,),]

$S \rightarrow TS \mid [S] S \mid)S \mid \in$

$T \rightarrow (x)$

$X \rightarrow TX \mid [X] X \mid \in$

   i) Construct first and follow sets
   ii) Construct its LL(1) parsing table
   iii) Is this grammer LL(1)? (08 marks)

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OR

8 a. The following is ambiguous grammer

   $S \rightarrow AS \mid b$

   $A \rightarrow SA \mid a$

   Construct for this grammer its collection of sets of LR(0) items. IF we try to build an LR – parsing table for the grammer, there are certain conflicting actions what are they? Suppose we tried to use the parsing table by non deterministically choosing a possible action whenever there is a conflict, show all the possible sequences of actions on input abab$. **(10 Marks)**

   b. What are the actions of a shift – reduce parser. Design shift – reduce parser for the following grammer on the input 10201 $S \rightarrow 0 \ S \ 0 \mid 1 \ S \ 1 \mid 2$. **(06 Marks)**

Module-5

9 a. Consider the context free grammer given below :

   $S \rightarrow EN$

   $E \rightarrow E + T \mid E - T \mid T$

   $T \rightarrow T * F \mid T / F \mid F$

   $F \rightarrow (E) \mid digit$

   $N \rightarrow ;$

   i) Obtain the SDD for the above grammer

   ii) Construct annotated parse tree for the input string $5 * 6 + 7$. **(08 Marks)**

   b. Obtain the DAG for the expression, show the steps $a + a * (b - c) + (b - c) * d$. **(04 Marks)**

   c. Translate the assignment

   $a = b * - c \ + b * - c$ into

   i) Three address code

   ii) Quadruples. **(04 Marks)**

OR

10 a. Explain the issues in the design of a code generator. **(11 marks)**

   b. Write the machine instructions for the following three address instructions :

   i) $b = a[i]$

   ii) $a[j] = c$

   iii) $x = *p$

   iv) $*p = y$

   v)   if $x < y$ got L. **(05 Marks)**

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