END TERM EXAMINATION

SIXTH SEMESTER [B.TECH/M.TECH] MAY-2010

Subject: *Compiler Design*

Paper Code: IT 308

Paper ID: 15308

(Batch 2006 onwards)

Maximum Marks :60

Time : 3 Hours

Note: All questions are compulsory.

(3+4+3+4+3+3 = 20)

1.

a. Write regular definition for the following languages
   i. All strings of digits with no repeated digits.
   ii. All strings of letters that contains the five vowels in order.
   iii. All strings of 0's and 1's that do not contain the sub string 011

b. Show that the following grammer
   S->Aa | bAc | Bc | bBa
   A-> d
   B-> d
   Is LR(1) but not LALR(1).

c. Construct a parsing table for given grammer.
   S-> iEtSS' | a
   S'-> eS | E
   E-> b

d. Define basic blocks and flow graphs.

e. Generate code for the following C program
   Main()
   {
           Int m;
           Int a[10];
           While (m<=10)
                   A[m]=0;
   }

f. Write dag for
           a = b+c;
           b= a-d;
           c= b+c;
           d= a-d;

2.

a. What do you mean by compiler? How it is different from interpreter?
   Explain the Analysis-Synthesis Model of Compiler?   4

b. Describe the language denoted by the following regular expression: 6
   i. 0 (0 | 1) *0
   ii. ((€ | 0) 1*)*
   iii. 0 * 10 * 10 * 10 *

   OR

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a. What is the need of compiler? Explain the various phases of compiler operation.   5

b. Define the following terms with the examples   5
    i. Lexemes, Patterns and tokens
    ii. Input Buffering
    iii. Lexical Errors

3.
         6

a. Consider the grammer
    S->aSbS | bSaS | €
     i. Show that the grammer is ambiguous by constructing two different derivatives for the sentence "abab".
     ii. Construct the corresponding rightmost derivatives for "abab".
     iii. Construct the corresponding parse tree for "abab".

b. What is top down parsing? How it is different from bottom up parsing?   4

OR

Explain in detail about LR parsers. What are various steps in LR parsing? Give detailed LR parsing algorithm with suitable examples.   10

4.

a. What is syntax tree? Why it is used? Construct a syntax tree for the expression
    a+a*(b-c)+(b-c)*d   5

b. Explain in detail various storage allocation strategies.   5

OR

a. Describe the term type expression and type conversion.   4

b. Write type expression for the following type   6
    I. An array of pointers to reals where the array index ranges from 1 to 100
    II. A 2D array of integers (an array of arrays) whose rows are indexed from 0 to 9 and whose columns are indexed from -10 to +10
    III. Function whose domain are function from integers to pointers to integers and whose ranges are records consisting of integer and a character.

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5.

a. What are the issues in the designing of a code generator?   4

b. Given the fragment of source code   6

```
Begin:
        Prod = 0;
        i = 1;
        Do begin
                Prod = prod + a[ i ] * b [ i ];
                i = i + 1;
        end
        while i < = 20
end
```

    i. Write three address code performing this computation.

   ii. Construct the dag (Directed Acyclic Graph) for the three address code to be generated above.

       OR

a. What do you mean by optimization of a compiler? What are the principal sources of optimization?   5

b. What is data flow analysis of structured flow graphs? Explain in detail.   5

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