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15CS63

Sixth Semester B.E. Degree Examination, Jan./Feb. 2021
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. What is System Software? Compare system software with application software and give examples. **(04 Marks)**
   b. Explain the instruction formats and addressing modes of SIC/XE Machine Architecture. **(08 Marks)**
   c. Write a sequence of instructions for SIC/XE to clear a 20 byte character string to all blank. **(04 Marks)**

OR

2 a. What are the Fundamental functions that any Assembler must perform? Explain any six assembler directives with example. **(08 Marks)**
   b. What is MACRO? Briefly discuss various data structures required for design of MACRO PROCESSOR. **(08 Marks)**

Module-2

3 a. Explain the working of Linkage editor and Linking loader. **(08 Marks)**
   b. What is a Loader? Develop an algorithm for Bootstrap loader. **(08 Marks)**

OR

4 a. What is Relocation? Explain the methods for specifying relocation as a part of object program. **(08 Marks)**
   b. Describe the features of the Sun OS linkers for SPARC systems. **(08 Marks)**

Module-3

5 a. Explain the various phases of compiler with a neat diagram. Show the transformation made by each of these phases for the statement a = b + c * 20, where a, b, and c are reals. **(10 Marks)**
   b. Construct a transition diagram for relational operator. Write the program segment to implement it showing the first state and one final state. **(06 Marks)**

OR

6 a. What is printed by following 'C' program Fragment

```
# define a(x + 1)
int x = 2 ;
void b ( ) {int x = 1 ; printf("% d\n", a);}
void c ( ) {printf("% d/n", a);}
void main ( ) {b ( ) ; c ( );}.
```
   (03 Marks)
   b. Give the reasons, why the analysis portion of a compiler is separated into lexical analysis and parsing phases. **(03 Marks)**
   c. Explain the structure of Lex program and write a Lex program that recognize the tokens if, then, else, id , number and relational operator. **(10 Marks)**

Module-4

7 a. Construct a predictive parsing table for the following grammar by making suitable changes to it. $E \rightarrow E + E \mid E * E \mid (E) \mid id$. **(10 Marks)**

b. What is Handle Pruning? Construct Bottom up parse tree for the input string w = aaa * a++ using the grammar $S \rightarrow S S + \mid S S * \mid a$. **(06 Marks)**

OR

8 a. Show that following grammar is not SLR (1).

$S \rightarrow L = R \mid R$
$L \rightarrow * R \mid id$
$R \rightarrow L$. **(10 Marks)**

b. What is a Shift – reduce Parsing? What are the actions of Shift – reduce Parser? Explain. **(06 Marks)**

Module-5

9 a. Write the SDD for simple type declaration and construct dependency graph for a declaration float id_1 , id_2 , id_3. **(08 Marks)**

b. Translate the arithmetic expression a + - (b + c) into
   i) Syntax tree.
   ii) Quadruples.
   iii) Triples.
   iv) Indirect triples. **(08 Marks)**

OR

10 a. Discuss the various issues in the design of Code generator. **(10 Marks)**

b. Give SDD for simple desk calculator and construct annoted parse tree for the expression (3 + 4) * (5 + 6)n. **(06 Marks)**

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