

7. (a) Construct a Directed Acyclic Graph (DAG) for the expression

$$a + a^* (b - c) + (b - c)^* d \quad 7$$

- (b) Write short notes on the following : 7  
 (i) Three-address code  
 (ii) Type checking and type conversion

8. (a) What is the difference between stack storage and heap storage? Explain with the help of diagram and example. 7

- (b) What do you understand by garbage collection? 7

9. (a) What are the various methods of optimizing code? Explain with the help of some examples. 7

- (b) Use code movement to optimize this code : 7

```
(i) for (i=0; i<=10; i++)
    {
        x=y*5;
        k=(y*5)+50;
    }
```

```
(ii) int b=7, c=25;
    for (i=0; i<100; i++)
    {
        a=i+b/c;
    }
```

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## B.Tech 6th Semester Exam., 2015

## COMPILER DESIGN

Time : 3 hours

Full Marks : 70

Instructions : akubihar.com

- (i) The marks are indicated in the right-hand margin.  
 (ii) There are **NINE** questions in this paper.  
 (iii) Attempt **FIVE** questions in all.  
 (iv) Question No. 1 is compulsory.

1. Write short notes (2-3 lines) on any seven of the following : 2×7=14

- (a) Lexical analysis tool akubihar.com  
 (b) LALR parsing table  
 (c) Use of ambiguous grammar in LR parser  
 (d) Type equivalence  
 (e) Structure of symbol table  
 (f) Intermediate language  
 (g) Control flow  
 (h) Semantic errors akubihar.com  
 (i) Loop optimization  
 (j) Code generation using dynamic programming

2. (a) Scope of variables for the code given below, find the values for the variables w, x, y, z :

```

int i=4; int j=5;
{
    int j=7;
    i=6;
    w=i+j;
}
x=i+j;
{
    int j=8;
    y=i+j;
}
z=i+j;
    
```

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What are the values assigned to variables w, x, y, z? 7

- (b) What is the difference between call by value and call by reference? Give example to explain your answer. 7

3. Consider the context-free grammar

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$$S \rightarrow SS+ | SS^* | a$$

- (a) Show how the string  $aa+a^*$  can be generated by the grammar. 7
- (b) Construct a parse tree for the string. 7
- (c) What language does this grammar generate? 14

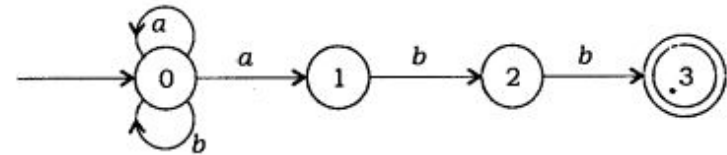
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4. (a) Write all the different phases of a compiler and explain each phase in 1-2 lines. 7

- (b) Describe the language denoted by the following regular expressions : 7

- (i)  $a(a|b)^* a$
- (ii)  $(\epsilon|a)b^*$

5. (a) What does the following non-deterministic finite automata represent? 7



- (b) What is context-free grammar? Explain with an example. 7

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6. (a) Consider the context-free grammar  $S \rightarrow OS1 | 01$  and the string 000111.

- (i) Give a left most derivation for the string. 7
- (ii) Give a right most derivation for the string. 7
- (iii) Give a parse tree for the string. 7

- (b) Write the difference between top-down parsing and bottom-up parsing. 7