



Roll No:

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**BTECH**  
**(SEM V) THEORY EXAMINATION 2023-24**  
**COMPILER DESIGN**

TIME: 3 HRS

M.MARKS: 100

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

**SECTION A**

**1. Attempt all questions in brief.**

Q no.	Question	Marks	CO
a.	Explain cross compiler with suitable example.	2	1
b.	Construct regular expression to accept valid identifier containing letters, digits, and underscore.	2	1
c.	Consider the following grammar. S → aSB   d B → b Compute the number of reduction steps taken by a bottom-up parser while accepting the string "aaaadbbbb".	2	2
d.	Construct the following grammar after removing left recursion: S → Aa   b   ε A → Ac   SAd   ε	2	2
e.	Define the syntax directed definition (SDD) with suitable and simple example.	2	3
f.	Construct the syntax tree for the following expression: (a*c)+b*((c*a)+d)	2	3
g.	Compare between static and dynamic scope rule.	2	4
h.	Write the short note of Activation Record with their fields.	2	4
i.	Elaborate the design issues of code generation.	2	5
j.	Compute the number of nodes in Directed Acyclic Graph (DAG) for the following C code segment executed in the sequence: a = b + c; e = a + 1; d = b + c; f = d + 1; g = e + f;	2	5

**SECTION B**

**2. Attempt any three of the following:**

Q no.	Question	Marks	CO
a.	Demonstrate the process of compilation with the help of following input: c = a*b+10	10	1
b.	Illustrate the problems associated with top-down parsing. Consider some examples to explain how these problems can be resolved.	10	2
c.	Illustrate the role of syntax directed translation in compiler design. Also explain how semantic actions are attached to the production with example.	10	3
d.	Explore the various data structures used for the symbol table construction.	10	4
e.	Construct target code for the following expression: x:=(a+b)*c+d/(a+b)	10	5

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**SECTION C**

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

a.	Construct minimized DFA:	10	1
b.	Explore the phases of compiler with a suitable example.	10	1

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

a.	Construct parsing table for the following grammar using LALR parser: $S \rightarrow CC$ $C \rightarrow aC \mid b$	10	2
b.	Verify that the following grammar is LL (1) $S \rightarrow AaAb \mid BbBa$ $A \rightarrow \epsilon$ $B \rightarrow \epsilon$	10	2

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

a.	Consider the following grammar and give the syntax directed definition to construct parse tree for the input expression $4*7+3*9$ . $E \rightarrow E+T \mid T$ $T \rightarrow T*F \mid F$ $F \rightarrow \text{num.}$ Also construct an annotated parse tree according to your syntax directed definition.	10	3
b.	Determine the quadruples, triples, and indirect triples for the following expression: $(x+y) * (y+z) + (x+y+z)$	10	3

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

a.	Explain the run-time storage allocation strategies with their merits and limitations.	10	4
b.	Explain the various types of compile-time errors in phases of compiler.	10	4

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

a.	Explain what constitutes a loop in a flow graph and how will do you do loop optimizations in code optimization of a compiler.	10	5
b.	Explain the need of data flow analysis in code optimization. Design the following C code segments in flow graph: <code>for(i=1; i&lt;=5; i++) { sum=sum+a[i]; }</code>	10	5