BETCE 3RD YEAR 2ND SEM. EXAM.-2018

SYSTEM SOFTWARE

Time: Three hours   Full Marks: 100

Set I   Answer any *ten* questions   Each question carries *two* marks   10x2

1. a) The first phase of a compiler, called the ....analyzer, or........., separates characters of the source language into groups that logically belong together; these groups are called......

    b) We treat token as a pair consisting of two parts: ....and.................................

    c) A grammar G that produces more than one parse tree for some sentences is called .... grammar.

    d) Write a regular expression to represent the set of all strings of a's and b's having exactly one 'a' or one 'b'.

    e) For constants, identifiers, array names, the compiler maintains a table called...........................

    e) Name a phase in the compilation process which is an optional phase

    f) Which phase of the compiler would detect the error of a missing right parentheses in the statement $xyz(a+2*(3+b))$?

    g) Replacement or run-time computations by compile time computations is called..........................

    h) .... involves replicating the body of the loop to reduce the number of tests required to be carried out, if the number of iterations are constant.

    i) ....involves merging the bodies of the two loops if the two loops have same number of iterations and they use the same indices.

    j) What is an assembler directive?

    k) What are the important issues in code generation?

    l) Name four mnemonic codes used in assembler.

Set II   Answer any *three* questions   Each question carries ten marks   10x3

2. a) Which feature of the assembly language lead to the development of a two pass assembler? Name the data structures involved in the two passes of an assembler?

    b) Define the functions of DEFTAB and a NAMTAB. How are they accessed?

    c) Explain the operation of a two pass assembler to be used in a hypothetical machine

    d) Suppose that a computer primarily uses direct addressing. But has several different instructions formats. What problems does this create for the relocation-bit approach to progress relocation? How might these problems be solved?

[Turn over

Set III   Answer any *three* questions   Each question carries *ten* marks   10x3

3. a) How should a programmer decide whether to use a macro or a subroutine to accomplish a given logical function? Illustrate with a suitable example.

    b) Describe how the lexical specifications of a programming language can be described by regular expressions.

    c) Give an example of code optimization by elimination of common subexpressions and removal of loop invariants.

    d) What are the statements in macro definition?
       Define macro expansion. What are the key notions in macro expansion?

    e) Consider the following piece of code:
       begin
       while a>b do
       begin
       x=y+z
       a=a-b
       end
        x=y-z
       end
       Construct the corresponding parse tree

Set IV   Answer any *two* questions   Each question carries *ten* marks   10x2

4. a) Explain the different phases of the compiler with the following code fragment-
       a=(b+c)*(b+c)*z

    b) What are the basic objectives of lexical analysis? What are tokens? Convert the following source program into a stream of tokens (assuming an appropriate encoding scheme)-

       while (A<B) do

           if (C>D) then X:=Y+Z

           else X:=Y-Z;

    c) Design a finite automaton (M) over the alphabet $\Sigma=\{0,1\}$, such that M accepts all binary strings whose decimal equivalents are divisible by 5.

    d) Construct an NFA for the following regular expression R.
       $R = a|abb|a*bb*$

       Derive a DFA for the NFA obtained, minimize the states of the DFA and show the result in the form of a state table.