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Odd Semester Examination 2024

Course Name: Formal Languages & Compiler Design
Time: 2.5 Hours
Follow proper numbering for answering the questions.

Paper Code: MCA301
Maximum Marks: 60

Q. No.	Questions	Marks	CO	BL
<u>Section A</u> <i>All questions are compulsory.</i>		4×5=20		
1	Define First and Follow. Find out the first() and follow() for all the symbols of given grammar, G. Grammar: $S \rightarrow E$ $E \rightarrow aTFb$ $F \rightarrow *aF \mid GH \mid \epsilon$ $T \rightarrow (E) \mid \epsilon$ $G \rightarrow g \mid \epsilon$ $H \rightarrow h \mid \epsilon$	5	CO4	L3
2	i. Find the number of tokens for the following C code: <pre style="margin-left: 40px;">int min(a,b) { int a, b; return a < b? a : b; }</pre> ii. Identify the type of grammar according to Chomsky classification Grammar: $A \rightarrow aBb$ $A \rightarrow b$ $B \rightarrow a$	5	CO3	L3
3	Which phase(s) of compiler: - Is/are considered frontend - Checks for type mismatch - Is/are independent of the underlying machine - Removes comment statements - Produces a parse tree	5	CO2	L1
4	Differentiate between Top Down parsing and Bottom Up Parsing. Give examples.	5	CO2	L2

Section E

Attempt any Four questions.

2×10=20

1	Construct the SDT to convert infix expression $a+b*c$ into postfix using the following grammar: $E \rightarrow E+T / T$ $T \rightarrow T * F / F$ $F \rightarrow id$	10	CO3	L4
2	i. Define basic blocks & control flow graph. ii. Eliminate left recursion from the following grammar: $S \rightarrow Ar At w x z$ $A \rightarrow Aa Ab Sc d \epsilon$	10	CO4	L4
3	Represent $x=a-a / (b-c)+((b-c)+(d^e^f))$ using following techniques: [^ represents Power operator] i. Syntax tree ii. DAG iii. Postfix iv. Quadruple	10	CO5	L3
4	Grammar G: $S \rightarrow Xa / bXc / Yc / bYa$ $X \rightarrow d$ $Y \rightarrow d$ Construct SLR(1) parsing table & check whether the above grammar is SLR(1) or not.	10	CO4	L4
5	What is an activation record? Explain with diagram and example.	10	CO5	L2
6	Write a short note on: i. Ambiguous grammar ii. Constant Propagation & Dead Code Elimination	10	CO1, CO5	L2

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