

# Nirma University

## Institute of Technology

Semester End Examination (IR), December - 2017

B. Tech. in Computer Engineering / Information Technology, Semester-VII  
IT794 Compiler Construction

Roll /  
Exam No.

Supervisor's  
initial with date

Time: 3 Hours

Max. Marks: 100

- Instructions:
1. Attempt all questions.
  2. Figures to right indicate full marks.
  3. Draw neat sketches wherever necessary.
  4. Assume necessary data if required and specify them.

### Q:-1 Do as Directed.

[16]

- A) Exemplify the terms: Token, handle, viable prefix, operator Grammar. [04]  
B) What is the significance of synchronization tokens in predictive parsing? [06]  
How can those tokens be added to parsing table?  
C) Check and Justify whether the following grammar is an operator [06]  
grammar or not.

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

OR

- C) Define ambiguous Grammar. State if the following grammar is [06]  
ambiguous: *(show all the steps)*

$$A \rightarrow AA+ \mid AA^* \mid a$$

### Q:-2 Do as Directed.

[20]

- A) Construct the LL(1) parse table for the following grammar: [06]

$$S \rightarrow a \mid \uparrow \mid (T)$$
$$T \rightarrow T, S \mid S$$

Show the action of the parser for the input string (a,a).

OR

- A) Write input buffering techniques with algorithm. [06]  
B) Explain the different phases of compilation with the following input [06]  
string "t = a + s \* 70"  
C) Consider the following grammar, State if the Grammar is LL(1), LR(0), [08]  
SLR(1), CLR(1) and LALR(1) with proper justification.

$$S \rightarrow AaAb \mid BbBa$$
$$A \rightarrow \epsilon$$
$$B \rightarrow \epsilon$$

### Q:-3 Do as Directed.

[14]

- A) Construct LALR(1) parsing table for the following Grammar: [08]

$$S \rightarrow Aa \mid aAc \mid Bc \mid bBa$$
$$A \rightarrow d$$
$$B \rightarrow d$$

- B) Construct NFA and Minimized DFA for the following Regular Expression: [06]  
(a|b)\*a(a|b)

**Q:-4 Do as Directed.****[16]**

- A) Differentiate between S-attributed definition and L-attributed definition. [08]  
State and explain whether the following grammar is  
a) L-attributed b) S-attributed c) both d) none

$$A \rightarrow LM \{L.i = f(A.i) ; M.i = f(L.S) ; A.s = f(M.s); \}$$

$$A \rightarrow QR \{R.i = f(A.i) ; Q.i = f(R.i) ; A.s = f(Q.s); \}$$
**OR**

- A) Construct Syntax Directed Definition for the below given grammar and [08]  
the input string "real id1,id2,id3".

$$D \rightarrow TL$$

$$T \rightarrow \text{int} \mid \text{real}$$

$$L \rightarrow L_1, \text{id} \mid \text{id}$$

- B) Construct translation scheme for the below given grammar and the [08]  
input string "4 - 2 - 4 \* 2".

$$E \rightarrow E \# T \mid T$$

$$T \rightarrow T \& F \mid F$$

$$F \rightarrow \text{num}$$
**Q:-5 Do as Directed.****[18]**

- A) Generate a type expression for the following grammar: [06]

$$E \rightarrow \text{id}$$

$$E \rightarrow \text{charliteral}$$

$$E \rightarrow \text{intliteral}$$

$$E \rightarrow E_1 [E_2]$$

$$E \rightarrow E_1 \uparrow$$

- B) How to allocate the space for the generated target code and the data [06]  
object of our source programs?

- C) Give three address code for the following C expression. [06]

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

- C) Describe the data structures used in symbol table generation. [06]

**Q:-6 Do as Directed.****[16]**

- A) Generate basic blocks for the following given code and Apply four code [08]  
optimization techniques on those blocks if possible.

```
void quicksort (m,n)
{
    int i, j, v, x;
    if ( n<= m) return;
    i=m-1; j=n; v = a[n];
    while(1) {
        do i = i+1; while ( a[i] < v );
        do j = j-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;
    quicksort(m,j); quicksort(i+1,n);
}
```

- B) Explain stack allocation techniques with example. [08]