Student Id: 05.05.2016
Name Surname:
Signature:

BLG311E – FORMAL LANGUAGES AND AUTOMATA

2016 SPRING

QUIZ 5

Convert the following grammar into Chomsky normal form (CNF).

$S \rightarrow ASA \mid aB$
$A \rightarrow B \mid S$
$B \rightarrow b \mid \Lambda$

Duration: 15 mins

Solution:

Eliminate Λ productions ($B \rightarrow \Lambda$ and $A \rightarrow B \rightarrow \Lambda$):

$S \rightarrow ASA \mid aB \mid AS \mid SA \mid a$
$A \rightarrow B \mid S$
$B \rightarrow b$

Eliminate unit productions ($A \rightarrow B$ and $A \rightarrow S$):

$S \rightarrow ASA \mid aB \mid AS \mid SA \mid a$
$A \rightarrow b \mid ASA \mid aB \mid AS \mid SA \mid a$
$B \rightarrow b$

Break-down strings of two or more than two symbols involving terminals (aB):

$S \rightarrow ASA \mid CB \mid AS \mid SA \mid a$
$A \rightarrow b \mid ASA \mid CB \mid AS \mid SA \mid a$
$B \rightarrow b$
$C \rightarrow a$

Replace each production having more than two non-terminal occurrences on the right by an equivalent set of double-non-terminal productions (ASA):

$S \rightarrow AD \mid CB \mid AS \mid SA \mid a$
$A \rightarrow b \mid AD \mid CB \mid AS \mid SA \mid a$
$B \rightarrow b$
$C \rightarrow a$
$D \rightarrow SA$