PAPER ID-310677

Roll No: | | | | | | | | | | | | |

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.   2 x 10 = 20

Q no.	Question	Marks	CO
a.	Define bootstrapping in the context of compilers.	2	1
b.	Which phase of compiler is optional and why?	2	1
c.	Explain the concept of shift-reduce parsing.	2	2
d.	Differentiate Parse tree and Syntax tree with an example.	2	2
e.	Define syntax-directed translation schemes.	2	3
f.	What are the two types of attributes that are associated with a grammar symbol?	2	3
g.	Discuss how scope information is represented in a symbol table.	2	4
h.	What is mean by Activation record?	2	4
i.	Discuss two design issues in code generation.	2	5
j.	Explain the concept of global data-flow analysis.	2	5

SECTION B

2.   Attempt any *three* of the following: 10x3=30

a.	Describe the relationship between finite state machines and regular expressions. Discuss how regular expressions are used in lexical analysis and pattern matching.	10	1
b.	For the grammar S→aAd |bBd |aBe |bAe , A→f , B→f Construct LR(1) Parsing table. Also draw the LALR table.	10	2
c.	Explain the concepts of quadruples and triples in the context of syntax-directed translation. Discuss how they represent intermediate code and support optimization.	10	3
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.	10	4
e.	Explain the role of a code generator in a compiler. Discuss its responsibilities and how it translates intermediate code into the target code.	10	5

SECTION C

3.   Attempt any *one* part of the following: 10x1=10

a.	Given a regular expression a(b|c)*, construct the corresponding Nondeterministic Finite Automaton (NFA) that recognizes the language described by the regular expression.	10	1
b.	Check whether given grammar is ambiguous or not. If ambiguous then convert it into unambiguous grammar: E→E+E|E*E|id.	10	1

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4.	Attempt any *one* part of the following:	10x1=10	
a.	Check whether the given grammar is LR(0) or not: S→PQy, P→Sy|x, Q→yS.	10	2
b.	Consider the following grammar for a simple expression language: E → E + T | T T → T * F | F F → (E) | id Consider expression id * (id+id).Apply shift reduce parsing to construct parse tree.	10	2

5.	Attempt any *one* part of the following:	10x1=10	
a.	Write syntax directed definition for a given assignment statement: S → id=E E → E+E E →E*E E→-E E → (E) E→id	10	3
b.	Explain how syntax-directed translation handles array references within arithmetic expressions.	10	3

6.	Attempt any *one* part of the following:	10x1=10	
a.	Define Symbol table? Explain about the data structures used for symbol table.	10	4
b.	Define semantic errors in a compiler. Discuss the challenges associated with detecting and handling semantic errors. Provide examples to illustrate semantic issues.	10	

7.	Attempt any *one* part of the following:	10x1=10	
a.	Consider a basic block with the following three instructions: 1. x = a + b 2. y = x * c 3. z = y – d Apply common sub expression elimination to optimize the basic block.	10	5
b.	Construct a Directed Acyclic Graph (DAG) to represent the following basic block: 1. x = a + b 2. y = c - d 3. z = x * y	10	5