

Internal Assessment Test 2– January2024

Sub:	Automata Theory & Compiler Design	Sub Code:	21CS51	Branch:	AIML
Date:	30/1/2024	Duration:	90 min's	Max Marks:	50
		Sem/Sec:	V /A	OBE	
Answer any FIVE FULL Questions					
		MARKS	CO	RBT	
1	<p>Explain the role of lexical analyzer in compiler . 5 marks Also explain input buffering withthe help of an example. 5 marks</p> <p>Solution</p>	10	CO2	L1	
2	<p>Convert the following DFA to corresponding Regular Expression using Rijk Method</p> <p>Solution</p>	10	CO2	L2	
3	<p>State Pumping Lemma Theorem. 5Marks Prove that $L = \{ L = \{x^n n \text{ is a prime} \}$ is not a regular language. 5 Marks</p> <p>Solution:</p>	10	CO2	L2	

SOLUTION

We use the following property of L. If $w \in L$, then $|w|$ is a prime.

Step 1: Suppose $L = L(G)$ is context-free. Let n be the natural number obtained by using the pumping lemma.

Step 2: Let P be a prime number greater than n . Then $z = a^P \in L$, we write $z = uvwxy$.

Step 3: By pumping lemma, $u^q v w x^q y = uv^q w x^q y \in L$.

So $|u w y|$ is a prime number. say q .

Let $|vx| = r$. Then $|u^q v w x^q y| = q + qr$.

As $q + q^r$ is not a prime, $u^q v w x^q y \notin L$. This is a contradiction. Therefore L is not context free.

4a) Eliminate the unit productions from the following:

$S \rightarrow XY$
 $X \rightarrow 0$
 $Y \rightarrow Z|1$
 $Z \rightarrow M$
 $M \rightarrow N$
 $N \rightarrow 0$

4a) $S \rightarrow XY$
 $X \rightarrow 0$
 $Y \rightarrow 0|1$
 $Z \rightarrow 0$
 $M \rightarrow 0$
 $N \rightarrow 0$

5 CO2 L1

4b) Remove NULL productions from following with all the required steps.

$S \rightarrow XYaC$
 $X \rightarrow XY$
 $Y \rightarrow b|\epsilon$
 $C \rightarrow D|\epsilon$
 $D \rightarrow d$

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4b) $S \rightarrow XYaC | XaC | Xa|Xa$
 $X \rightarrow XY|X$
 $Y \rightarrow b$
 $C \rightarrow D$
 $D \rightarrow d$

5 CO2 L2

5 Simplify the given CFG.

$S \rightarrow a|aA|B|C$
 $A \rightarrow aB|\epsilon$
 $B \rightarrow aA$
 $C \rightarrow cCD$
 $D \rightarrow ddd$

Solution:

P_i	T_i	V_i	Y_i
$S \rightarrow a$	a	S, A	
$S \rightarrow aA$		S, A, B	
$A \rightarrow aB$	a, ϵ	S, A, B	
$B \rightarrow aA$	a, ϵ	S, A, B	

\therefore The simplified grammar $G_1 = (V_1, T_1, P_1, S)$
 where $V_1 = \{S, A, B\}$
 $T_1 = \{a, \epsilon\}$
 $S = S$
 $P_1 = \{S \rightarrow a|aA, A \rightarrow \epsilon|aB, B \rightarrow aA\}$

10 CO3 L3

6 The grammar G with production rules. 5 marks
 Test for ambiguity and find LMD and RMD. $S \rightarrow 0XS|0$
 $X \rightarrow SX|SS|00$
 $w = 0000000$

10 CO2 L3

	<p>5 Marks</p> <p>Solution Students may find out any two lnds or 2 rmds and prove for ambiguity.</p>			
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Faculty Signature

CCI Signature

HOD Signature