

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-VII (NEW) EXAMINATION – WINTER 2021****Subject Code:3170701****Date:22/12/2021****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.
4. Simple and non-programmable scientific calculators are allowed.

**MARKS**

- Q.1** (a) Define following terms: **03**  
       i. Compiler  
       ii. Interpreter  
       iii. Token  
 (b) Explain activation tree? **04**  
 (c) Explain a rule of Left factoring a grammar and give Example. **07**

- Q.2** (a) Explain input buffering methods. **03**  
 (b) Define the following terms and give suitable example for it. **04**  
       i. Augmented Grammar  
       ii. LR(0) Item  
       iii. LR(1) Item  
 (c) Draw the DFA for the regular expression  $(a|b)^*abb$  using set construction method only. **07**

**OR**

- (c) Draw NFA from regular expression using Thomson's construction and convert it into DFA.  $(a|b)^* a b^* a$  **07**  
**Q.3** (a) Describe Ambiguous Grammar with example. **03**  
 (b) Design FIRST and FOLLOW set for the following grammar. **04**  
 $S \rightarrow 1AB \mid \epsilon$   
 $A \rightarrow 1AC \mid 0C$   
 $B \rightarrow 0S$   
 $C \rightarrow 1$   
 (c) Explain operator grammar. Generate precedence function table for following grammar. **07**  
 $E \rightarrow EAE \mid id$   
 $A \rightarrow + \mid *$

**OR**

- Q.3** (a) Differentiate Top Down Parsing and Bottom up parsing **03**  
 (b) Explain error recovery strategies used by parser. **04**  
 (c) Construct CLR parsing table for following grammar. **07**  
 $S \rightarrow aSA \mid \epsilon$   
 $A \rightarrow bS \mid c$   
**Q.4** (a) Explain various issues in design of code generator. **03**  
 (b) Explain the following parameter passing methods. **04**  
       1. Call-by-value  
       2. Call-by-reference  
       3. Copy-Restore  
       4. Call-by-Name  
 (c) Explain Peephole Optimization. **07**

**OR**

- Q.4** (a) Draw a DAG for expression:  $a + a * (b - c) + (b - c) * d$ . **03**  
 (b) Compare: Static v/s Dynamic Memory Allocation. **04**  
 (c) Translate following arithmetic expression **07**  
 $-(a * b) + (c + d) - (a + b + c + d)$  into  
 1] Quadruples  
 2] Triple  
 3] Indirect Triple
- Q.5** (a) Explain symbol table. For what purpose, compiler uses symbol table? **03**  
 (b) Explain Basic-Block Scheduling. **04**  
 (c) Explain synthesized attributes with the help of an example. **07**
- OR**
- Q.5** (a) Define a following: **03**  
 i. Basic block  
 ii. Constant folding  
 iii. Handle.  
 (b) Write difference(s) between stack and heap memory allocation. **04**  
 (c) Explain Pass structure of assembler. **07**
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**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-VII (NEW) EXAMINATION – SUMMER 2022****Subject Code:3170701****Date:16/06/2022****Subject Name:Compiler Design****Time:02:30 PM TO 05:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

		MARKS
<b>Q.1</b>	(a) Explain the roles of linker, loader and preprocessor.	<b>03</b>
	(b) What is Input Buffering? Why it is used?	<b>04</b>
	(c) Explain the language dependent and machine independent phases of compiler. Also List major functions done by compiler.	<b>07</b>
<b>Q.2</b>	(a) Describe the role of lexical analyzer.	<b>03</b>
	(b) Write the regular expression R over {0,1} or {a,b}: 1) The set of all strings with even number of a's followed by an odd number of b's. 2) The set of all strings that consist of alternating 0's and 1's	<b>04</b>
	(c) Explain activation record in detail.	<b>07</b>
	<b>OR</b>	
	(c) What are conflicts in LR Parser? What are their types? Explain with an example.	<b>07</b>
<b>Q.3</b>	(a) What do you mean by left recursion and how it is eliminated?	<b>03</b>
	(b) What is ambiguous grammar? Show that $S \rightarrow aS Sa a$ is an ambiguous grammar.	<b>04</b>
	(c) Consider the following grammar: $S' = S\#$ $S \rightarrow ABC$ $A \rightarrow a bbD$ $B \rightarrow a \epsilon$ $C \rightarrow b \epsilon$ $D \rightarrow c \epsilon$ Construct FIRST and FOLLOW for the grammar also design LL(1) parsing table for the grammar	<b>07</b>
	<b>OR</b>	
<b>Q.3</b>	(a) Differentiate between top down parser and bottom up parser.	<b>03</b>
	(b) Explain handle and handle pruning	<b>04</b>
	(c) Consider the following grammar $S \rightarrow AA$ $A \rightarrow aA$ $A \rightarrow b$ And construct the LALR parsing table.	<b>07</b>
<b>Q.4</b>	(a) Differentiate between S attributes and L attributes	<b>03</b>
	(b) For the following production write the semantic action: 1. $S \rightarrow E\$$	<b>04</b>

2.  $E \rightarrow E1 + E2$
  3.  $E \rightarrow E1 * E2$
  4.  $E \rightarrow \text{digit}$
- (c) Translate the following expression into quadruple, triple, and indirect triple: **07**  
 $-(a+b)*(c+d)-(a+b+c)$
- OR**
- Q.4** (a) Differentiate between parse tree and syntax tree **03**  
 (b) What is dependency graph? Explain with example. **04**  
 (c) Generate the three address code for the following program segment: **07**  
 While( $a < c$  and  $b > d$ )  
   Do if  $a=1$  then  $c = c+1$   
   Else  
     While  $a \leq d$   
       Do  $a = a+b$
- Q.5** (a) List the issues in code generation. **03**  
 (b) Discuss the functions of error handler. **04**  
 (c) What is DAG? What are its advantages in context of optimization? How does it help in eliminating common sub expression? **07**
- OR**
- Q.5** (a) What is global optimization? Name the 2 types of analysis performed for global optimization. **03**  
 (b) Explain the following with example **04**  
   1) Lexical phase error  
   2) Syntactic phase error  
 (c) What is peephole optimization? Explain with example. **07**

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