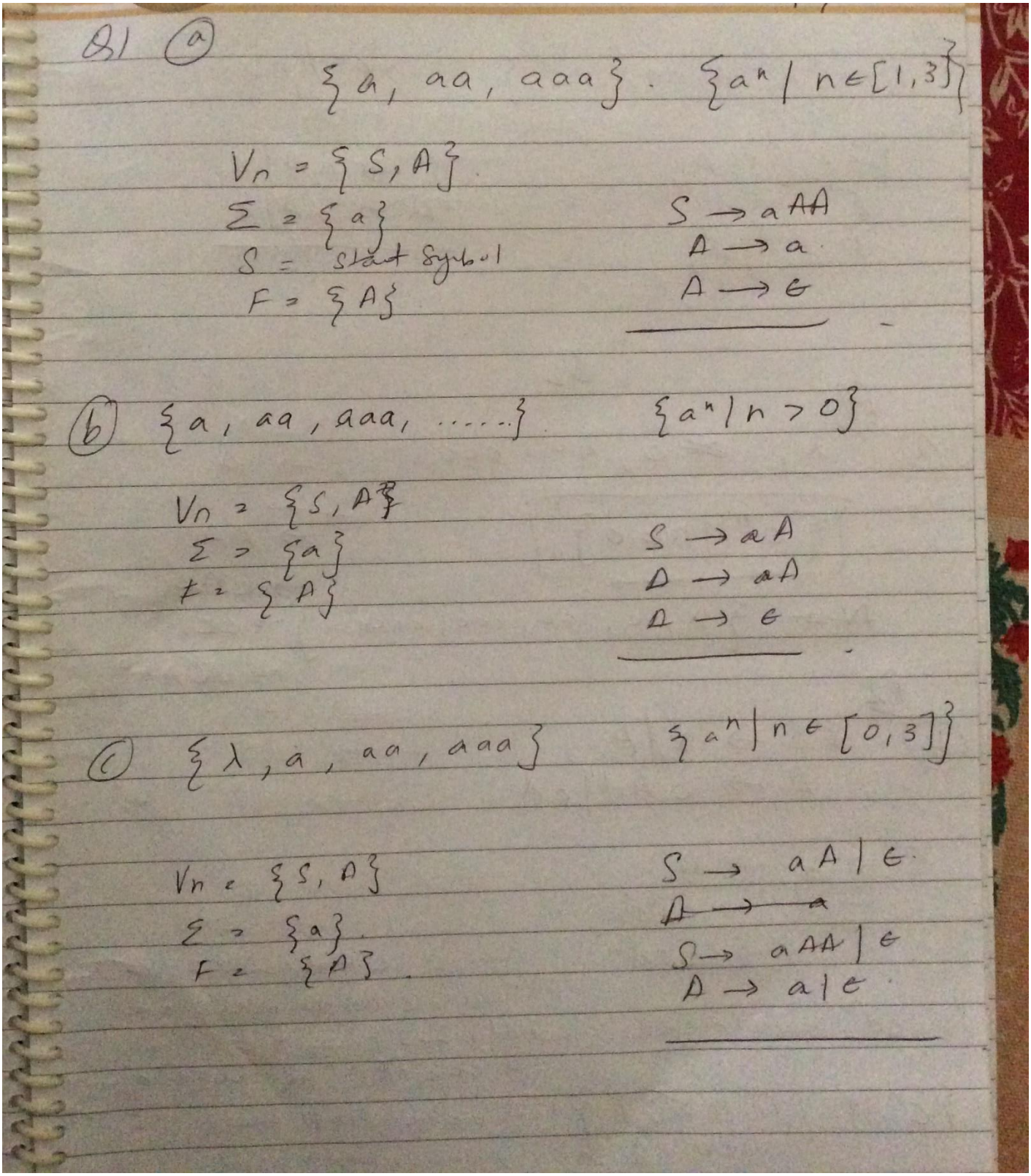
Compiler Design

Lab 3: Context Free Grammar

Muhammad Maaz Hasan Akhtar
ERP: 09399

Code:

https://github.com/maazh/Compiler-Design-Labs



Date

Q1

(d) $\{\lambda, a, aa, \cdots\}$ $\{a^n / n \geq 0\}$

$V_n = \{S, A\}$
$\Sigma = \{a\}$
$P = \{A\}$

$S \to aA / \epsilon$
$A \to aA / \epsilon$

Q2.

P1

(a) $\lambda, c, cc, ccc, \cdots$

$\{c^n / n \geq 0\}$

$N = \{\lambda, c, cc, ccc, cccc \cdots\}$

$S \to \lambda$
$S \to A$
$\to AA$
$\to cAA$
$\to ccAA$
$\to cccAAA$
$\to \cdots$

P2

(b) $S \to \lambda / A$
$A \to cAd / cd$

$\{c^n d^n / n \geq 0\}$

$S \to \lambda \to A$
$\to cd \to cAd$
$\to ccdd \to ccAdd$
$\to cccddd \to cccAddd$
$\to ccccdddd \to ccccddddd$
$\to cccccddddd \to \cdots$

$\{\lambda, cd, ccdd, cccddd, ccccdddd, \cdots\}$

$\{c^n d^m / n, m \geq 0 \text{ or } n+m \geq 1\}$

Ans.

Date

P3

$S \to \lambda / A$

$A \to cAd / cd$ ~~$A \to cAd / cd$~~ $A \to AcA / c$

$S \to \lambda / A$

cd / cAd

$S \to \lambda / A$ &

λ, A ~~AcA~~

AcA c

AcAcc AcAcA

AcAcAcAcAcc

AcAccccccccc.

$\{c^n \mid n \geq 0, n \bmod 2 > 0\}$

all languages where 'c' is either zero, or odd in number.

P4

$S \to cA$

$A \to d / cA / Td$

$T \to Td / d$

{c, .

cTd

cTdd

cTddd

cA

cd cA cTd. cdd

ccd ccA ccTd

cTdd / cd.

$\{c^m d^n \mid m, n > 0\}$

{cd, ccd, cdd, cddd.. } cddddd

cTddd cddd

cTddd

Ans-

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Q2 ⓒ

$$\{c^m d^n \mid m,n \geq 0, \ m+n \geq 0\} \quad m+n \geq 1$$

$$\{c^m d^n \mid m > n \geq 0, \ m+n \neq 1\} \quad m+n \neq 1$$

Date

Q3.

(a) $V_n = \{S, A\}$

$\Sigma = \{a, b\}$

S

$F = \{A\}$.

P: $S \rightarrow aAb$

~~$A \rightarrow ab$~~

$A \rightarrow aAb \mid \epsilon$

(b) $\{a^n b^m \mid n > 0, 0 < m < n\}$

$m > 0$

$n > m$

aaab, aaabb, aaaaab, aaaabbb ...

$S \rightarrow aA$

S

$A \rightarrow aB$

$B \rightarrow aB \mid b$

$V_n = \{S, A, B\}$

$\Sigma = \{a, b\}$

$F = \{B\}$

P: $S \rightarrow A$

$A \rightarrow aaBb$

$B \rightarrow aBb \mid \epsilon$

$B \rightarrow aB$.

$B \rightarrow \epsilon$

Date

(c) $\{a^n b^m \mid n>0, 0 \le m < n\}$

$\{a, aab, aa, aaa\ldots, aaab, aaabb\ldots\}$

$V_n = \{S, A, B, C\}$.
$\Sigma = \{a, b\}$
$F = \{B, C\}$.

P: $S \to A$
$A \to aB$
$B \to aB \mid abC \mid \epsilon$
$C \to b \mid \epsilon$