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Supplementary/Improvement Examination-2023 (For Even Semester-2023)

Course Name: Compiler Design

Paper Code: BTCSE 602 / BTCSEAI 602

Time: 3 Hours

Maximum Marks: 75

Follow proper numbering for answering the questions.

Course Outcome (CO):

CO1. Evaluate the basic concepts of formal languages and their application to Compiler Design.

CO2. Develop a familiarity with fundamental principles of compiler design.

CO3. Demonstrate the process of translating a high-level language to executable code.

CO4. Analyze different parsing techniques and algorithms.

CO5. Generate intermediate code for statements in the high-level languages.

CO6. Apply techniques for code optimization.

CO7. Implement a complete compiler for a small programming language.

Q. No.	Questions	Marks	CO	BL
Section A <i>All questions are compulsory.</i>		7×5=35		
1	Grammar G: $\text{Exp} \rightarrow \text{Term } u \text{ Term } v \text{ Factor } w \mid \text{Factor } w \text{ Factor } v \text{ Term } u$ $\text{Term} \rightarrow \epsilon$ $\text{Factor} \rightarrow \epsilon$ Evaluate First() and Follow() for all the symbols of above grammar, G.	5	CO4	L3
2	i. What is left most derivation and right most derivation? ii. Consider the grammar, G: $S \rightarrow (L) \mid a$ $L \rightarrow L, S \mid S$ Construct leftmost and rightmost derivation for (a, a)	5	CO3	L3
3	Explain the difference between compiler and interpreter.	5	CO2	L3
4	Define left factoring in Grammar. Left factor the following grammar: $S \rightarrow aSSbS \mid aSaSb \mid abb \mid b$	5	CO6	L1, L2
5	What is the need of eliminating left recursion from the grammar? Eliminate left recursion from the following grammar: $E \rightarrow E + T \mid T$ $T \rightarrow T \times F \mid F$ $F \rightarrow (E) \mid id$	5	CO2	L3
6	Find the number of tokens for the following C code: <pre>int i; for (i = 1; i <= n; i++) { fact = fact * i; }</pre>	5	CO3	L2
7.	What is activation record? Explain.	5	CO1	L2

Section B <i>Attempt any Four questions.</i>		4×10=40		
1	Considering alphabet to be {a,b} : i. Design NFA for all strings starting with "ab". ii. Design DFA for the language $L = \{ a^n \}$, where $n \bmod 4 = 0$ }	10	CO3	L3
2	i. Define basic blocks & control flow graph. ii. Write Three address code for the following program: <pre> a=3; b=4; for (i=0; i<n; i++) { a= b+1; a = a* a; }</pre>	10	CO6	L4
3	Represent $x = a + b * c + (b * c^d) + ((b * c) + ((b - c) * (c^d)))$ using following techniques: i. Directed Acyclic Graph ii. Postfix iii. Triple [^ represents Power operator]	10	CO5	L3
4	Grammar G: $S \rightarrow LL \mid id$ $L \rightarrow *L \mid r$ Construct the CLR(1) parsing table & find out whether the above grammar is CLR(1) or not.	10	CO4	L4
5	Consider Grammar, G given below: $S \rightarrow (L) / a$ $L \rightarrow SL'$ $L' \rightarrow \epsilon / , SL'$ i. Construct LL(1) parsing table. ii. Parse the input string $w = (a, a, a,)\\$ using LL(1) parsing algorithm.	10	CO4	L3
6	Write a short note on any two of the following: i. Synthesized and inherited attributes. ii. Any two code optimization techniques. iii. Inheritance & Polymorphism	10	CO1 CO3	L1 L2

BL-Bloom's Taxonomy Levels (1- Remembering, 2- Understanding, 3- Applying, 4- Analysing, 5-Evaluating, 6- Creating)