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**THEORY OF AUTOMATA**

**ASSIGNMENT #3**

**Question #1:**

Context-free grammar for java language:

Program 🡪 public static void main( String args[] ) { Stmts }

Stmts 🡪 PrintStmt | InitStmt | DeclStmt | IfStmt | IfElseStmt | ForStmt | WhileStmt

stmts print stmts / Decl stmts / If stmts / Def stmts / forLoop stmts / while stmts / dowhile stmts / switch stmts / ifelse stmt / ∈

Init stmts Dec stmts | DecList stmts;

Decl stmts Datatype ID;

DeclList Datatype ID Extra;

Datatype int, float, char, boolean, String

Extra ,ID Extra / ∈

Def stmts ID = digit; / ID = Expression;

ID letter / letter(letter digit)\*

letter a/b/c/………/z/A/B/C/………/Z

digit 0/1/……../9

letter digit letter digit

print stmts System.out.print(“string”); / System.out.print(Exp);

string (digit letter symbols)\*

Expression ID op ID

op + / - / / / \* / ^ / %

forLoop stmts for(def stmts; cond; inc/dec) {stmts}

cond ID logOP ID / ID logOP digit

inc ID++

dec ID--

logOP <= / >= / == / < / > / !=

if stmts if(cond) {stmts}

while stmts while(cond) {stmts}

dowhile stmts do{stmts} while (cond);

switct stmts switch(cond) {stmts switct}

switct stmt case: digit/letter break; / default: print stmt break;

ifelse stmt if (cond) {stmts} else {stmts}

**Question #2:**

**Part I**



S 🡪 0S11S2 | 0S1 | 1S2 | ∈

Example:

001112

S 🡪 0S11S2 (replacing S by 0S1)

🡪 00S111S2 (replacing S by ∈)

🡪 001112

**Part II**



S 🡪 aSaa | b

Example:

aabaaaa

S 🡪 aSaa

🡪 aaSaaaa

🡪 aabaaaa

**Question #3:**

**Part I**



S 🡪 00 | 11 | 0A0A | 1A1A

A 🡪 0A | 1A | 0 | 1

Example:

10011001

S 🡪 1A1A

🡪 10A1A

🡪 100A1A

🡪 10011A

🡪 100110A

🡪 1001100A

🡪 10011001

**Part II**



S 🡪 abc | aAbcc

Ab 🡪 bA

Ac 🡪 Bbccc

bB 🡪 Bb

aB 🡪 aa | aaA

Example:

aabbccccc

S 🡪 aAbcc

🡪 abAcc

🡪 abBbcccc

🡪 aBbbcccc

🡪 aabbcccc