



# KINGS

COLLEGE OF ENGINEERING  
Punalkulam

**DEPARTMENT OF INFORMATION TECHNOLOGY**



## QUESTION BANK

**Subject Code: CS1252**  
**Subject Name: Operating Systems**

**Year/ Sem: III / V**

### **UNIT – I** **PART – A (2 MARKS)**

1. Differentiate between tightly coupled systems and loosely coupled systems.
2. What is the kernel?
3. What are the three main purposes of an operating system?
4. List the four steps that are necessary to run a program on a completely dedicated machine.
5. What are batch systems?
6. What are privileged instructions?
7. What do you mean by system calls?
8. What is process control block?
9. What are schedulers?
10. What is co-operative process?
11. What are the use of job queues, ready queues and device queues?
12. State the advantage of multiprocessor system.
13. What is the main advantage of multiprogramming?
14. What is the use of inter process communication.
15. What is meant by context switch?
16. What is independent process?
17. What are the benefits OS co-operating processes?
18. How can a user program disturb the normal operation of the system?
19. What are the three major activities of an operating system in regard to Secondary- storage management?

**PART – B (16 MARKS)**

1. Explain the various types of computer systems.
2. Explain how protection is provided for the hardware resources by the operating system.
3. What are the system components of an operating system and explain them?
4. What are the various process scheduling concepts?
5. Explain about inter process communication.
6. List five services provided by an operating system. Explain how each provides convenience to the users. Explain also in which cases it would be impossible for user-level programs to provide these services.

**UNIT-II**

**PART – A (2 MARKS)**

1. What is a thread?
2. What are the benefits of multithreaded programming?
3. Compare user threads and kernel threads.
4. What is the use of fork and exec system calls?
5. Define thread cancellation & target thread.
6. What are the different ways in which a thread can be cancelled?
7. Define CPU scheduling.
8. What is preemptive and non preemptive scheduling?
9. What is a Dispatcher?
10. What is dispatch latency?
11. What are the various scheduling criteria for CPU scheduling?
12. Define throughput.
13. What is turnaround time?
14. Define race condition.
15. What is critical section problem?
16. What are the requirements that a solution to the critical section problem must satisfy?
17. Define entry section and exit section.
18. Give two hardware instructions and their definitions which can be used for implementing mutual exclusion.
19. What is a semaphore?
20. Define busy waiting and spin lock.

**PART – B (16 MARKS)**

1. Give an overview about threads.
2. Explain in detail about the threading issues.
3. Write about the various CPU scheduling algorithms.
4. What is critical section problem and explain two process solutions and multiple process solutions?
5. Explain what semaphores are, their usage, implementation given to avoid busy waiting and binary semaphores.
6. Explain about critical regions and monitors
7. Consider the following set of processes, with the length of the CPU-burst time given in milliseconds:

Process	Burst Time	Priority
$P_1$	10	3
$P_2$	1	1
$P_3$	2	3
$P_4$	1	4
$P_5$	5	2

The processes are assumed to have arrived in the order  $P_1, P_2, P_3, P_4, P_5$ , all at time 0.

- a. Draw four Gantt charts illustrating the execution of these processes using FCFS, SJF, A non preemptive priority (a smaller priority number implies a higher priority), and RR (quantum = 1) scheduling. (4)
- b. What is the turnaround time of each process for each of the scheduling algorithms in part a? (4)
- c. What is the waiting time of each process for each of the scheduling algorithms in Part a? (4)
- d. Which of the schedules in part a results in the minimal average waiting time (over all processes)? (4)

**UNIT – III**  
**PART – A (2 MARKS)**

1. Define deadlock.
2. What is the sequence in which resources may be utilized?
3. What are conditions under which a deadlock situation may arise?
4. What is a resource-allocation graph?
5. Define request edge and assignment edge.
6. What are the methods for handling deadlocks?
7. Define deadlock prevention.
8. Define deadlock avoidance.
9. What are a safe state and an unsafe state?
10. What is banker's algorithm?
11. Define logical address and physical address.
12. What is logical address space and physical address space?
13. What is the main function of the memory-management unit?
14. Define dynamic loading.
15. Define dynamic linking.
16. What are overlays?
17. Define swapping.
18. What are the common strategies to select a free hole from a set of available holes?
19. What do you mean by best fit and worst fit?
20. What do you mean by first fit?

**PART – B (16 MARKS)**

1. Give a detailed description about deadlocks and its characterization
2. Explain about the methods used to prevent deadlocks
3. Explain the Banker's algorithm for deadlock avoidance.
4. Explain about contiguous memory allocation.
5. Give the basic concepts about paging.
6. Explain about the techniques for structuring the page table.
7. Explain the basic concepts of segmentation

8. Consider the following snapshot of a system:

<i>Process</i>	<i>Allocation</i>	<i>Max</i>	<i>Available</i>
	<i>A B C D</i>	<i>A B C D</i>	<i>A B C D</i>
<i>P0</i>	0 0 1 2	0 0 1 2	1 5 2 0
<i>P1</i>	1 0 0 0	1 7 5 0	
<i>P2</i>	1 3 5 4	2 3 5 6	
<i>P3</i>	0 6 3 2	0 6 5 2	
<i>P4</i>	0 0 1 4	0 6 5 6	

Answer the following questions using the banker's algorithm:

- What is the content of the matrix *Need*? Is the system in a safe state? (8)
- If a request from process P1 arrives for (0, 4, 2, 0), can the request be granted immediately? (8)

**UNIT- IV**  
**PART – A (2 MARKS)**

- What is virtual memory?
- What is Demand paging?
- Define lazy swapper.
- What is a pure demand paging?
- Define effective access time.
- Define secondary memory.
- What is the basic approach of page replacement?
- What are the various page replacement algorithms used for page replacement?
- What are the major problems to implement demand paging?
- What is a reference string?
- List the various file attributes.
- What are the various file operations?
- What is the information associated with an open file?
- What are the different accessing methods of a file?
- What is Directory?
- What are the operations that can be performed on a directory?
- What are the most common schemes for defining the logical structure of a directory?
- Define UFD and MFD.

19. What is a path name?
20. Name two differences between logical and physical addresses.

**PART – B (16 MARKS)**

1. Explain the various page replacement strategies.
2. What are files and explain the access methods for files?
3. Explain the schemes for defining the logical structure of a directory.
4. Write notes about the protection strategies provided for files
5. Consider the following page reference string:  
1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6.  
How many page faults would occur for the following replacement algorithms, assuming one, two, three, four, five, six, or seven frames? Remember all frames are initially empty, so your first unique pages will all cost one fault each.
  - LRU replacement
  - FIFO replacement
  - Optimal replacement
6. A page-replacement algorithm should minimize the number of page faults. We can do this minimization by distributing heavily used pages evenly over all of memory, rather than having them compete for a small number of page frames. We can associate with each page frame a counter of the number of pages that are associated with that frame. Then, to replace a page, we search for the page frame with the smallest counter.
  - a. Define a page-replacement algorithm using this basic idea. Specifically address the problems of (1) what the initial value of the counters is, (2) when counters are increased, (3) when counters are decreased, and (4) how the page to be replaced is selected. (8)
  - b. How many page faults occur for your algorithm for the following reference string, for four page frames?  
1, 2, 3, 4, 5, 3, 4, 1, 6, 7, 8, 7, 8, 9, 7, 8, 9, 5, 4, 5, 4, 2. (4)
  - c. What is the minimum number of page faults for an optimal page-replacement strategy for the reference string in part b with four page frames? (4)

**UNIT – V**  
**PART – A (2 MARKS)**

1. What are the various layers of a file system?
2. What are the structures used in file-system implementation?
3. What are the functions of virtual file system (VFS)?
4. Define seek time and latency time.
5. What are the allocation methods of a disk space?
6. What are the advantages of Contiguous allocation?
7. What are the drawbacks of contiguous allocation of disk space?
8. What are the advantages of Linked allocation?
9. What are the disadvantages of linked allocation?
10. What are the advantages of Indexed allocation?
11. How can the index blocks be implemented in the indexed allocation scheme?
12. Define rotational latency and disk bandwidth.
13. How free-space is managed using bit vector implementation?
14. Define caching.
15. Define spooling.
16. What are the various disk-scheduling algorithms?
17. What is low-level formatting?
18. What is the use of boot block?
19. What is sector sparing?

**PART – B (16 MARKS)**

1. Write about the kernel I/O subsystem.
2. Explain the various disk scheduling techniques
3. Write notes about disk management and swap-space management.
4. Suppose that a disk drive has 5000 cylinders, numbered 0 to 4999. The drive is currently serving a request at cylinder 143, and the previous request was at cylinder 125. The queue of pending requests, in FIFO order, is  
86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130  
Starting from the current head position, what is the total distance ((in cylinders) that the disk arm moves to satisfy all the pending requests, for each of the following disk scheduling

- a. FCFS
  - b. SSTF
  - c. SCAN
  - d. LOOK
  - e. C-SCAN
5. Compare the performance of C-SCAN and SCAN scheduling, assuming a uniform distribution of requests. Consider the average response time (the time between the arrival of a request and the completion of that request's service), the variation in response time, and the effective bandwidth. How does performance depend on the relative sizes of seek time and rotational latency?