

III B.Tech Supplementary Examinations, Aug/Sep 2008
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) Explain the reasons for separating lexial 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) Define LR(0) grammer. [4]
 (b) Construct SLR passing table for the following grammar. [12]
 $E \rightarrow E + T/T$
 $T \rightarrow TF/F$
 $F \rightarrow F^*|a|b.$
4. (a) What is type expression? Write type expression for the following types. [2]
 - i. 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. [3]
 - ii. Functions whose domains are functions from integers to pointers to integers and whose ranges are records consisting of an integer and a character. [3]
- (b) What is type system. Discuss static and dynamic checking of types. [8]
5. (a) Explain how the symbol table space can be reused. Explain through an example. [8]
 (b) Discuss various symbol table organization techniques. [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) Write an algorithm to compute reaching definition informatory for a flow graph. [8]
 (b) Explain the working of the above algorithm using a suitable example. [8]

8. Given the following source program

```
START    100
A   DS   3
MOVER    X,B
ADD      X,C
MOVEM    X,D
D   EQU  A+1
L2   PRINT D
ORIGIN  A ?1
C   DC   '5'
ORIGIN  L2 + 1
STOP
B   DC   '19'
END.
```

- (a) Show the contents of the symbol table at the end of the PASS I [5]
- (b) Explain the significance of EQU and ORIGIN statements in the program. [6]
- (c) Show the intermediate code generated for the given program. [5]

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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) Construct operator precedence parser for the following grammar for reference expressions.
 $R \rightarrow R'1'R|RR|R^*(R)|a|b.$ [10]
 (b) What are the common conflicts that can be encountered in shift reduce parsers. [6]
3. (a) What is an SLR grammer [4]
 (b) Construct LALR(1) parsatable for the following grammer [12]
 $S \rightarrow Aa|bAc|Bc|bBa$
 $A \rightarrow d$
 $B \rightarrow d .$
4. Write short notes on:
 - (a) type conversion with example [8]
 - (b) type coercion with example [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) What are the applications of DAG. Explain how the following expression can be converted in a DAG
 $a+b*(a+b)+c+d$ [8]
 (b) Explain how loop invariant components can be eliminated. [8]
7. (a) Explain how ?Redundant sub expression elimination? can be done at global level in a given program. [8]
 (b) Explain how syntax trees can be constructed for the following expression
 $a*b-(c+d)$
 $a*b+(a*b)$ [8]

Code No: RR320504

Set No. 2

8. (a) Write the general format of Macro Prototype statement and Macro call Give an example. [6]
- (b) What is meant by Conditional expansion and Expansion time Loops? [5]
- (c) Define Macro Expansion Counter (MEC). Mention its functions. [5]

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1. Explain with one example how LEX program perform lexical analysis for the following PASCAL patterns: identifier, comments, numerical constants, key words, arithmetic operation. [16]

2. (a) Eliminate ambiguity if any from the following grammar for boolean expressions.

$$\text{bexpr} \rightarrow \text{bexpr or bterm|bterm}$$

$$\text{bterm} \rightarrow \text{bterm and bfactor|bfactor}$$

$$\text{bfactor} \rightarrow \text{nst factor|(bexpr)|true|false.}$$
 where or, and, not (,), true, false are terminals in the grammar. [8]
- (b) Write a recursion descent parser for the above grammar. [8]

3. (a) Distinguish synthesized and inherited attributes.
- (b) Give a syntax-directed translator scheme for converting the statements of the following grammar into three address code

$$S \rightarrow \text{while expr do begin S and}$$

$$|S; S$$

$$|break$$

$$|other$$
[6+10]

4. (a) What is type expression? Write type expression for the following types. [2]
 - i. 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. [3]
 - ii. Functions whose domains are functions from integers to pointers to integers and whose ranges are records consisting of an integer and a character. [3]
- (b) What is type system. Discuss static and dynamic checking of types. [8]

5. (a) Explain how the symbol table space can be reused. Explain through an example. [8]
- (b) Discuss various symbol table organization techniques. [8]

6. (a) What are the various machine dependent code optimization techniques. [8]
- (b) Convert the following arithmetic expression into syntax tree and three address code

$$b * 3 (a+b)$$
[8]

Code No: RR320504

Set No. 3

7. (a) Explain the generic issues in the design of code generator. [8]
- (b) Write about the various object code forms. [8]
8. (a) Explain the memory requirement for variant I and variant II of intermediate code of an assembler design. [8]
- (b) How Declarative state and Assembler directives are processed by an assembler. [8]

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1. (a) Write a procedure that combines two NFAs in to a single NFA. The operations to be performed are those of concatenation, union and closure. [10]
(b) Write a procedure that detects all extraneous states in a DFA. [6]
2. (a) Eliminate ambiguity if any from the following grammar for boolean expressions.
bexpr \rightarrow bexpr or bterm|bterm
bterm \rightarrow bterm and bfactor|bfactor
bfactor \rightarrow nst factor|(bexpr)|true|false.
where or, and, not (,), true, false are terminals in the grammar. [8]
(b) Write a recursion descent parser for the above grammar. [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 is type expression? Write type expression for the following types. [2]
 - i. 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. [3]
 - ii. Functions whose domains are functions from integers to pointers to integers and whose ranges are records consisting of an integer and a character. [3]
(b) What is type system. Discuss static and dynamic checking of types. [8]
5. (a) What are the advantages and disadvantages of static storage allocation strategy. [8]
(b) What are the advantages and disadvantages of heap storage allocation strategy? [8]
6. (a) Translate the expression $-(a+b)*(c+d)+(a+b+c)$ into quadruple, triple and indirect triple. [9]
(b) Explain in detail the optimization technique "Strength Reduction". [7]

7. (a) Write an algorithm to compute reaching definition informatory for a flow graph. [8]
(b) Explain the working of the above algorithm using a suitable example. [8]
8. (a) How are constants defined in an assembly program? Explain with an example. [8]
(b) What is meant by Assembler directives? Explain the functions of the following assembler directives. [8]
- i. START
 - ii. ORIGIN
 - iii. EQU
 - iv. LTORG
