

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**

$a = (a + b * c) \wedge (b * c) + b * c \wedge a ;$

(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**
