**UG EVEN SEMESTER (CBCS) EXAMINATION, SEPTEMBER - 2021**

**COMPUTER SCIENCE**

**8th Semester**

COURSE NO. MCSCC - 802 / MS - 202

**( Compiler Design )**

Full Marks : 70
Pass Marks : 28

Time : 3 hours

*The figures in the margin indicate full marks for the questions*

(Answer any five questions, taking one from each unit)

UNIT - I

1. (a) What is the role of Lexical Analyzer in Compiler Design? 4

   (b) What is input buffering? How does Lexical Analyzer distinguish between the two Fortran statements:

   DO 10 I= 1.25

   DO 10 I=1.25 2+3=5

   (c) Draw a DFA for the following statement: 3rd symbol from the end must be "a" with $\Sigma = \{a,b\}$ 5

2. (a) How is a Lexical Analyzer implemented? What are the pros and cons of various methods to implement a lexical analyser. 2+3=5

(b) How does a Lexical Analyzer distinguish between Keywords and identifiers. What is "maximal munch" principle. 3+2=5

(c) Give regular expressions for unsigned numbers and email address 4

## UNIT - II

3. (a) What is Left Recursion? Why should it be eliminated? 2+2=4

(b) What is Left factoring? Why is it done? 3

(c) Consider the following grammar

E->E.i(E)|(E)|E?E: | i where {. ,? , :} are also terminals
Is the grammar LL(1) ? Justify your answer. 7

4. (a) What is a Handle? What is its role in Bottom up Parsing? 1+2=3

(b) What are the things that a syntax analyser cannot do? 3

(c) Consider the following grammar:

S->AaAb | BbBa



A->ε

B-> ε

Show that the grammar is LL(1) but not SLR 8

## UNIT - III

5. (a) What is an L-attributed definition? Identify the problem with the following translation scheme

S->$A_1 A_2${$A_1$.in:=1 ; $A_2$.in:=2}

A->a { print( A.in)} 2+2=4

(b) Let synthesized attribute val give the value of the binary number generated by S in the following grammar. For example on input 101.101, S.val=5.625

S-> L.L | L

L-> LB | B

B-> 0|1

Use synthesized attributes to determine S.val 6

(c) Consider the following grammar:

D-> id L

L-> , id L | : T

T-> integer | real

Construct a translation scheme to enter the type of each identifier into the symbol table 4

6. (a) "Inherited attributes are only a convenient way of writing attribute equations. Actually all attributes are synthesized attributes" Justify the statement by taking a suitable example 4

(b) What is the role of a marker non terminal in the evaluation of inherited attributes during syntax directed translation? 4

(c) Consider the following types for the overload * operator

integer * integer -> integer

integer * integer -> complex

complex * complex -> complex

Using these rules determine which of the following expressions have unique types. Assume 1, 2.3 are integers and z is a complex number

i) 1*2*3

ii) (1*2)*z

iii) (1*z)*z 2x3=6

## UNIT - IV

7. (a) What is intermediate code? How can intermediate languages be classified? What are the pros and cons of both methods of classification? 2+3=5

(b) Show the annotated parse trees and semantic actions for the following arithmetic expressions

i) a + (b-c) * d 4

ii) –(a + b) * ( c+d ) + (a*b +c) 5



8. (a) What is three address code? 2

(b) Translate the executable statements of the following C program into three address code 7

```
main{
    inti ;
    int a[10] ;
    while (i<=10) {
        a[i] = 0;
        i= i +1;
            }
}
```

(c) How can backpatching be used to generate code for flow of control statements in one pass ? 5

## UNIT - V

9. Show the annotated parse tree and code generation process for the following expression:

A[i, j] : = B[ [C]i, j ] ]+ D[ i * j] 14

10. Show the annotated parse tree and code generation process for the following expression:

a and ( b or c and not d) 14