Code No: 07A70511 **R07** **Set No. 2**

IV B.Tech I Semester Examinations,NOVEMBER 2010
AUTOMATA AND COMPILER DESIGN
Electronics And Computer Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Design a DFA that accepts all strings of binary numbers that are divisible by 2.
   (b) Construct a DFA accepting the set of strings with an odd number of 0's and an odd number of 1's over the alphabet $\Sigma = \{0, 1\}$.
   (c) Briefly, explain the applications of Automata Theory. [4+4+8]
2. (a) What is importance of polymorphic functions?
   (b) Write translation scheme for checking polymorphic functions? [8+8]
3. (a) Explain Quadruples, Triples, and Indirect Triples.
   (b) Construct Quadruples, Triples, and Indirect Triples of the following expression: (a + b) * (c + d) - (a + b + c). [6+10]
4. Construct the LR(0) parser for the following augmented grammar: [16]
   $S' \rightarrow S$
   $S \rightarrow L = R \,|R$
   $L \rightarrow a \,|^*R$
   $R \rightarrow L$.
5. (a) Draw the parse tree for an expression: a* - (b + c)
   (b) Give the Context Free Grammar(CFG) that generates the set $\{0^n1^n \,|n \geq 1\}$. [6+10]
6. (a) What is an activation record? Explain how it is related with runtime storage organization?
   (b) Write and explain about heap allocation strategy? [8+8]
7. Explain about Data-Flow analysis of structured flow graphs. [16]
8. Generate code for the following C program [16]

```
Main( )
{
        int i;
        int a[10];
        while ( i <= 10 )
                a[i] = 0;
}
```

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Code No: 07A70511 **R07** **Set No. 4**

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Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
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1. (a) What is a three-address code? Give an example.
   (b) Describe various types of three address statements with an example of each. [4+12]

2. Write and explain Unification algorithm. [16]

3. (a) Let x and y are strings, and x^r denotes the reversal of x. What is the value of $(xy)^r$?
   (b) Design a DFA that accepts all strings that begin with letter a, where Σ= {a, b}.
   (c) What are the key elements of a LEX program? [4+4+8]

4. Construct the SLR(1) parse table for the following grammar:
   $S' \rightarrow S$
   $S \rightarrow CC$ [16]
   $C \rightarrow cC \,|d.$

5. (a) Explain briefly about data- flow analysis?
   (b) Explain various function-preserving Transformations? [8+8]

6. (a) What are self-organizing lists? How can this be used to organize a symbol table? Explain with an example?
   (b) Write about storage Organization? [10+6]

7. (a) What is recursive-descent parser? Explain.
   (b) Construct the recursive procedures for the following grammar:
   $E \rightarrow E + T \,|T$
   $T \rightarrow T^*F \,|F$
   $F \rightarrow (E) \,|a.$ [16]

8. How to construct DAG for below statements. Explain concept of rearranging the order with the help same example.
   t1 := a + b
   t2 := c + d
   t3 := e - t2
   t4:= t1 - t3 [16]

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Code No: 07A70511 **R07** **Set No. 1**

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Answer any FIVE Questions
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1. (a) What is hash function. Explain.
   (b) Explain concept of reference counts and marking techniques for deallocation. [8+8]

2. (a) What are the closure properties of Regular sets? Explain.
   (b) Briefly explain the logical phases of a compiler model. [8+8]

3. Explain the role of addressing modes in code generation? [16]

4. Explain in detail the procedure that eliminating global common sub expression? [16]

5. Consider the following Syntax Directed Translation Schema:
   E→E + E { print '+'}
   E → E*E { print '*'}
   E → (E) { . }
   E →i { print 'id.name'}
   An LR parser executes the actions specified within braces immediately after reducing with the corresponding production. Draw the decorated parse tree and find the translation of a string: (a + b) * (c + d) into another string using Syntax Directed Translation Schemes. [8+8]

6. (a) What is the time complexity of a parser to parse a string of 'n' tokens?
   (b) Consider the Grammar: G = ({S, A}, {a, b}, {S → aAa |bAb| |A, A → SS}, S) Find the leftmost derivation, rightmost derivation, and parse tree for the string: baabbb. [6+10]

7. (a) Distinguish static and dynamic Type checking?
   (b) Discuss in detail about semantic analysis phase? [8+8]

8. Build the LALR parsing table for the following grammar:
   E → E + T |T
   T → TF |F [16]
   F → F∗ |a| b.

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Code No: 07A70511 **R07** **Set No. 3**

IV B.Tech I Semester Examinations,NOVEMBER 2010
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Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. Show by example how SLR(1), CLR(1), and LALR(1) parse tables are constructed. [16]

2. (a) What is an attribute grammar? Give an example.
   (b) Generate the three-address code for the following Boolean expression:
   NOT (P < Q AND R < S OR NOT (T < U AND R < Q)). [6+10]

3. Explain Unrestricted Grammar and give the recognizer for the Unrestricted Grammar? [16]

4. Explain the following:
   (a) Implementation of Stack allocation Scheme
   (b) Activation Record. [8+8]

5. (a) Consider the grammar: $E \rightarrow E + E \,|E * E|a$
   Find five derivative trees for the sentence: a * a + a * a
   (b) Consider the following recursive grammar:
   $E \rightarrow E + T \,|E - T|\, T$
   $T \rightarrow T * F \,|T/F|\, F$
   $F \rightarrow (E) \,|a$
   What is an equivalent grammar when the left recursion is removed? [8+8]

6. What is the limit flow graph? Is the flow graph shown in figure 6 reducible? Explain. [16]

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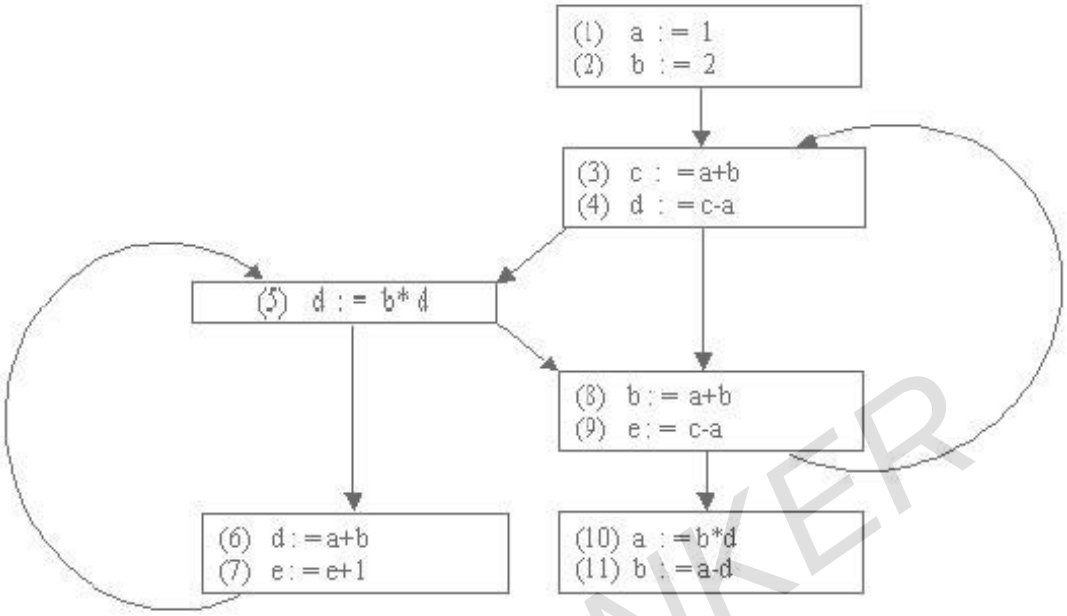

Figure 6

7. Generate optimal code for following assignment statements
   x = a + b + c
   x = (a * -b) + (c - (d + e))
   x = (a / b - c) / d
   x = a + (b + c / d * e) / (f * g = h * i). [4×4]

8. (a) Design a DFA that accepts the language over the alphabet, Σ = {0, 1, 2} where the decimal equivalent of the language is divisible by 3.
   (b) Compare compiler and an interpreter with the help of suitable examples. [8+8]

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