Code No: R31051

R10

Set No: 1

III B.Tech. I Semester Regular Examinations, November/December - 2012
COMPILER DESIGN
(Computer Science and Engineering)

Time: 3 Hours　　　　　　　　　　　　　　　　　　　　　　　**Max Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks
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1. (a) What are the functions of pre-processing?
   (b) Explain briefly, the need and functionality of linkers, assemblers and loaders.

2. Explain the role and functions of lexical analyser with the possible error recovery actions.

3. (a) Construct the LL(1) parse table for the fallowing grammaer;
   Program -→ begin d semi X end
   X -→ d semi X | s Y
   Y → semi s Y | ε
   (b) Distinguish between top-down parsing and bottom-up parsing.

4. Construct the LR Parsing table for the following grammar:
   E→E + T | T
   T→T * F | F
   F → (E) | id

5. (a) Construct the CLR parsing table for the following grammar:
   S→L=R | R
   L→ *R | id
   R→L
   (b) Differentiate between CLR and LALR parsing techniques.

6. (a) What is attributed grammar? Give the syntax-directed definition for a simple desk-calculator.
   (b) Explain with advantages and disadvantages of stack and heap storage allocation strategies for strings and records.

7. (a) List and explain the various intermediate code forms with an example each.
   (b) Give the primary structure preserving transformations on Basic Blocks.
   (c) Write a short note on procedure inlining.

8. (a) Explain various machine dependent code optimization techniques.
   (b) Write a short note on instruction scheduling.
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Set No: 2

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Time: 3 Hours   **Max Marks: 75**

Answer any FIVE Questions
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*****

1. (a) Describe the Analysis-Synthesis model of compilation.
   (b) What are the different translation rules of a LEX program? Explain.

2. (a) Write a LEX program to recognise the decimal numbers.
   (b) What are the three general approaches to the implementation of a Lexical analyser? Explain.

3. (a) Construct LL(1) parse table for the following grammar.
   $S \rightarrow$ Aa|bAc|Bc|bBa
   $A \rightarrow d$
   $B \rightarrow d$
   (b) Explain error-recovery in predictive parsing.

4. (a) Explain the procedure for constructing set of LR(0) items.
   (b) Compute LR(0) items for the following grammar:
   $S \rightarrow L=R \mid R$
   $L \rightarrow *R \mid id$
   $R \rightarrow L$

5. (a) Explain briefly about LALR parsing technique with an example.
   (b) Explain the various actions performed by shift-reduce parsers with an example.

6. (a) Construct the syntax directed definition to convert infix notation into postfix notation.
   (b) Explain the method of handling fixed length data and variable length data.

7. (a) Explain briefly, about the intermediate code generation phase of a compiler.
   (b) Explain various machine independent code optimization techniques.

8. (a) What is peephole optimization? Mention the transformations that are characteristic of peephole optimizations.
   (b) Explain the process of register allocation using graph coloring.
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R10

Set No: 3

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Time: 3 Hours   **Max Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks
*****

1. (a) Mention the functions of linkers and loaders in pre-processing.
   (b) Describe the functionality of compilers in language processing.

2. (a) Construct the transition diagram to recognize the tokens for identifiers and relational
   numbers.
   (b) What are the reasons for separating lexical analysis from parsing?
   (c) Write a procedure for minimizing number of states of a DFA, and also explain with
   one
   example.

3. (a) Construct predictive parsing table for the following grammar:
   $S \rightarrow (L) \mid a$
   $L \rightarrow L,S \mid S$
   and check whether the following sentences belong to that grammar or not.
   (i) (a,a)
   (ii) (a, (a , a))
   (iii) (a, ((a , a), (a , a)))
   (b) What are the differences between LL(1) Parsing and LL(k) Parsing?

4. (a) Construct the LR(0) items for the "dangling-else" grammar.
   (b) Write an algorithm for constructing LALR Parser table.

5. (a) What is a handle? Explain the method of handle pruning with an example.
   (b) Explain the various actions performed by shift-reduce parsers with an example.

6. (a) Construct the syntax directed translation scheme to convert a given arithmetic
   expression into three address code.
   (b) Explain the differences between static and dynamic storage allocation schemes.

7. (a) What are DAGs and how are they useful in implementing transformations on basic
   blocks?
   (b) Explain the principle sources of code improving transformations.

8. (a) Explain how garbage collection is done using reference count.
   (b) Discuss peephole optimization technique with an example.
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Set No: 4

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Time: 3 Hours   **Max Marks: 75**
Answer any FIVE Questions
All Questions carry equal marks
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1. (a) Explain the phases in detail. Write down the output of each phase for the expression
   a: = b + c *50.
   (b) Give and explain the diagrammatic representation of a language processing system.

2. (a) What is meant by input buffering? Explain the use of sentinels in recognizing tokens.
   (b) Explain the functions of lexical analyzer with its implementation.

3. (a) Calculate FIRST and FOLLOW sets for the following grammar:
   $E \rightarrow TE'$
   $E' \rightarrow +TE' \mid \varepsilon$
   $T \rightarrow FT'$
   $T' \rightarrow *FT' \mid \varepsilon$
   $F \rightarrow (E) \mid id$
   (b) Explain the model of a non-recursive predictive parser with an example.

4. (a) Differentiate between LR parsing and LALR Parsing with an example.
   (b) Compute LR(0) items for the following grammar:
   $S \rightarrow AB$
   $A \rightarrow a \mid \varepsilon$
   $B \rightarrow b \mid \varepsilon$

5. (a) What is a shift reduce parser? Mention the conflicts that occur during shift-reduce parsing.
   (b) Explain the way to implement a shift-reduce parser using a stack by taking an input string for a grammar.

6. (a) What is syntax-directed definition? Construct the syntax-directed definition to produce a syntax trees for assignment statements.
   (b) Explain various fields of an activation records by giving clear format of it.

7. (a) What are the steps involved in partitioning a Sequence of three address statements into basic blocks?
   (b) Explain the following code optimization techniques:
   (i) Constant folding   ii) Dead code elimination   iii) Strength reduction

8. (a) Describe the technique of inter procedural optimization
   (b) Explain any few machine dependent code optimization techniques.
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