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BTECH
(SEM VI) THEORY EXAMINATION 2024-25
COMPILAR DESIGN

TIME: 3 HRS

M.MARKS: 70

Note: Attempt all Sections. In case of any missing data; choose suitably.

SECTION A

1. Attempt all questions in brief. 02 x 7 = 14

Q no.	Question
a	Differentiate between phases and passes of a compiler.
b	State any two differences between top-down and bottom-up parsing.
c	Mention the difference between inherited and synthesized attributes.
d	Explain the role of a hash table in implementing a symbol table.
e	What is the Finite State Machines (FSM)? Design a FSM that accepts all strings of <i>a</i> and <i>b</i> containing even number of <i>a</i> 's and odd number of <i>b</i> 's.
f	Write a note on Lexical and Syntactic structure of a programming language.
g	What is machine-independent code optimization?

SECTION B

2. Attempt any three of the following: 07 x 3 = 21

a.	Explain in detail the process of compilation. Illustrate the output of each phase of compilation of the input " $a = (b + c) * (b + c) * 2$ ".
b.	Using rightmost derivations or the derivation trees show that the grammar with following production rules is ambiguous $S \rightarrow aSbS \mid bSaS \mid \epsilon$
c.	Analyze the role of symbol tables in different phases of compilation. How does symbol table interact with lexical, syntax, and semantic analyzers?
d.	Given the grammar: $S \rightarrow Aa \mid bAc \mid Bc \mid bBa$ $A \rightarrow d$ $B \rightarrow d$ Construct the SLR parsing table and determine whether any conflicts occur.
e.	Semantic errors are often difficult to detect. Explain different types of semantic errors with examples and how a compiler detects them during semantic analysis.

SECTION C

3. Attempt any one part of the following: 07 x 1 = 07

a.	Construct LL(1) parsing table for the following grammar $S \rightarrow aB \mid aC \mid Sd \mid Se$ $B \rightarrow bBc \mid f$ $C \rightarrow g$
b.	Explain the major design issues in code generation. How do these issues impact the performance of a compiler?

4. Attempt any one part of the following: 07 x 1 = 07

a.	Parse the input string (a,(a, a)) using shift reduce parser $S \rightarrow (L) \mid a$ $L \rightarrow L, S \mid S$
b.	Discuss the optimization techniques used at the basic block level. Explain with an example how a basic block can be optimized.

5. Attempt any one part of the following: 07 x 1 = 07

a.	Write Quadruple, Triple, and three address code for the expression $(a/b) * (a+b) - (a*b)/d$
b.	Give various types of three address statements used for different programming language constructs such as assignment, jump, procedure calls, array statements



Paper id: 250631

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	etc.
6. Attempt any one part of the following: 07 x 1 = 07	
a.	What are Static and Dynamic Scope Rules? How are the activation records used in implementation of recursive calls of a procedure/function.
b.	Generate a three address code for the following code segment <pre> c = 0; while (c<5) { if (a < b) then x++; else goto p; c++; } p: printf("Not Done"); </pre>
7. Attempt any one part of the following: 07 x 1 = 07	
a.	What are the principle sources of optimization of code? How the DAG is used in common sub-expression elimination? Discuss in details.
b.	Give a classification of various errors and discuss each class of errors with examples.

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