CBCS SCHEME

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15CS63

Sixth Semester B.E. Degree Examination, Aug./Sept.2020
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 SIC Architecture in detail. **(06 Marks)**

b. Explain the data structures and Pass-1 algorithm of SIC/ME assembler. **(06 Marks)**

c. List out the differences between system software and application software. **(04 Marks)**

OR

2 a. List the different addressing modes used in SIC/XE. Give instructions format for each and explain the addressing mode. **(08 Marks)**

b. Generate the machine code for the following :

(i) 0000 +JSUB RDREC
(ii) 0004 STL RETADR
(iii) 0008 LDB #LENGTH
(iv) 000A CLEAR X

Assume the opcodes are:
JSUB = 48_H, STL = 14_H, LDB = 60_H, CLEAR = $B4_H$
The LC value for : RDREC = 1036_H
RETADR = 0030_H , LENGTH = 0033_H
The mnemonics values for registers are
A = 0, X = 1, L = 2, B = 3, S = 4, T = 5, F = 6, Pc = 8, SW = 9. **(08 Marks)**

Module-2

3 a. With an example show how relocation and linking operations are performed. **(08 Marks)**

b. With source code, explain the working of boot-strap loader. **(08 Marks)**

OR

4 a. Explain machine independent loader features given an example with implementation. **(08 Marks)**

b. With a neat diagram, explain how object program can be processed using linkage loader and linkage editor. **(08 Marks)**

Module-3

5 a. With a neat diagram explain the different phases of the complier. **(10 Marks)**

b. Explain the concept of input buffering with its implementation. **(06 Marks)**

OR

6 a. Describe language processing system with a neat diagram. **(06 Marks)**

b. Write the transition diagram for the following :

(i) relop (ii) unsigned numbers (iii) identifiers **(06 Marks)**

c. Differentiate between compiler and interpreter. **(04 Marks)**

Module-4

7 a. Compute : (i) First( ) and Follow( )
(ii) Predictive parsing table for the given grammar

$D \rightarrow L \; ; T$
$L \rightarrow L \; ; id \mid id$
$T \rightarrow int \mid real$

(06 Marks)

b. Consider the CFG with the production set,

$E \rightarrow E + T \mid T$
$T \rightarrow TF \mid F$
$F \rightarrow F* \mid a \mid b$

Compute the following,
(i) FIRST( ) and FOLLOW( )
(ii) Set of LR(0) items
(iii) SLR parsing table. (10 Marks)

OR

8 a. Compute the following for the given grammar.

$S \rightarrow AA$
$A \rightarrow a \mid b$

(i) LR(1) items (ii) Canonical Parsing table (iii) Verify for any valid string. (10 Marks)

b. Write a short note on shift reduce parsing with an example. (06 Marks)

Module-5

9 a. Write the annotated parse tree and its syntax directed definition to obtain $1 * 2 * 3 * (4 + 5)n$ for the grammar

$L \rightarrow En$
$E \rightarrow E + T \mid T$
$T \rightarrow T * F \mid F$
$F \rightarrow (E) \mid digit$

(06 Marks)

b. Translate the arithmetic expression :
$a * -(b + c)$ into
(i) Quadruples (ii) Triples (iii) Indirect triples (06 Marks)

c. Discuss various issues in the design of code generation. (04 Marks)

OR

10 a. By considering an array type int[3][3], write syntax directed translation with semantic rules and its annotated parse tree. (06 Marks)

b. Obtain the directed acyclic graph for the expression $x + x * (y + z) + (y + z) * w$, along with the steps. (06 Marks)

c. Generate assembly level language code (target code) for the following three address sequence assuming that p and q are in memory locations:

y = *q
q = q + 4
*p = y
p = p + 4

(04 Marks)

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