Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. VIIth Semester–Examination – Nov- 2011

Subject code: 170701

Subject Name: Compiler Design

Date:19/11/2011 **Time: 10:30 am – 01:00 pm**

Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** How can panic mode and phrase level recovery be implemented in LR parsers? Consider the expression grammar **07**

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

Prepare the SLR parsing table with error detection and recovery routines.

(b) 1. Write a regular definition for the language of all strings of 0's and 1's with an even number of 0's and odd number of 1's. **04**

2. Write an algorithm for eliminating left recursion. **03**

Q.2 **(a)** 1. What is a pass in a compiler? What is the effect of reducing the number of passes? **04**

2. Convert the following regular expression into deterministic finite automata. **03**

(a+b)*abb(a+b)*

(b) Write a syntax directed definition for desk calculator. Justify whether this is an S-attributed definition or L-attributed definition. Using this definition draw annotated parse tree for 3*5+4n. **07**

OR

(b) What is inherited attribute? Write syntax directed definition with inherited attributes for type declaration for list of identifiers. Show annotated parse tree for the sentence **07**

real id_1,id_2,id_3.

Q.3 **(a)** Write the two methods used in lexical analyzer for buffering the input. Which technique is used for speeding up the lexical analyzer? **07**

(b) Is the following grammar suitable for LL(1) parsing? If not make it suitable for LL(1) parsing. Compute FIRST and FOLLOW sets. Generate the parsing table. **07**

$S \rightarrow AB$
$A \rightarrow Ca \mid \epsilon$
$B \rightarrow BaAC \mid c$
$C \rightarrow b \mid \epsilon$

OR

Q.3 **(a)** Compute the operator precedence matrix and precedence function for the following grammar if it exists. +,*,-,/,id,num,(and) are terminal symbols. **07**

$G \rightarrow E$
$E \rightarrow E+T|E-T|T$
$T \rightarrow T*F|T/F/F$
$F \rightarrow num|id|(E)$

(b) Consider the following grammar **07**

$E \rightarrow E+T \mid T$

$T \rightarrow TF \mid F$

$F \rightarrow F^* \mid a \mid b$

1) Construct the SLR parsing table for this grammar.
2) Construct the LALR parsing table.

Q.4 **(a)**

1. Explain activation tree and control stack. **04**
2. What are the limitations of static storage allocation? Explain the problem of dangling references. **03**

(b) Translate the arithmetic expression a*-(b+c) into **07**

1. Syntax tree
2. Postfix notation
3. Three address code

OR

Q.4 **(a)**

1. For what purpose compiler uses symbol table? How characters of a name are stored in symbol table? **04**
2. Explain the static scope rule and dynamic scope rule. **03**

(b) Translate the expression –(a+b)*(c+d)+(a+b+c) into **07**

1. Quadruples
2. Triples
3. Indirect triples.

Q.5 **(a)** Write the generic issues in the design of code generators. **07**

(b) Write an algorithm for global common subexpression elimination. **07**

OR

Q.5 **(a)** Explain peephole optimization. **07**

(b) Draw the transition diagrams for predictive parsers for the following grammar. **07**

$E \rightarrow TE'$

$E' \rightarrow +TE' \mid \epsilon$

$T \rightarrow FT'$

$T' \rightarrow *FT' \mid \epsilon$

$F \rightarrow (E) \mid id$

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