Seat No.: _____   Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
ME – SEMESTER II (OLD) EXAMINATION – SUMMER 2017

Subject Code: 1720202   **Date:10/05/2017**
Subject Name: Design of Language Processors
Time: 10:30 A.M. to 01:00 P.M.   **Total Marks: 70**
Instructions:
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Explain a language processing system with diagram. Also explain phases of a compiler with suitable example.   07

(b) What is regular language? Write regular definition for following: 07
1. The set of identifiers of Java language.
2. Comments consisting of a string surrounded by /* and */ without an intervening */ unless it appears inside the quotes " and ".
3. All strings of 0's and 1's with an even number of 0's and an odd number of 1's.

Q.2 **(a)** Construct DFA for following regular expression using syntax tree method. Also minimize it.   07
(a|b)*(c*|d)(a|b)c#

(b) Construct DFA from following regular expression using Thompson's construction method.   07
(a|b)*a(a|b)(a|b)#

OR

(b) What is a finite automaton? Explain its use in language processors. Compare and contrast NFA and DFA along with time-space tradeoffs.   07

Q.3 **(a)** Justify with example: Why predictive parsers cannot be constructed for following grammars?   07
1. Ambiguous grammars
2. Left recursive grammars
3. Grammars without left factoring

(b) Show that the following grammar is CLR: 07
S → Aa | bAc | Bc | bBa
A → d
B → d

OR

Q.3 **(a)** Construct non-recursive predictive parse table for following grammar: 07
R → R '|' R | RR | R* | (R) | a | b, where first vertical bar is the "or" symbol, not a separator between alternatives.

(b) What is operator grammar? Construct operator precedence parse table for following grammar: 07
A → A or A | A and A | not A | (A) | a , parse the string ((a or a) and not a) using the table.

Q.4 **(a)** Write production and semantic rules for declaration statement of 'C' language. Which types of attributes are used in semantic rules? **07**

(b) Construct three-address code and flow graph for given block of statements: **07**
```
Fact (int x)
{
    int f=1;
    for(i=2; i <= x; i++)
        f = f * i;
    return f;
}
```

OR

Q.4 **(a)** Explain function-preserving transformation techniques for code optimization with examples. **07**

(b) Construct a syntax tree and DAG for following expression: **07**
$a = b + (c * d) - e ^ (c * d) / f$

Q.5 **(a)** What is symbol table? Explain its use in analysis phase of a compiler. Explain any one data structure used to implement it with suitable example. **07**

(b) Write an algorithm for pass-I of an assembler. Generate IC for given instructions using it. **07**
```
    START
    READ A
    MOVER AREG, A
    ADD AREG, ='5'
    MOVEM AREG, A
    PRINT A
    STOP
A   DS 1
    END
```

OR

Q.5 **(a)** Explain macro call and macro expansion for nested macro with example. **07**

(b) Explain in detail the role of linker and loader in language processing system. **07**

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