1 a)

Language Specification:

Alphabet:

1. Upper (A-Z) and lower case letters (a-z) of the English alphabet
2. Decimal digits (0-9);
3. Underline character ‘\_’;

Lexic:

1. Special symbols: - operators + - \* / = < <= == > >= << >> #

-separators [ ] { } : ; space

-reserved words: int, do, else, if, while, for, break, cout, cin, endl, include, iostream, using namespace, std

b. Identifiers

-a sequence of letters, the rule is:

<identifier> ::= <letter> | <letter>{<letter>}

<letter>:: = “A”|”B”|…|”Z” |”a”|…|”z”

c.Constants

1.integer -rule:

<integer> ::= <digit> {<digit>}

<digit> ::= “0”|…|”9”

Syntax:

<program> ::= "include" "iostream" ";" "using namespace" "std" ";" "int" "main" "(" ")" "{" <stmt\_list> "}"

<stmt\_list> ::= <stmt> ";" | <stmt> ";" <stmt\_list>

<stmt>::== <decl\_stmt> | <assign\_stmt> | <io\_stmt> | <if\_stmt> | <for\_stmt> | “break” | <expr\_stmt>

<decl\_stmt> ::=“int” <identifier>

<assign\_stmt>::=<identifier> “=” <expression>

<expression>::= <term> | <term> “+” <expression>

<term>::= <factor> | <factor> “\*” <term> | <factor> “%” <term>

<factor>::= <integer> | <identifier> | “(“ <expression> “)”

<io\_stmt>::= “cin” “>>” <identifier> | “cout” “<<” <identifier> | “cout” “<<” “endl|| “cout” “<<” “ “

<if\_stmt>:== "if" "(" <condition> ")" "{" <stmt\_list> "}" ["else" "{" <stmt\_list> "}"]

<for\_stmt>:== “for” “(“ <assign\_stmt> “;” <condition> “;” <assign\_stmt> “)” "{" <stmt\_list> "}"

<expr\_stmt>::= <expression>

<condition> ::= <expression> <rel\_op> <expression>

<rel\_op> ::= “"<" | "<=" | "==" | ">" | ">="

b. include iostream;

using namespace std;

int main() {

int k,i,j;

int isPrime;

cout << "Enter a number: ";

cin >> k;

for ( i = 2; i < k; i = i + 1) {

isPrime = 1;

for ( j = 2; j < i; j = j + 1) {

if (i % j == 0) {

isPrime = 0;

break;

}

}

if (isPrime == 1) {

cout << i << " ";

}

}

cout << endl;

}

<program> ::= "include" "iostream" ";" "using namespace" "std" ";" "int" "main" "(" ")" "{" <stmt\_list> "}"

Dupa care mergem in stmt\_list si avem

Int k,I,j;

Int isPrime; care sunt a doua ramura de stmt\_list

Apoi avem 2 io\_stmt cout<< “enter a number: “; si cin>>k

Apoi for\_stmt care este format din assign\_stmt, condition si stmt\_list

For ( inti=2; i<k; i=i+1) = for “(“ <assignt\_stmt> “;” <condition> “;” <assignt\_stmt> ")”

Apoi avem in acoladele for-ului stmt\_list care de fapt este o lista de stmt: assign\_stmt (isPrime = 1; ) un for statement ca mai devreme si if\_stmt si arata asa “if” “(“ <condition> “)” “{<stmt\_list> “}”

Acel isPrime=0 si break este un stmt\_list care de fapt e un assignt statement si corespunde definitiei assign\_stmt de identifier = expression unde expresia e un termen, care este un factor care este un integer in cazul acesta si break fiind un keyword

Apoi urmeaza urmatorul stmt\_list care este un if\_stmt care corespunde din nou definitiei, un io\_stmt care din nou corespunde si ultimul cout<<endl care corespunde si acesta