

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**BE - SEMESTER-VII(OLD) • EXAMINATION – WINTER 2016**

**Subject Code: 170701**

**Date: 29/11/2016**

**Subject Name: Compiler Design**

**Time: 10:30 AM to 01:00 PM**

**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) Describe all phases of a compiler. **07**  
(b) (i) What is a symbol table? Discuss the most suitable data structure for it by stating merits / demerits. **07**  
(ii) Explain linker & loader.
- Q.2** (a) (i) Consider the grammar **07**  
 $S \rightarrow SS+ \mid SS^* \mid a$   
Show that the string  $aa+a^*$  can be generated by the grammar. Construct the parse tree for the grammar. Is the grammar ambiguous?  
(ii) Write unambiguous production rules for if then else construct.  
(b) Construct DFA without constructing NFA for following regular expression: **07**  
 $a^*b^*a(a \mid b)b^*a\#$   
Minimize the same.
- OR**
- (b) Construct NFA for following regular expression using Thompson's notation and then convert it into DFA. **07**  
 $a(b \mid c)^*a^*c\#$
- Q.3** (a) Apply shift reduce parser for parsing following string using unambiguous grammar. **07**  
 $id - id * id - id$   
(b) (i) Compare top-down and bottom-up parser. **07**  
(ii) Explain right-most-derivation-in-reverse with the help of an example.
- OR**
- Q.3** (a) Explain SLR parser. How is its parse table constructed? **07**  
(b) Construct a precedence graph, precedence table for operator precedence parser to be used for parsing a string consisting of id, -, \*, \$. Parse following string. **07**  
 $\$ id - id * id * id \$$
- Q.4** (a) Write production and semantic rules for producing and analyzing statements like : **07**  
 $int * ip, i, j, *ip1;$   
 $float * fp, f;$   
(b) Explain synthesized attributes with the help of an example. **07**
- OR**
- Q.4** (a) Draw transition diagrams corresponding to production rules for arithmetic expressions consisting of operators + and ^ for predictive parser. Explain how parsing takes place for the same using transition diagrams. **07**  
(b) (i) Explain various parameter passing methods. **07**  
(ii) Explain left factoring with the help of an example.

- Q.5** (a) Draw syntax tree and DAG for following statement. Write three address codes from both. **07**  
 $a = (a + b * c) ^ (b * c) + b * c ^ a ;$
- (b) Explain activation record. How is task divided between calling & called program for stack updating? **07**
- OR**
- Q.5** (a) For a statement given below, write output of all phases (except that of optimization phase) of a compiler. **07**  
 $a = a + b * c ;$
- (b) Explain peephole optimization. **07**

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