Minor Exam

Masters of Computer Applications

MCAC 401: Compiler Design

Unique Paper Code: 223401402

Semester IV

March-2022

Year of admission: 2020

Time: One Hour **Max. Marks: 20**

1. Consider the following grammar with set of non-terminals as {S, V, E} and set of terminals as {x, =, n}. S is the start symbol. **(6 Marks)**

   $S \rightarrow x$
   $S \rightarrow V = E$
   $V \rightarrow x$
   $E \rightarrow V \mid n$
   Construct LR (1) set of items and GOTO graph (DFA).

2. Consider the following Syntax Directed Translation (SDT): **(3 Marks)**

   $T \rightarrow DA$ $\quad \{t = D.type; w = D.width\}$
   $D \rightarrow \boldsymbol{int}$ $\quad \{D.type = integer;\ D.width = 4;\}$
   $D \rightarrow \boldsymbol{float}$ $\quad \{D.type = float;\ D.width = 8;\}$
   $A \rightarrow \in$ $\quad \{A.type = t; A.width = w;\}$
   $A \rightarrow [\ \boldsymbol{num}\ ]\ A_1$ $\quad \{ array(num.value, A_1.type);$
   $A.width = num.value \times A_1.width;\ \}$
   Construct an annotated parse tree for the type expression $\boldsymbol{float}$ [2][3][4] showing all dependencies.

3. In structured query language (SQL), keywords and identifiers are case insensitive. Write a Lex program that recognizes SELECT, FROM, and WHERE, identifiers may be considered to be a sequence of letters and digits, beginning with a letter. **(6 Marks)**

4. Write the syntax directed translation (SDT) to convert the following statement to three-address instructions. Also, generate the corresponding three-address instructions.

   $if(x < 10 \ ||\ x > 20 \ ||\ x! = y)\ \{x = 0;\}$ **(5 Marks)**