



UTM
UNIVERSITI TEKNOLOGI MALAYSIA

FACULTY OF ENGINEERING

SCHOOL OF COMPUTING

SESSION 2020/2021 SEMESTER 2

SCSJ3203 THEORY OF COMPUTER SCIENCE
SECTION 04

TUTORIAL 4
CFG PART 1

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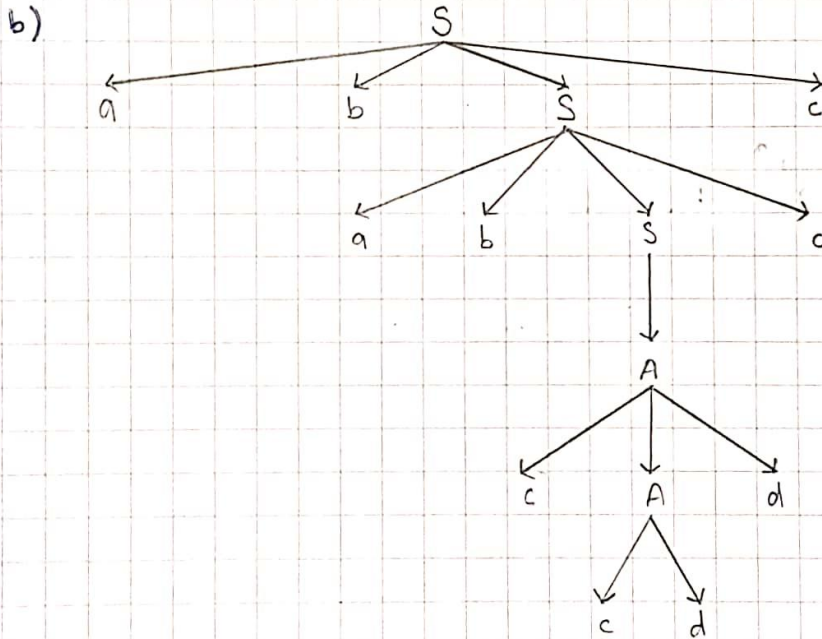
Matrics : B19EC0006

Lecturer : DR ZALMIYAH ZAKARIA

Due Date : 26th April 2021

TCS Tutorial 6: CFG Part 1.

1. a) $S \rightarrow abSc$ $S \rightarrow abSc$
 $\rightarrow ababScc$ $S \rightarrow abSc$
 $\rightarrow ababAcc$ $S \rightarrow A$
 $\rightarrow ababcAdcc$ $A \rightarrow cAd$
 $\rightarrow ababccddcc$ $A \rightarrow cd$



c) $L(G) = \{(ab)^n c^m d^m c^n \mid n \geq 0; m > 0\}$

$$2. a) G_1: S \rightarrow a S b \mid B \\ B \rightarrow b B \mid b$$

$$\begin{aligned} S &\rightarrow a S b \\ &\rightarrow a a S b b \\ &\rightarrow a a B b b \\ &\rightarrow a a b B b \\ &\rightarrow a a b b b \end{aligned}$$

$$\begin{aligned} S &\rightarrow a S b \\ S &\rightarrow a S b \\ S &\rightarrow B \\ B &\rightarrow b B \\ B &\rightarrow b \end{aligned}$$

$$L(G_1) = \{a^m b^n \mid m, n \geq 0\}$$

$$b) G_2: S \rightarrow a S b \mid a S \mid \lambda$$

$$\begin{aligned} S &\rightarrow a S b \\ &\rightarrow a a S b b \\ &\rightarrow a a a S b b b \\ &\rightarrow a a a b b b \end{aligned}$$

$$\begin{aligned} S &\rightarrow a S b \\ S &\rightarrow a S b \\ S &\rightarrow a S \\ S &\rightarrow \lambda \end{aligned}$$

$$L(G_2) = \{a^m b^n \mid m, n \geq 0\}$$

$$3. a) L_1 = a^* b^*$$

$$\begin{aligned} S &\rightarrow A S \mid b A \mid \lambda \\ A &\rightarrow b A \mid \lambda \end{aligned}$$

$$b) L_2 = (a+b)^*$$

$$S \rightarrow a S \mid b S \mid \lambda$$

$$c) L_3 = b(a+b)^* a$$

$$\begin{aligned} S &\rightarrow b A \\ A &\rightarrow a A \mid b A \mid a \end{aligned}$$

$$d) L_4 = (ab)^* ba$$

$$\begin{aligned} S &\rightarrow a A \mid b B \\ A &\rightarrow b S \\ B &\rightarrow a \end{aligned}$$

4.

Table 2	
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5	
2	
10	
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