SVKM's NMIMS
MUKESH PATEL SCHOOL OF TECHNOLOGY MANAGEMENT & ENGINEERING

Programme: B.Tech (Computer)   Year: IV   Semester: VII

Academic Year: 2019-20

Subject: Principles of Compiler Design

Date: 13 November 2019

Marks: 70
Time: 2.00 pm - 5.00 pm
Durations: 3 (hrs)
No. of Pages: __2__

Final Examination (2019-20)

Instructions: Candidates should read carefully the instructions printed on the question paper and on the cover of the Answer Book, which is provided for their use.

1) Question No. _1_ is compulsory.
2) Out of remaining questions, attempt any __4__ questions.
3) **In all _5_ questions to be attempted**.
4) All questions carry equal marks.
5) **Answer to each new question to be started on a fresh page.**
6) **Figures in brackets on the right hand side indicate full marks**.
7) **Assume suitable data if necessary.**

Q.1		Attempt All	
	A.	Write the difference between Interpreter and Compiler.	(3)
	B.	Draw and explain phases of compiler.	(4)
	C.	What is the need of Lexical Analysis Phase?	(3)
	D.	Write the difference between machine dependent and machine independent code optimization	(4)

Q.2   Attempt All

    A. Discus various issue in Lexical Analysis. What do you understand by terms tokens, (7) patterns and lexemes.

    B. Design LALR Parser for following grammar (7)

$S \rightarrow Aa$
$S \rightarrow bAc$
$S \rightarrow dc$
$S \rightarrow bda$
$A \rightarrow d$

Parse the input string "bdc".

Q.3   Attempt All

    A. The following grammar is not suitable for a top down predictive parser. Identify the (7) problem and correct it by rewriting the grammar. Show that your grammar satisfies *LL (1)*. Condition by building *LL (1)* parse table for it.

$P \rightarrow Ra \mid Qba$

$R \rightarrow aba \mid caba \mid Rbc$

$Q \rightarrow bbc \mid bc$

Also parse the string "cababca" using LL(1) table.

B. What is the importance of Intermediate Representation? Consider the following (7)
SDT to generate the syntax tree for type checking on the *(2+3) ==8.*

$E \rightarrow E_1 + E_2 \{if ((E_1.type == E_2.type) \&\& (E_1.type==int))$
  $then\ E.type = int\ else\ error;\}$
$\mid E_1 == E_2 \{ if ((E_1.type == E_2.type) \&\&$
      $(E_1.type==int/boolean\ ))\ then\ E.type = int$
      $else\ error;\}$
$\mid (E_1)\ \{E.type=E1.type;\}$
$\mid num\ \{ E.type=int;\}$
$\mid True\ \{ E.type=bool;\}$
$\mid False\ \{ E.type=bool;\}$

Q.4   Attempt All

A. What is three address code representation? Consider the following expression and (7)
obtain Quadruple and triple form.

$a = b + c * d;$

B. Define the meaning of term basic induction variable and other induction variable with (7)
suitable example.

Q.5   Attempt All

A. Explain the major issues of code generation phase. (7)
Explanation of each issue for 1 mark

B. Consider the following three address code statement (7)

$T1=A+B$

$T2=C+D$

$T3=E-T2$

$T4=T1-T3$

   a) Construct a directed a cyclic graph (DAG)
   b) Construct a code sequence by applying following algorithm

   begin
       select an unlisted node n, all of whose parents have been listed;
       list n;
   while the left most child m of n has no unlisted parents and is not a leaf **do**
   begin
     list m;
       n:=m;
     end
   end

Q.6   Attempt All

A. Explain Peephole optimization. List and explain operation of Peephole optimization. (7)

B. Compute DAG for following three address statement. Considering this DAG as an (7)
example the process of code generation from DAG

   $t1=a+b$

   $t2=c+d$

   $t3=e-t2$

   $t4=t1-t3$

Q.7   Attempt All

A. Write a short note on Input buffering scheme. (4)

B. Write a short note on Symbol Table management. (4)

C. Briefly explain LEX tool. (3)

D. Describe how various phases could be combined as a pass in a compiler. (3)