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B.TECH.
(SEM V) THEORY EXAMINATION 2021-22
COMPILER DESIGN

Time: 3 Hours

Total Marks: 100

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt all questions in brief. **2 x 10 = 20**

- a. What is the difference between parse tree and abstract syntax tree?
- b. Explain the problems associated with top-down Parser.
- c. What are the various errors that may appear in compilation process?
- d. What are the two types of attributes that are associated with a grammar symbol?
- e. Define the terms Language Translator and compiler.
- f. What is hashing? Explain.
- g. What is do you mean by left factoring the grammars? Explain.
- h. Define left recursion. Is the following grammar left recursive?
$$E \rightarrow E+E \mid E^*E \mid a \mid b$$
- i. What is an ambiguous grammar? Give example.
- j. List down the conflicts during shift-reduce parsing.

SECTION B

2. Attempt any three of the following: **10 x 3 = 30**

- a. Construct the LALR parsing table for the given grammar
$$S \rightarrow BB$$
$$B \rightarrow aB \mid b$$
- b. What is an activation record? Explain how it is related with runtime storage organization?
- c. Write the quadruple, triple, indirect triple for the following expression
$$(x + y) * (y + z) + (x + y + z)$$
- d. Discuss the following terms:
 - i. Basic block
 - ii. Next use information
 - iii. Flow graph
- e. Construct predictive parse table for the following grammar.
$$E \rightarrow E + T / T$$
$$T \rightarrow T * F / F$$
$$F \rightarrow F / a / b$$

SECTION C

3. Attempt any one part of the following: **10 x 1 = 10**

- a. Construct the SLR parse table for the following Grammar
$$E \rightarrow E + E$$
$$E \rightarrow E * E$$
$$E \rightarrow id$$
- b. Differentiate between stack allocation and heap allocation.



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4. Attempt any *one* part of the following: 10 x 1 = 10

- a. Write syntax directed definition for a given assignment statement:

$S \rightarrow id=E$
 $E \rightarrow E+E$
 $E \rightarrow E * E$
 $E \rightarrow -E$
 $E \rightarrow (E)$
 $E \rightarrow id$

- b. What are the advantages of DAG? Explain the peephole optimization.

5. Attempt any *one* part of the following: 10 x 1 = 10

- a. What do you understand by lexical phase error and syntactic error? Also suggest methods for recovery of errors.
- b. Discuss how induction variables can be detected and eliminated from the given intermediate code

B2: i:= i+1
t1:=4*j
t2:=a[t1]
if t2<10 goto B2

6. Attempt any *one* part of the following: 10 x 1 = 10

- a. Test whether the grammar is LL(1) or not, and construct parsing table for it.

$S \rightarrow 1AB / \epsilon$
 $A \rightarrow 1AC / 0C$
 $B \rightarrow 0S$
 $C \rightarrow 1$

- b. Distinguish between static scope and dynamic scope. Briefly explain access to non local names in static scope.

7. Attempt any *one* part of the following: 10 x 1 = 10

- a. What are the various issues in design of code generator & code loop optimization?
- b. Generate the three address code for the following code fragment.

```
while(a>b)
{
  if(c<d)
    x=y+z;
  else
    x=y-z;
}
```