	Uiteah
Name:	
Roll No.:	A Descript Name of Sail Explored
Invigilator's Signature :	

COMPILERS

Time Allotted: 3 Hours Full Marks: 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP - A

Answer any *five* questions. $5 \times 2 = 10$

1. Consider the following grammar:

 $A \rightarrow \epsilon$

 $B \rightarrow \epsilon$

Check the grammar is LL(1) or not.

2. Compute the FIRST and FOLLOW sets for each non-terminal of the grammar given below :

 $S \rightarrow ABa \mid bCA$

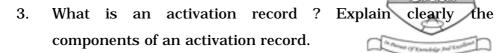
 $A \rightarrow cBCD \mid \epsilon$

 $B \rightarrow CdA \mid ad$

 $C \rightarrow eC \mid \epsilon$

 $D \rightarrow bSf|a$

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4. Construct DAG for the following code:

$$a = a + b$$

 $e = a + d + e$

5. Define viable prefix.

Given a grammar

$$E \to E + T | T$$

$$T \to T^* F | F$$

$$F \to id$$

which is a set of valid items for a viable prefix $E \!+\! \,$.

6. Generate three address code for following 'C' program:

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

CS/M.Tech(CSE)/SEM-3/CSEM-30

Suppose we have the following C declarations 7.

```
typedef struct {
```

int a,b;

} CELL, *PCELL;

CELL foo[100];

PCELL bar(x, y) int x, CELL Y{}

Write type expressions for the types of foo and bar.

GROUP - B

Answer any *four* questions. $4 \times 15 = 60$

8. Construct LR(1) parsing table for the following augmented grammar:

goal → expr

 $expr \rightarrow term + expr$

expr → term

term → factor * term

term → factor

 $factor \rightarrow id$

Show LR(1) automaton also.



- 9. a) Given grammar:
 - 1) $L \rightarrow En$
 - 2) $E \rightarrow E_1 + T$
 - 3) $E \rightarrow T$
 - 4) $T \rightarrow T_1 * F$
 - 5) $T \rightarrow F$
 - 6) $F \rightarrow (E)$
 - 7) $F \rightarrow digit$.

Write down syntax directed definition for the given grammar where n is the end marker of the input string. In the SDD, each of the non-terminals has a single syntax attribute, called val. The terminal digit has a synthesized attribute lexval which is an integer value returned by the lexical analyzer.

b) For the abvoe SDD give annotated parse trees of the following expr

$$(3+4)*(5+6)n$$

c) How to determine an evaluation order for the attribute instances in a given parse tree. Explain with example.

$$3 + 6 + 6$$

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10. a)

}

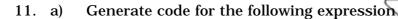
```
Fact(x)
{
    int f = 1;
    for ( i = 2; i < = x ; i ++ )
    {
        f = f * i;
        return (f);
    }
```

Write down three address code for the above program. Partition the code into basic blocks and construct the flow graph.

b) Construct DAG for the following basic block.

$$d := b * c$$
 $e := a + b$
 $b := b * c$
 $a := e - d$

c) Explain structure-preserving transformations and algebraic transformations of basic blocks using examples. 6+6+3



$$x = (a + b) - ((c + d) - e)$$

b)

switch (a + b)
{
 case 1: { x = y + z; break; }
 default : { p = q + r; }
 case 2: { u = v + w; break; }
}

Write down three address representation of the above code segment.

$$S \rightarrow A$$

$$A \rightarrow aB \mid Ad$$

$$B \rightarrow bBC \mid f$$

$$C \rightarrow g$$

$$6 + 4 + 5$$

12. Construct SLR parsing table for the given grammar. Also check acceptability of the input string:abbcbcde#[# is the endmarker]

$$S \rightarrow aABe$$

$$A \rightarrow Abc$$

$$A \rightarrow b$$

$$B \rightarrow d$$



- 13. Write short notes on the folloiwng :
 - a) YACC
 - b) Symbol table
 - c) Storage allocation strategies.

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