7) write a c program to simulate page replacement algorithms a) FIFO b) LRU C) Optimal

a) FIFO

```
//FIFO PAGE REPLACEMENT ALGORITHM
#include<stdio.h>
#include<conio.h>
int fsize;
int frm[15];
void display();
void main()
{
 int pg[100],nPage,i,j,pf=0,top=-1,temp,flag=0;
// clrscr();
 printf("\n Enter frame size:");
 scanf("%d",&fsize);
 printf("\n Enter number of pages:");
 scanf("%d",&nPage);

 for(i=0;i< nPage;i++)
 {
  printf("\n Enter page[%d]:",i+1);
  scanf("%d",&pg[i]);
 }
   for(i=0;i< fsize;i++)
```

```
    frm[i]=-1;
printf("\n page | \t Frame content ");
printf("\n--------------------------------------");
for(j=0;j< nPage;j++)
{
 flag=0;
  for(i=0;i< fsize;i++)
  {
   if(frm[i]==pg[j])
   {
    flag=1;
    break;
   }
  }

  if(flag==0)
  {
   if(top==fsize-1)
   {
    top=-1;
   }
   pf++;
   top++;
   frm[top]=pg[j];
  }
 printf("\n %d    |",pg[j]);
 display();
}
  printf("\n----------------------------------------");
 printf("\n total page fault:%d",pf);
getch();
}
void display()
{
 int i;
 for(i=0;i< fsize;i++)
  printf("\t %d",frm[i]);
}
```

Output:

```
Enter frame size:3
Enter number of pages:20
 Enter page[1]:7
 Enter page[2]:0
 Enter page[3]:1
 Enter page[4]:2
 Enter page[5]:0
 Enter page[6]:3
 Enter page[7]:0
 Enter page[8]:4
 Enter page[9]:2
 Enter page[10]:3

 Enter page[11]:0

 Enter page[12]:3

 Enter page[13]:2

 Enter page[14]:1

 Enter page[15]:2

 Enter page[16]:0

 Enter page[17]:1

 Enter page[18]:7

 Enter page[19]:0

 Enter page[20]:1


 page |       Frame content

 -------------------------------------

 7   | 7     -1     -1

 0   | 7     0      -1

 1   | 7     0      1

 2   | 2     0      1

 0   | 2     0      1

 3   | 2     3      1

 0   | 2     3      0

 4   | 4     3      0

 2   | 4     2      0

 3   | 4     2      3
```

```
0   | 0     2     3

3   | 0     2     3

2   | 0     2     3

1   | 0     1     3

2   | 0     1     2

0   | 0     1     2

1   | 0     1     2

7   | 7     1     2

0   | 7     0     2

1   | 7     0     1

------------------------------------

 total page fault:15
```

b) LRU

```
//LRU PAGE REPLACEMENT ALGORITHM
#include<stdio.h>
main()
{
int q[20],p[50],c=0,c1,d,f,i,j,k=0,n,r,t,b[20],c2[20];
printf("Enter no of pages:");
scanf("%d",&n);
printf("Enter the reference string:");
for(i=0;i<n;i++)
        scanf("%d",&p[i]);
printf("Enter no of frames:");
scanf("%d",&f);
q[k]=p[k];
printf("\n\t%d\n",q[k]);
c++;
k++;
for(i=1;i<n;i++)
        {
                c1=0;
                for(j=0;j<f;j++)
                {
                        if(p[i]!=q[j])
                        c1++;
```

```
}
if(c1==f)
{
        c++;
        if(k<f)
        {
                q[k]=p[i];
                k++;
                for(j=0;j<k;j++)
                printf("\t%d",q[j]);
                printf("\n");
        }
        else
        {
                for(r=0;r<f;r++)
                {
                        c2[r]=0;
                        for(j=i-1;j<n;j--)
                        {
                        if(q[r]!=p[j])
                        c2[r]++;
                        else
                        break;
                }
        }
```

```
            for(r=0;r<f;r++)
             b[r]=c2[r];
            for(r=0;r<f;r++)
            {
                for(j=r;j<f;j++)
                {
                    if(b[r]<b[j])
                    {
                        t=b[r];
                        b[r]=b[j];
                        b[j]=t;
                    }
                }
            }
            for(r=0;r<f;r++)
            {
                if(c2[r]==b[0])
                q[r]=p[i];
                printf("\t%d",q[r]);
            }
            printf("\n");
        }
    }
}
printf("\nThe no of page faults is %d",c);
```

```
}
```

Output:

```
Enter no of pages:10

Enter the reference string:7 5 9 4 3 7 9 6 2 1

Enter no of frames:3


    7

    7    5

    7    5    9

    4    5    9

    4    3    9

    4    3    7

    9    3    7

    9    6    7

    9    6    2

    1    6    2


The no of page faults is 10

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Process exited after 62.06 seconds with return value 0

Press any key to continue . . .
```

C) Optimal

```
// OPTIMAL PAGE REPLACEMENT ALGORITHM
#include<stdio.h>
int main()
{
    int no_of_frames, no_of_pages, frames[10], pages[30], temp[10], flag1, flag2, flag3, i, j, k, pos, max, faults = 0;
    printf("Enter number of frames: ");
    scanf("%d", &no_of_frames);
    printf("Enter number of pages: ");
    scanf("%d", &no_of_pages);
    printf("Enter page reference string: ");

    for(i = 0; i < no_of_pages; ++i){
        scanf("%d", &pages[i]);
    }

    for(i = 0; i < no_of_frames; ++i){
        frames[i] = -1;
    }

    for(i = 0; i < no_of_pages; ++i){
        flag1 = flag2 = 0;
```

```
for(j = 0; j < no_of_frames; ++j){
    if(frames[j] == pages[i]){
           flag1 = flag2 = 1;
           break;
       }
}

if(flag1 == 0){
    for(j = 0; j < no_of_frames; ++j){
        if(frames[j] == -1){
            faults++;
            frames[j] = pages[i];
            flag2 = 1;
            break;
        }
    }
}

if(flag2 == 0){
    flag3 =0;

    for(j = 0; j < no_of_frames; ++j){
                temp[j] = -1;

                for(k = i + 1; k < no_of_pages; ++k){
```

```
        if(frames[j] == pages[k]){
            temp[j] = k;
            break;
        }
    }
}

for(j = 0; j < no_of_frames; ++j){
    if(temp[j] == -1){
        pos = j;
        flag3 = 1;
        break;
    }
}

if(flag3 ==0){
    max = temp[0];
    pos = 0;

    for(j = 1; j < no_of_frames; ++j){
        if(temp[j] > max){
            max = temp[j];
            pos = j;
        }
    }
```

```
            }

                                    frames[pos] = pages[i];

                                    faults++;

        }

        printf("\n");

        for(j = 0; j < no_of_frames; ++j){
            printf("%d\t", frames[j]);
        }
    }

    printf("\n\nTotal Page Faults = %d", faults);
    return 0;
}
```

Output:

```
Enter number of frames: 3

Enter number of pages: 10

Enter page reference string: 2 3 4 2 1 3 7 5 4 3


2       -1      -1

2       3       -1

2       3       4
```

```
2	3	4
1	3	4
1	3	4
7	3	4
5	3	4
5	3	4
5	3	4

Total Page Faults = 6
--------------------------------
Process exited after 29.31 seconds with return value 0
Press any key to continue . . .
```