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Roll No. ....

Sixth SEMESTER

**B.Tech [ IT ]**

**END SEMESTER EXAMINATION**

**May-2019**

**IT-302 COMPILER DESIGN**

Time: 3:00 Hours

Max. Marks : 40

**Note : Question 1 is mandatory**

Answer any three questions from Q. 2 to Q. 5

Assume suitable missing data, if any.

Q.1 Answer the following with suitable justification:

a) Demonstrate a translation for the postfix notation for  $2+(3*4)$

[SDD, Annotated Parse tree, evaluation at nodes]

b) In the definition  $A \rightarrow A+ \{A.val=A.val+1\}$

$A \rightarrow E \{print(id.lexval)\}$

the inherited attributes are.....and the synthesized attributes are..... (and why?)

c) An example of grammar that is LR but not LL(1) is .....(with reason)

d) What type of error (if any) is: for  $(x = 1; x < ; x++)$  and how and where will this error be detected?

e) Demonstrate a translation for Semantic analysis phase of compiler for a test string that involves multiplication of different types.

[SDD, Annotated Parse tree, evaluation at nodes]

(3+1+1+2+3)

Q.2 For the following grammar:  $S' \rightarrow SS$ ,  $S \rightarrow Q=A$ ,  $A \rightarrow P-B$ ,  $B \rightarrow P+B$ ,  
 $B \rightarrow \text{num}$ ,  $P \rightarrow \text{id}$ ,  $P \rightarrow \epsilon$ ,  $Q \rightarrow \text{id}$

a) Construct the LR(0) automaton and the LR parsing table

- b) Refer to LR parsing table and write the sequence of moves for the string:  $id = id - + id$  (7+3)

Q.3 For the following grammar  $S' \rightarrow S\$$ ,  $S \rightarrow Q=A$ ,  $A \rightarrow P-B$ ,  $B \rightarrow P+B$ ,  $B \rightarrow \text{num}$ ,  $P \rightarrow id$ ,  $P \rightarrow \epsilon$ ,  $Q \rightarrow id$

- Construct the Syntax Directed Definition (SDD) for generating the 3-address code from the given grammar creating temporary variables where necessary.
- Conduct a Syntax Directed Translation using the above SDD for the test string  $id = id + id + id$
- Store the translation output in a *Triple* storage structure. Analyze the drawbacks of this storage scheme.

(4+3+3)

Q.4. For the block of 3-address code given by

$a = b + c$

$a = a + d$

$b = b + a$

$d = b + c$

- Construct the DAG and Conduct local optimization of the DAG assuming that only  $a$  and  $b$  are live on exit from the block.
- Convert the optimized DAG into optimized 3-address code
- Convert the optimized IR code into the target code (ALP)

(5+2+3)

Q.5 Explain in detail (any two)

- Symbol Table entries and updation mechanism
- An example of Error recovery techniques
- Static versus Dynamic storage allocation & Stack versus Heap storage

(5+5)