8. How does the distinction between kernel mode and user mode function as a rudimentary form of protection system?

9. What are five major activities of an O.S. with regard to file management?

9. What are three major activities of an O.S. with regard to memory management

9. What is the main advantage of the layered approach to system design?

9. What system calls have to be executed by a command interpreter or shell in order to start a new process.?

9. What are the two models of Interprocess communication & what are strengths and weakness of the two approaches?

9. Describe the actions taken by a kernel to context switch between processes

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describe the difference among short term, medium term and long term scheduling.

Q Including the initial parent process, how many processes are created by the program

```
#include <stdio.h>
#include <unistd.h>
int main()
{
    fork();
    fork();
    fork();
    return 0;
}
```

Q Which of the follo. scheduling algo could result in starvation?

a. FCFS.
b. Shortest job first.
c. Round Robin.
d. Priority

Q Suppose that a scheduling algo. (at the level of short-term CPU scheduling) favors those processes that have used the least processor time in the recent past. Why will this algo. favor I/O-bound programs and yet not permanently starve CPU-bound programs?

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Q Consider a variant of the RR scheduling algo. in which the entries in the ready queue are pointers to the PCBs.

a. What would be the effect of putting two pointers to the same process in the ready queue?

b. What would be two major advantages and two disadvantages of this scheme?

c. How would be two major advantages and two dis

c. How would you modify the basic RR algorithm to achieve the same effect without the duplicate pointer?

Q. Consider the following set of processes, with the length of the CPU burst given in milisec.

Process	Burst Time	Priority
P1	10	3
P2	1	1
P3	2	3
P4	1	4
P5	5	2

Dispatcher — define.

function of dispatcher

Scheduling Criteria

Define starvation, which algorithm leads to starvation

Discuss how the following pairs of scheduling criteria conflict in certain settings.

a) CPU utilization & response time.

b) Avg. turnaround time and Max. waiting time.

c) I/O device utilization and CPU utilization

Define Race Condition with suitable example.

What is solution for preventing Race condition.

Write petersons algorithm and prove it satisfies the requirement

Requirements for Critical section problem.

2 Soln to Critical section problem

① Dekker.

Two processes P_0 & P_1 share the following variables.

```
boolean flag[2];   initially false
int turn;

do
 {
 flag[i] = TRUE;
While ( flag[j] )
    {
    if (turn == j)
      {
      flag[i] = false;

While ( turn == j)
      ; do nothing.
   flag[i] = TRUE;

    }
}

   // Critical Section;

turn = j;
flag[i] = FALSE;
   a R.S.
} while(TRUE);
```

The structure of process P_i ($i = 0$ or 1) is shown in figure. Other process P_j ($j = 1$ OR 0) Prove that the algorithm satisfies all three requirements for the C.S. problem.

Show that, if the wait() and signal() semaphore operations are not executed atomically, then mutual exclusion may be violated.

(1) Describe how the swap() instruction can be used to provide mutual exclusion that satisfies the bounded waiting requirement.

(b) Calculate Hit and faults using FIFO, OPT and LRU page replacement policies for the following page sequences :– 10

2, 3, 5, 4, 2, 5, 7, 3, 8, 7

Assume page frame size is 3.

3. (a) What are the various buffering techniques ? Explain each one in detail. 10

(b) Give five memory partitions of 100 KB, 500 KB, 200 KB, 300 KB and 600 KB (in order) how would the first-fit, best-fit and worst-fit algorithms place processes of 212 KB, 417 KB, 112 KB and 426 KB (in order) ? Which algorithm makes the most efficient use of memory ? 10

4. (a) Explain various file allocation methods. 10

(b) Consider the following Snapshot of a system :– 10

Processes	Allocation	Max	Available
	A B C D	A B C D	A B C D
P_0	0 0 1 2	0 0 1 2	1 5 2 0
P_1	1 0 0 0	1 7 5 0	
P_2	1 3 5 4	2 3 5 6	
P_3	0 6 3 2	0 6 5 2	
P_4	0 0 1 4	0 6 5 6	

Answer the following questions using the Banker's algorithm.

(i) What is the content of matrix Need ?

(ii) Is the system in a safe state ?

(iii) If the request from process P_1 arrives for (0, 4, 2, 0) can request be granted immediately ?

questions which are circled in red

Con. 3766-GN-7049-12.

Q4.a) On a simple paging system with 2^{24} bytes of physical memory 256 pages of logical address space and page size of 2^{10} bytes. (10)

i) Determine the no of bits in physical address. Specify the page frame?

ii) How many entries are present in page-table?

iii) How many bits are in logical address space?

b) Suggest an implementation of binary semaphores that avoids busy waiting. (10

Q5.a) What is a kernel ? Describe briefly the approaches of designing kernel. (10

b) Consider the following page traces in a demand paging system with 3 page frames. (1

2,3,1,1,2,3,4,6,2,3,4,3,1,2,3.

Determine the number of page faults and hit ratio using FIFO and LRU page replacement algorithm.

5. (a) What is Semaphore ? Explain different types of semaphore.

(b) Explain files in relation with following points :–

(i) File Structure

(ii) File Operation

(iii) File Access

(iv) File Types.