**2. Write a C program to simulate a Non-Deterministic Finite Automata (NFA) for the given language.**

**Aim:-** Write a C program to simulate a Non-Deterministic Finite Automata (NFA) for the given language.

**Algorithm:-**

1. Get the following as input from the user.

i. Number of states in the NFA

ii. Number of symbols in the input alphabet and the symbols

iii. Number of final states and their names

2. Declare a 3-dimensional matrix to store the transitions and initialize

all the entries with -1.

3. Get the transitions from every state for every input symbol from the

user and store it in the matrix.

**Program:-**

#include<stdio.h>

#include<string.h>

int main()

{

int i,j,k,l,m,next\_state[20],n,mat[10][10][10],flag,p;

int num\_states,final\_state[5],num\_symbols,num\_final;

int present\_state[20],prev\_trans,new\_trans;

char ch,input[20];

int symbol[5],inp,inp1;

printf("How many states in the NFA : ");

scanf("%d",&num\_states);

printf("How many symbols in the input alphabet : ");

scanf("%d",&num\_symbols);

for(i=0;i<num\_symbols;i++)

{

printf("Enter the input symbol %d : ",i+1);

scanf("%d",&symbol[i]);

}

printf("How many final states : ");

scanf("%d",&num\_final);

for(i=0;i<num\_final;i++)

{

printf("Enter the final state %d : ",i+1);

scanf("%d",&final\_state[i]);

}

//Initialize all entries with -1 in Transition table

for(i=0;i<10;i++)

{

for(j=0;j<10;j++)

{

for(k=0;k<10;k++)

{

mat[i][j][k]=-1;

}

}

}

//Get input from the user and fill the 3D transition table

for(i=0;i<num\_states;i++)

{

for(j=0;j<num\_symbols;j++)

{

printf("How many transitions from state %d for the input %d :

",i,symbol[j]);

scanf("%d",&n);

for(k=0;k<n;k++)

{

printf("Enter the transition %d from state %d for the input

%d : ",k+1,i,symbol[j]);

scanf("%d",&mat[i][j][k]);

}

}

}

printf("The transitions are stored as shown below\n");

for(i=0;i<10;i++)

{

for(j=0;j<10;j++)

{

for(k=0;k<10;k++)

{

if(mat[i][j][k]!=-1)

printf("mat[%d][%d][%d] = %d\n",i,j,k,mat[i][j][k]);

}

}

}

while(1)

{

printf("Enter the input string : ");

scanf("%s",input);

present\_state[0]=0;

prev\_trans=1;

l=strlen(input);

for(i=0;i<l;i++)

{

if(input[i]=='0')

inp1=0;

else if(input[i]=='1')

inp1=1;

else

{

printf("Invalid input\n");

exit(0);

}

for(m=0;m<num\_symbols;m++)

{

if(inp1==symbol[m])

{

inp=m;

break;

}

}

new\_trans=0;

for(j=0;j<prev\_trans;j++)

{

k=0;

p=present\_state[j];

while(mat[p][inp][k]!=-1)

{

next\_state[new\_trans++]=mat[p][inp][k];

k++;

}

}

for(j=0;j<new\_trans;j++)

{

present\_state[j]=next\_state[j];

}

prev\_trans=new\_trans;

}

flag=0;

for(i=0;i<prev\_trans;i++)

{

for(j=0;j<num\_final;j++)

{

if(present\_state[i]==final\_state[j])

{

flag=1;

break;

}

}

}

if(flag==1)

printf("Acepted\n");

else

printf("Not accepted\n");

printf("Try with another input\n");

}

}

**Output:-**

