BETCE 4th YEAR 1st SEM. EXAM.-2024

SYSTEM SOFTWARE

Time: Three hours | Full Marks: 100

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

1. a) There are ____ registers in a SIC machine architecture.
   b) What does the SYMTAB hold?
   c) LOCCTR is a variable that is used to help in the assignment of _____.
   d) Load-and-go assembler does not need a _____ .
   e) The linkage editor performs _____ of all control sections relative to the start of the linked program.
   f) Linking loader performs linking operation at load time. The scheme that postpones the linking function until execution time is called _____ _____ .
   g) The main data structure needed for the linking loader is the _____.
   h) All the literal operands used in a program are gathered together into one or more _____ .
   i) The symbol &EORCK is a macro time variable, also called a ____ _____, which can be used to store working values during the macro expansion.
   j) What does MEND signify?
   k) The argument table ARGTAB stores the _____ according to their position in the _____ list, when a macro invocation statement is recognized.
   l) Replacement of run-time computations by compile time computations is called _____.
   m) _____ 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.
   n) It is convenient to regard a source program statement as a sequence of _____ rather than simply as a string of characters.
   o) Finite automata provides an easy way to visualize the operation of a _____ .
   p) Write a regular expression to represent the set of all strings of 1's and 0's having exactly one '1' or one '0'.

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

2. a) What are the special uses for the registers of a SIC.What are the uses of the additional registers of SIC/XE? Mention the mnemonics used to represent them. 4+4+2

   b) Mention the functions involved in translation of source program to object code. What is the significance of the three types of records in a simple objet program? 5+5

c) Define Bit Mask. In a complex computer that runs more than one program will the absolute loader be efficient? Suggest a solution if not.

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? 5+5

e) Immediate operands and literals are both ways of specifying an operand value in a source statement. What are the advantages and disadvantages of each? When might each be preferred to the other? 6+4

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

3. a) Some macro processors allow macro instructions in which some of the parameters are keyword parameters and some are positional parameters. How could a macro processor handle such mixed-mode macro instructions? Give examples. 4+6

b) Describe how the lexical specifications of a programming language can be described by regular expressions. 10

c) How do we increase the efficiency of a Linkage editor? Discuss from memory usage perspective. 10

d) 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 10

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

4. a)(i)What kinds of source program errors would be detected during lexical analysis?

(ii)What kinds of source program errors would be detected during syntactic analysis? 5+5

b) Give the intermediate code of the following subroutine in the form of quadruples- 10

BEGIN

```
        SUM     :=0;
        SUMSQ  :=0;
        FOR     I:= 1 TO 100 DO
                BEGIN
                        READ (VALUE);
                        SUM    := SUM + VALUE;
                        SUNSQ := SUMSQ + VALUE * VALUE
                END
        MEAN      := SUM DIV 100;
        VARIANCE  := SUMSQ DIV 100- MEAN * MEAN;
        WRITE (MEAN, VARIANCE)
END
```

c) Construct an NFA for the following regular expression R.

$R = a|ab\ *|aa\ *\ b$

Derive a DFA for the NFA obtained, minimize the states of the DFA and show the result in the form of a state table. 10

d) Draw a state diagram for a finite automaton to recognize a token type named "real constant". This token consists of a string of digits that contains a decimal point. There must be at least one digit before the decimal point. 10