Ex. No.: 9
Date: 3/1/25

DEADLOCK AVOIDANCE

Aim:

To find out a safe sequence using Banker's algorithm for deadlock avoidance.

Algorithm:

1. Initialize work=available and finish[i]=false for all values of i
2. Find an i such that both:
   finish[i]=false and $Need_i <=$ work
3. If no such i exists go to step 6
4. Compute work=work+allocationi
5. Assign finish[i] to true and go to step 2
6. If finish[i]==true for all i, then print safe sequence
7. Else print there is no safe sequence

Program Code:

```
#include <stdio.h>
int main()
{ int p,c, count=0, i,j, al[5][3], max[5][3], need[5][3]
  safe[5], avai[3], done[5], terr=0;
  scanf("%d %d", &p, &c);
for(i=0;i<p;i++)
  { for(j=0;j<c;j++)
      { scanf("%d", &alc[i][j]);
  } }
for(i=0;i<p;i++)
  { for(j=0;j<c;j++)
      { scanf("%d", &max[i][j]);
  } }
for(i=0;i<c;i++)
  { scanf("%d", avai[56]);
  }
```

```
for (i=0; i<p; i++)
 { for (j=0; j<(i)-r++)
    { need[i][j] = max[i][j] - alc[i][j];
    }
 }
for (i=0; i<p; i++)
  { done[i]=0
  }
while (coup<p)
  { for (i=0; i<p; i++)
    { if (done[i]==0)
      { for (j=0; j<c; j++)
        { if (need[i][j] > avail[j])
            break;
        }
        if (j==c)
        { safe[count]=i;
          done[i]=1;
          for (j=0; j<c; j++)
          { avail[j]+= alc[i][j];
          }
          count++;
          terminate=0;
        }
        else {
          terminate++
        }
    }
  }
  if (terminate==(p-1))
  { break;
  }
```

```
    }
if (terminate != (P-1))
  { printf ("\n available resource");
    for (i=0; i<C; i++)
      { printf ("%d ", avail[i]);
      }
    printf ("\n In Safe sequence");
    for (i=0; i<P; i++)
      { printf ("%d ", safe[i]);
      }
  }
  return 0
}
```

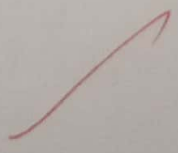
OUTPUT

5 3

allocation	max	available
0 1 0	7 5 3	3 3 2
2 0 0	3 2 2	
3 0 2	9 0 2	
2 1 1	4 2 2	
0 0 2	5 3 3	

need

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



availabe resour

10 ≤ 7

safe sequnce

<P1, P3, P4, P0, P2>

Sample Output:

The SAFE Sequence is
P1 -> P3 -> P4 -> P0 -> P2

Result:

Thus the above code for deadlock avoidance using bankers algorithm is successfully executed.