

Examination - 9th Semester Examination , 2020
Subject – Compiler Design (CD)
Paper – 9.2

Full Mark – 70

Time – 3 Hours

(Answer All Questions. Each question carries equal marks)

1. a) Define “ One Pass Compiler ”. Explain the various phases of compilation with suitable example.
- b) Check whether the following grammar is ambiguous grammar or not .
 $E \rightarrow E+E \mid E-E \mid E * E \mid E/E \mid E^E \mid (E) \mid id$
Also write the left most and right most derivation of the input string
id+ id* id

OR

- c) Define the various components of “Context Free Grammar” ? State with suitable example .
- d) Explain the concept of operator precedence and operator associativity .

2. a) Construct Predictive Parsing Table of the following grammar :

$E \rightarrow E+T \mid T$
 $T \rightarrow T * F \mid F$
 $F \rightarrow (E) \mid id$

- b) State whether the following grammar is operator precedence or not .
If not then convert it into operator precedence grammar.

$E = EAE \mid (E) \mid - E \mid id$
 $A = * \mid + \mid - \mid /$

Also calculate handle of the input string $id + id * id$

OR

- c) Consider the following augmented grammar :

$E' \rightarrow E$
 $E \rightarrow E+T \mid T$
 $T \rightarrow T * F \mid F$
 $F \rightarrow (E) \mid id$

If I is the set of two items $\{ [E' \rightarrow E.], [E \rightarrow E. * F] \}$, then calculate $goto(I, *)$.

- d) Define LR Parsing . What are the different types of LR Parsing methods ?
Also compare among them .

3. a) Define the term “Symbol Table” . What are the different types of symbol table management techniques ? Explain each one in brief .
- b) Define the term “Peephole Optimization” . State the different types of criterias for code improving transformation .

OR

- c) Differentiate between Linear List and Open Hashing Data Structure .
 d) What are the different types of storage management techniques ?
 Explain each one in brief .

4. a) Define the grammar for Boolean Expression .

Write down the 3- address code of the following Boolean expression

$$a < b \text{ and } c < d \text{ or } e < f$$

Also explain the concept of Backpatching .

b) Define Basic Block and Flow Graph . What are the different types transformations performed on Basic Block explain in brief .

OR

c) What are the different types Intermediate Code Generation ?

Define 3- address code . Write down the 3- address code of the following source code

$$a = b * -c + b * -c$$

Also draw the quadruple and triple table of the above .

d) Differentiate between DAG and Syntax Tree .

Draw the DAG and Syntax Tree of the following expression

$$A = A - 5$$

5. a) Optimize the following source code :

```

Void quicksort(m,n)
int m,n;
{
    int I,j;
    int v,x;
    if(n<=m) return;
    /* fragment begins here */
    i = m-1 ; j = n ; v = a[n] ;
    while(1)
    {
        do I = i+1 ; while ( a[i] < v ) ;
        do j = i-1 ; while ( a[j] > v ) ;
        if( i >= j ) break;
        x = a[i] ; a[ i ] = a[j] ; a[ j ] = x ;
    }
    x = a[i] ; a[ i ] = a[n] ; a[n] = x ;
    /* fragment ends here */
    quicksort(m,j ) ; quicksort(i+1,n) ;
}

```

OR

c) What are the different types of code optimization techniques ?
 Explain each one in brief .

d) Differentiate between Machine Dependent and Machine Independent Optimization .