

III B.Tech II Semester Regular Examinations, Apr/May 2006**LANGUAGE PROCESSORS
(Computer Science & Engineering)****Time: 3 hours****Max Marks: 80****Answer any FIVE Questions
All Questions carry equal marks**

1. (a) Write a procedure for constructing a deterministic finite automata from a non-deterministic Automata, explain with one example. [10]
(b) Give the general format of a LEX program. [6]
2. (a) The grammar $S \rightarrow aSa|aa$ generates all even length string of a's except for the empty string. If a brute force method of top down parsor is used, it succeeds of 2a's, 4a's, 8a's but fails on 6a's. Find out all even strings for which the parser succeeds. [8]
(b) List out the rules for constructing the simple precedence table for a CFG. [8]
3. Construct LALR parse table for the following grammer
 $S \rightarrow L = R$
 $S \rightarrow R$
 $L \rightarrow *R$ [16]
 $L \rightarrow id$
 $R \rightarrow L$
4. (a) What are the advantages and disadvantages of Structural equivalence. Explain with example. [8]
(b) What are the advantages and disadvantages of Name equivalence. Explain with examples. [8]
5. (a) What is an activation record? Explain how it is related with run time storage organization. [8]
(b) Write a short notes on heap strategy and run-time storage allocation. [8]
6. (a) Explain any two machine dependent code optimization techniques. [8]
(b) What is a DAG. Explain its application. [8]
7. (a) Consider the following code sequence.
 - i. MOV B, R0
 ADD C, R0
 MOV R0 A
 - ii. MOV B,A
 ADD C, ACalculate the cost of the above instructions in terms of access time and memory usage. [10]

- (b) Explain the simple Strategy to generate assembly code from Quadruples. [6]
- 8. (a) List out the data structure to perform Macro Expansion. [8]
- (b) Write an algorithm for Macro processing. [8]

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1. (a) Write a procedure for minimizing number of states of a DFA, and explain with one example. [10]
(b) What are the different translation rules of a LEX program? [6]
2. (a) Explain the reasons for separating lexical analysis phase from syntax analysis. [6]
(b) Eliminate ambiguities from the following grammar
$$S \rightarrow iEtSeS|iEtS|a$$
$$E \rightarrow b|c|d$$
 [10]
3. Construct canonical LR pars table for the following grammar.
$$S \rightarrow L = R$$
$$S \rightarrow L$$
$$L \rightarrow^* R$$
$$R \rightarrow L$$
 [16]
4. Write type expression for the following types
 - (a) An array of pointers to real, where the array index ranges from 1 to 100. [5]
 - (b) A two dimensional array of integers (i.e an array of arrays) whose rows are indexed from 0 to 9 and whose columns are indexed from 10 to 10. [5]
 - (c) Functions whose domains are functions from integers to pointers to integers and whose ranges are records consisting of an integer and a character. [6]
5. (a) What are the contents of a symbol table? Explain in detail. [8]
(b) What is the data structure used to implement a symbol table in an efficient way? Give reasons ? [8]
6. (a) Explain with an example the abstract machine code form of Intermediate code. [8]
(b) Give a detailed account on loop optimisation techniques. [8]
7. Explain Code Generation algorithm with the function GETREG. [16]
8. (a) Write the design specification for a parameter in macro statement. [6]

- (b) What is meant by Expansion time Variable (EV). Write the syntax of two forms of Expansion time variable. [5]
- (c) How the value of EV can be manipulated through the preprocessor statement SET. Explain with an example. [5]

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1. (a) Write about lexical analyzer generator. [7]
(b) Construct minimumstate DFAs for the following regular expressions.
 - i. $(a+b)^* a (a+b)$ [3]
 - ii. $(a+b)^* a (a+b) (a+b)$ [3]
 - iii. $(a/b)^* a (a/b)(a/b)(a/b)$. [3]
2. (a) Explain the reasons for separating lexical analysis phase from syntax analysis. [6]
(b) Eliminate ambiguities from the following grammar
 $S \rightarrow iEtSeS|iEtS|a$
 $E \rightarrow b|c|d$ [10]
3. (a) What is an SLR grammar [4]
(b) Construct LALR(1) parser for the following grammar for [12]
 $S \rightarrow Aa|bAc|Bc|bBa$
 $A \rightarrow d$
 $B \rightarrow d$.
4. Write type expression for the following types
 - (a) An array of pointers to real, where the array index ranges from 1 to 100. [5]
 - (b) A two dimensional array of integers (i.e an array of arrays) whose rows are indexed from 0 to 9 and whose columns are indexed from 10 to 10. [5]
 - (c) Functions whose domains are functions from integers to pointers to integers and whose ranges are records consisting of an integer and a character. [6]
5. (a) Write a notes on the static storage allocation strategy with examples and discuss its limitations. [8]
(b) Discuss about the static allocation strategy of run-time environment with examples. [8]
6. (a) Explain with an example the abstract machine code form of Intermediate code. [8]

- (b) Give a detailed account on loop optimisation techniques. [8]
7. (a) Augment the code generation algorithm to incorporate the following features. [8]
- i. The parenthesis in an expression
 - ii. Non commutative operators like ‘-’ **and** ‘/’ etc
- (b) Show various steps in the code generation algorithm of the expression
 $(a + b) / (c + d)$
Assuming two machine registers to be available. [8]
8. (a) Write the features of Assembly Language programming. [6]
- (b) Write the general format of an Assembly language statement. [5]
- (c) Explain the 3 kinds of statements of an assembly program. [5]

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1. (a) Write about lexical analyzer generator. [7]
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 - iii. $(a/b)^* a (a/b)(a/b)(a/b)$. [3]
2. (a) Convert the following grammar into LL(1) grammar
 $R \rightarrow R \text{ "}'R|RR|R * |(R)|a|b$ [10]
 (b) What are the advantages and disadvantages of operator precedence parsing. [6]
3. (a) Explain in detail how an L-attributed grammar can be converted into a translator scheme.
 (b) Give the translate scheme to convert an expression grammar into three address code. [8+8]
4. (a) How do you check the expressions in polymorphic functions? Explain through an example. [8]
 (b) Consider the following declarations


```
type link = ↑ cell;
var  next : link;
      last : link;
      p    : ↑ cell;
      q,r  : ↑ cell;
```

 Which among the following expressions are Structurally equivalent? Which are name equivalent? Justify your answer.
 - i. link
 - ii. pointer(cell)
 - iii. pointer(link)
 - iv. pointer(record((info X integer) X (next X pointer(cell)))) [8]
5. (a) Which data structure will be used to implement a symbol table in an efficient way? Give reasons. [8]

- (b) Discuss and analyze about all the allocation strategies in run-time storage environment . [8]
6. (a) Explain with an example how abstract machine code can be generated for a given if-then-else statement. [8]
- (b) Write a short notes on peephole optimization. [8]
7. (a) Discuss global optimization techniques. [8]
- (b) Explain the equation for computing live variables in a given flow graph. [8]
8. (a) An assembly Language program contains the following statement.
X EQU Y + 25
Indicate how the EQU statement can be processed by a single pase assembler if
- i. Y is a Back reference
- ii. Y is a Forward reference. [8]
- (b) What are assembler directives. [8]
