

Roll No:

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

BTECH
(SEM V) THEORY EXAMINATION 2024-25
COMPILER DESIGN

TIME: 3 HRS

M.MARKS: 100

Note: Attempt all Sections. If you require any missing data, then choose suitably.

SECTION A

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

Q.No.	Questions	CO
(a)	Elaborate the regular expression to represent a language consisting of equal numbers of a's and b's.	1
(b)	Differentiate between parse tree and abstract syntax tree?	1
(c)	Is the following grammar left recursive? $S \Rightarrow S a \mid S b \mid c \mid d$ Remove the left recursion from the above grammar.	2
(d)	Consider the following grammar: $S \rightarrow B \mid SabS, B \rightarrow bB \mid \epsilon$ Compute FOLLOW(B).	2
(e)	Find the postfix notation for the following expression: $(a+b+c)*(c+q)$	3
(f)	Describe the two types of attributes that are associated with a grammar symbol?	3
(g)	Elaborate the functions of error handler?	4
(h)	Elaborate Hashing with example.	4
(i)	Discuss constant folding with example.	5
(j)	Discuss two design issues in code generation.	5

SECTION B

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

Q.No.	Questions	CO
(a)	Describe Lexical Analysis Phase. Count the number of tokens present in the following code: <pre>int i=1; for(j=0;j<10;j++) i=i+1;</pre>	
(b)	Compute the FIRST and FOLLOW for the following grammar: $S \rightarrow iCtSS' / a$ $S' \rightarrow eS / \epsilon$ $C \rightarrow b$	
(c)	Explain the concepts of quadruples and triples in the context of syntax-directed translation. Discuss how they represent intermediate code and support optimization.	
(d)	Describe a simple stack allocation scheme for managing memory during program execution. Explain how it is used for storing local variables and managing function calls.	
(e)	Explain the role of a code generator in a compiler. Discuss its responsibilities and how it translates intermediate code into the target code.	

Roll No:

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

BTECH
(SEM V) THEORY EXAMINATION 2024-25
COMPILER DESIGN

TIME: 3 HRS

M.MARKS: 100

SECTION C

- 3. Attempt any one part of the following: 10*1 = 10**
- | | | |
|-----|--|--|
| (a) | Clarify whether the following grammar is ambiguous or not:
$S \rightarrow A \mid B$ $A \rightarrow aAb \mid ab$ $B \rightarrow abB \mid \epsilon$ $S \rightarrow AB \mid aaB$ $A \rightarrow aA \mid \epsilon$ $B \rightarrow bB \mid \epsilon$ | |
| (b) | 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. | |
- 4. Attempt any one part of the following: 10 *1 = 10**
- | | | |
|-----|--|--|
| (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) | 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. | |
- 5. Attempt any one part of the following: 10*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 an activation record? Draw a diagram of a general activation record and explain the purpose of different fields of an activation record. | |
- 6. Attempt any one part of the following: 10*1 = 10**
- | | | |
|-----|--|--|
| (a) | How do we represent scope information? Explain scope by number and scope by location. | |
| (b) | Write quadruple, triples, and indirect triples for the following expression:
a=b*-c+b*-c | |
- 7. Attempt any one part of the following: 10*1 = 10**
- | | | |
|-----|---|--|
| (a) | Define Symbol Table. Explain the data structures used for the symbol table. | |
| (b) | Explain the following:
(i) Copy Propagation
(ii) Dead-Code Elimination
(iii) Code Motion
(iv) Reduction in Strength | |