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**B. TECH.  
(SEM V) THEORY EXAMINATION 2022-23  
COMPILER DESIGN**

**Time: 3 Hours****Total Marks: 100****Note:** Attempt all Sections. If require any missing data; then choose suitably.

**SECTION A**

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

- (a) How will you group the phases of compiler?
- (b) Mention the role of semantic analysis.
- (c) What are the various parts in LEX program?
- (d) Differentiate Parse tree and Syntax tree with an example.
- (e) Give the properties of intermediate representation.
- (f) Differentiate between LR and LL parsers.
- (g) What is phrase level error recovery?
- (h) Discuss the capabilities of CFG.
- (i) Define loop jamming.
- (j) What is induction variable?

**SECTION B**

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

- (a) Write SDD to produce three-address code for Boolean expressions and obtain the three-address code for the statement given below:

```
while a < b do
  if c < d then
    x = y * z
  else
    x = y + z
```

- (b) Discuss the stack allocation and heap allocation strategies of the runtime environment with an example.
- (c) What do you mean by attributed grammars? Discuss the translation scheme for converting an infix expression to its equivalent postfix form.
- (d) Construct the NFA and DFA for the following regular expression.

**$(0+1)^*(00+11)(0+1)^*$**

- (e) Explain the lexical analysis and syntax analysis phases of the compiler with a suitable example. Explain the reporting errors in these two phases as well.

**SECTION C**

**3. Attempt any *one* part of the following:**

**10 x 1 = 10**

- (a) Construct the CLR parse table for the following Grammar:

**$A \rightarrow BB$**

**$B \rightarrow cB$**

**$B \rightarrow d$**

- (b) Construct the SLR parsing table for the following Grammar.

**$S \rightarrow 0S0$**

**$S \rightarrow 1S1$**

**$S \rightarrow 10$**

**4. Attempt any *one* part of the following:**

**10 x 1 = 10**

- (a) What is back patching. Generate three address code for the following Boolean expression using back patching:  
 $a < b$  or  $c > d$  and  $e < f$
- (b) What is top down parsing? What are the problems in top down parsing? Explain each with suitable example.

**5. Attempt any *one* part of the following:**

**10 x 1 = 10**

- (a) What is an activation record? Draw diagram of general activation record and explain the purpose of different fields of an activation record.
- (b) How do we represent the scope information? Explain scope by number and scope by location.

**6. Attempt any *one* part of the following:**

**10 x 1 = 10**

- (a) Define Symbol table? Explain about the data structures used for symbol table.
- (b) Explain the following:
- (i) Copy Propagation
  - (ii) Dead-Code Elimination
  - (iii) Code Motion
  - (iv) Reduction in Strength.

**7. Attempt any *one* part of the following:**

**10 x 1 = 10**

- (a) Explain in the DAG representation of the basic block with example.
- (b) Write quadruple, triples and indirect triples for following expression :  
 $a = b * - c + b * - c.$