BETCE 4th YEAR 1st SEMESTER EXAM.-2025

SYSTEM SOFTWARE

Full Marks:100 Time 1 hour

CO1 Answer any 10 of the following questions. Marks:10x2=20

a) State the main difference between a SIC machine and a SIC/XE machine.
b) What do you understand by *forward reference*?
c) What is a *literal pool*?
d) The assembler enters _____ into SYMTAB when it enters EQU statement.
e) Which assembler directive is used to assign values to symbols indirectly?
f) What is the role of LOCCTR?
g) The MASM assembler was developed for which systems?
h) The linkage editor performs _____ of all control sections relative to the start of the linked program.
i) State what the Header record contains in an Absolute Loader?
j) Relocation bits are arranged together to form a _____.
k) What is dynamic linking?
l) What is a *macro call*?
m) How is ARGTAB used for a macro call?
n) Give another name for bottom-up parsing.

CO2 Answer any *three* questions Marks:10x3=30

1. (i) What are SIC assembler directives? Give examples. (ii)How is compatibility ensured between SIC and SIC/XE machines? 5+5
2. Define Control Section of a program. What is its function? How are they different from PCBs? 3+3+4
3. Immediate operands and literals are both ways of specifying an operand value in a source statement. State the advantages of each methods? Explain with examples when each one will be preferred over the other. 4+6
4. The BASE statement gives information to the assembler after which the programmer must also write an instruction like LDB to load the correct value into the base register. Explain whether the assembler can automatically generate the LDB instruction from the BASE statement. Also, state the advantages and disadvantages of this method. 5+5
5. Explain the bit mask approach to relocation? 10

CO3 Answer any *three* questions Marks:10x3=30

1. Parse this statement "SUMSQ:=SUMSQ+VALUE*VALUE" by using the recursive descent method. 10
2. 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
3. Demonstrate how a nonrecursive macro processor allows for the invocation of macros within macros. State the advantages and disadvantages of such method. 6+4
4. Assume the array D is declared as

   D: ARRAY [-10..10,2..12] OF INTEGER

   and is stored in row-major order. Generate quadruples for the statement D[I,J] := 0
   Repeat the same for a column-major order. 5+5
5. The code-generation routines in the text use immediate addressing for integers written by the programmer in arithmetic expressions (for example, the 100 in the expression SUM DIV 100). Examine how such constants could be handled by a compiler for a machine that does not have immediate addressing? 10

Set IV Answer any *two* questions Marks:10x2=20

1. Explain the different phases of the compiler with the following code fragment-
   a=(b+c)*(b+c)*z 10
2. 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;
```

   4+2+4
3. Design a finite automaton (M) over the alphabet Σ={0,1}, such that M accepts all binary strings whose decimal equivalents are divisible by 5. 10
4. 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. 10