Program:

```
#include<stdio.h>
#include<stdlib.h>
#include<stdbool.h>
int need[100][100],avai[100];
struct process{
int pc;
bool status;
}pno[100];
bool check(int i,int m)
{
int j;
for(j=0;j<m;j++)
{
if(need[i][j]>avai[j])
return 0;
}
return 1;
}
void disp(int n)
{
int i;
printf("SYSTEM IN SAFE STATE\nSAFE SEQUENCE = ");
for(i=0;i<n;i++)
{
printf("P%d ",pno[i].pc);
}
}
void banker(int alloc[][100],int max[][100],int n,int m)
{
int i,j,ck=0,ic=0,flag=0;
bool checker=0;
printf("NEED MATRIX :\n");
for(i=0;i<n;i++)
{
for(j=0;j<m;j++)
{
need[i][j]=max[i][j]-alloc[i][j];
printf("%d ",need[i][j]);
pno[i].status=0;
}
printf("\n");
}
while(ck<n)
{
if(check(ic,m)==1&&pno[ic].status==0)
{
int ac=0;
pno[ck].pc=ic;
ck++;
pno[ic].status=1;
checker=1;
for(ac=0;ac<m;ac++)
{
avai[ac]=avai[ac]+alloc[ic][ac];
}
}
if(ic==n-1&&checker==0)
{
printf("SYSTEM UNSAFE\n");
flag=1;
ck=n;
}
if(ic==n-1)
{
ic=-1;
checker =0;
}
ic++;
}
if(flag==0)
disp(n);
```

```
int main()
{
int alloc[100][100],max[100][100],n,m,i,j;
printf("ENTER THE NO PROCESS AND RESOURCES : ");
scanf("%d%d",&n,&m);
printf("\nENTER ALLOCATION MATRIX : \n");
for(i=0;i<n;i++)
for(j=0;j<m;j++)
scanf("%d",&alloc[i][j]);
printf("ENTER MAX MATRIX : \n");
for(i=0;i<n;i++)
for(j=0;j<m;j++)
scanf("%d",&max[i][j]);
printf("ENTER AVAILABLE :\n");
for(i=0;i<m;i++)
scanf("%d",&avai[i]);
banker(alloc,max,n,m);
return 0;
}
```

Execution:

Input:
5 4 0 0 1 2 1 0 0 0 1 3 5 4 0 6 3 2 0 0 1 4 0 0 1 2 1 7 5 0 2 3 5 6 0 6 5 2 0 6 5 6 1

Output:

ENTER THE NO PROCESS AND RESOURCES :
ENTER ALLOCATION MATRIX :
ENTER MAX MATRIX :
ENTER AVAILABLE :
NEED MATRIX :
0 0 0 0
0 7 5 0
1 0 0 2
0 0 2 0
0 6 4 2
SYSTEM IN SAFE STATE
SAFE SEQUENCE = P0 P2 P3 P4 P1