2081:

Long Answer Questions: [10 marks each]

1. Explain the translation of logical address into physical address using segment table with necessary diagram. List advantages and disadvantages of segmentation.

2. Find the seek time using SCAN, C-SCAN, Look and C-Look disk scheduling algorithms for processing the following request queue:

   35, 70, 45, 15, 65, 20, 80, 90, 75, 130.

   Suppose the disk has tracks numbered from 0 to 150 and assume the disk arm to be at 30 and moving outward.

3. Explain the Sleeping Barber problem. Illustrate how it can be solved.

Short Answer Questions: [5 marks each]

4. Explain microkernels and exokernels.

5. Consider a swapping system in which memory consists of the following hole sizes in memory order:

   15 MB, 2 MB, 10 MB, 6 MB, 8 MB and 20 MB.

   Which hole is taken for successive segment requests of:

   a. 10 MB

   b. 10 MB

   For first fit, next fit and best fit.

6. Explain how semaphore solves the problem of critical section.

7. How do you think deadlock can be avoided? Explain.

8. Explain Inter-Process Communication in Linux.

9. List different file structures and explain them.

10. Calculate the average waiting time and turnaround time using priority algorithm

    (Priority 1 being the highest) for the given scenario:

PID	Burst Time	Arrival Time	Priority
A	3	0	3
B	2	2	3
C	4	3	2
D	2	3	1

11. Explain memory-mapped I/O.

12. Write short notes on:

    a. Virtual Memory

    b. Race Condition

2080-new:

Long Answer Questions: [10 marks each]

1. How DMA operation is performed? Consider a disk with 200 tracks and the queue has random requests from different processes in the order : 45, 48, 29, 17, 80, 150, 28 and 188. Find the seek time using FIFO, SSTF and SCAN. Assume the initial position of head as 100.

2. How do you distinguish between deadlock and starvation ? Describe. Explain working mechanism of TLB.

3. Why do we need to schedule process? Find the average waiting time and average turnaround time for the following set of processes using FCFS, SJF, RR (Quantum = 3) and shortest remaining time next.

Process	CPU Burst Time	Arrival Time
P1	20	0
P2	25	15
P3	10	30
P4	15	45

Short Answer Questions: [5 marks each]

4. What is system call ? Describe the transition between different states of process.

5. Discuss contiguous and linked list file allocation technique.

6. Why do we need virtual memory? Describe the structure of a page table.

7. Illustrate the term safe and unsafe state in deadlock prevention with scenario.

8. How lock variable is used in achieving mutual exclusion? Describe.

9. Why do we need hierarchical directory system? Explain structure of disk.

10. Find the number of page fault using FIFO and LRU for the reference string 4, 7, 6, 1, 7, 6, 1, 2, 7, 2 with frame size 3.

11. Define working set. How does clock replacement algorithm work?

12. Write short notes on :

    a. Inode

    b. RAID

Model:

Long Answer Questions: [10 marks each]

1. What is sleep and wakeup? Demonstrate problem with suitable code snippet and illustration.

2. When does page fault occurs and how it is handled? Demonstrate second chance and LRU page replacement algorithm for memory with three frames and following reference string: 1,3,7,4,5,2,3,6,4,5,7,8,5,1,4.

3. What is I-node? Why it is superior to other file allocation approaches? Consider 20-GB disk with 8-KB block size. How much memory space will be occupied if contiguous, and File allocation table is used for file allocation? Assume that each FAT entry takes 4 byte.

Short Answer Questions: [5 marks each]

4. Define the terms shell and system call. How it is handled? Illustrate with suitable example.

5. What are main goals of interactive system scheduling? Discuss priority scheduling along with its pros and cons.

6. How does starvation differ from deadlock? Consider the following situation of processes and resources:

Process	Has	Max
P1	2	6
P2	1	5
P3	2	5
P4	2	6

    a. What will happen if process P3 requests 1 resource?

    b. What will happen if process P4 requests 1 resource?

7. Define the term race condition. Justify that race condition leads data loss or incorrect data.

8. Explain directory implementation techniques employed in operating systems briefly.

9. Consider the segment table:

10. What are the physical address for the following logical addresses?

    a. 0,430

    b. 1,10

    c. 1,11

    d. 2,500

Segment	Base	Length
0	219	600
1	2300	14
2	90	100
3	1327	580
4	1952	965

11. What is the main purpose of disk scheduling algorithms? Which disk scheduling technique is best but impractical? Explain the algorithm with example.

12. How do threads differ from processes? Explain thread usages.

13. Write short notes on:

    a. Linux Scheduling

    b. Fragmentation

2080:

Long Answer Questions: [10 marks each]

1. When does the request switch from user mode to kernel mode? Give answer with an example. Find the average waiting time and turnaround time for the process scheduling algorithms FCFS, Priority and RR (Quantum=2) in the following given dataset.

Process	Arrival Time	Burst Time	Priority
P0	0	5	1 (Lowest)
P1	1	3	4 (Highest)
P2	2	8	2
P3	3	6	3

2. How do you recognize critical section? Why do we need to synchronize it? Consider the request for page references 7,0,1,2,0,3,0,4,2,3,0,3,2. Find the number of page fault for FIFO and LRU with 4-page frames.

3. Can deadlock occur in case of preemptive resources? List the conditions for deadlock. Define allocation graph with example.

Short Answer Questions: [5 marks each]

4. Explain different memory allocation strategies.

5. Suppose a disk has 201 cylinders, numbered from 0 to 200. At same time the disk arm is at cylinder 10, and there is a queue of disk access requests for cylinders 30, 85, 90, 100, 105, 110, 135, and 145. Find the total seek time for the disk scheduling algorithm FCFS and SSTF. Assume the head is moving inward.

6. What are the advantages of using interrupt? Describe.

7. Differentiate between contiguous and linked list file allocation technique.

8. Differentiate between paging and segmentation.

9. What does Belady's anomaly mean? What are the benefits of multiprogramming over uniprogramming?

10. How can we achieve mutual exclusion? Describe.

11. What makes thread different with process? Draw the transition diagram between states of a process.

12. When does a page fault occur? Give a structure of a page table.

2079:

Long Answer Questions: [10 marks each]

1. Discuss about single level and two-level directory system. Consider the following process and answer the following questions.

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

a. What is the content of matrix Need?

b. Is the system in safe state?

c. If P1 request (0,4,2,0) can the request be granted immediately.

2. When does race condition occur in inter process communication? What does busy waiting mean and how it can be handled using sleep and wakeup strategy?

3. Define shell and system call. suppose a disk has 201 cylinders, numbered from 0 to 200. At same time the disk arm is at cylinder 95, and there is a queue of disk access requests for cylinders 82,170,43,140,24,16 and 190. Calculate the seek time for the disk scheduling algorithm FCFS,SSTF,SCAN and C-SCAN.

Short Answer Questions: [5 marks each]

4. Distinguish between starvation and deadlock . How does the system schedule process using multiple queues?

5. List any two demerits of disabling interrupt to achieve mutual exclusion. Describe about fixed and variable partitioning.

6. For the following dataset, compute average waiting time for SRTN and SJF.

Process	Arrival Time	Burst Time
P0	0	7
P1	2	4
P2	4	1
P3	5	4

7. Discuss the advantages and disadvantages of implementing file system using Linked List.

8. Consider the page references 7,0,1,2,0,3,0,4,2,3,0,3,2, Find the number of page fault using OPR and FIFO, with 4-page frame.

9. Describe the working mechanism of DMA.

10. What is the task of disk controller ? List some drawback of segmentation.

11. Write about the structure and advantages of TLB.

12. Why do we need the concept of locality of reference ? List the advantages and disadvantages of Round Robin algorithm.

2078:

Long Answer Questions: [10 marks each]

1. What kind of problem arises with sleep and wakeup mechanism of achieving mutual exclusion? Explain with suitable code snippet.

2. Why OPR is best but not practically feasible page replacement algorithm? Calculate the number of page faults for OPR, LRU and Clock page replacement algorithm for the reference string: 1, 3, 4, 2, 3, 5, 4, 3, 1, 2, 4, 6, 3, 2, 1, 4, 2. Assume the memory size is 3.

3. How does an unsafe state differ from deadlocked state? Consider follows initial state and identify whether requested is and granted or denies for the given cases.

Process	Has	Max
A	2	6
B	1	5
C	2	3
B	3	8

Free = 2

    a. What will happen if process D request 1 resource?

b. What will happen if process A request 1 resource?

Short Answer Questions: [5 marks each]

4. What is system call? Discuss process of handling system calls briefly.

5. What is lock variable? Discuss its working and problems associated with it in detail.

6. Differentiate between internal and external fragmentation? Suppose that we have memory of 100 KB with 5 partitions of size 150 KB, 200 KB, 250 KB, 100 KB, and 300 KB. Where the processes A and B of size 175 KB and 125 KB will be loaded, if we use Best-Fit, and Worst-Fit Strategy?

7. Differentiate between internal and external fragmentation? Suppose that we have memory of 100 KB with 5 partitions of size 150 KB, 200 KB, 250 KB, 100 KB, and 300 KB. Where the processes A and B of size 175 KB and 125 KB will be loaded, if we use Best-Fit, and Worst-Fit Strategy?

8. What is meant by file attributes? Discuss any one technique of implementing directories in detail.

9. Why the concept of disk interleaving is important? Explain with suitable example.

10. What is resource allocation graph? Explain the process of detecting deadlocks when there is single instance of each resources with suitable example?

11. Discuss the concept of SJF and SRTN scheduling algorithms with suitable example.

12. What approaches are used for managing free disk spaces? Explain linked list approaches with example.

13. Write short notes on:

    a. IPC in Linux

    b. Disk access

2076:

Long Answer Questions: [10 marks each]

1. Defined interactive system goals? List various interactive scheduling algorithms. Consider following process data and compute average waiting time and average turnaround time for RR(quantum 10) and priority scheduling algorithms.

PID	Burst Time	Arrival Time	Priority
A	16	0	1
B	37	12	2
C	25	7	3

2. How does Second Chance page replacement algorithm differ from FIFO page replacement policy? Discuss the concept of Belady's anomaly with suitable example.

3. What is the main objective of disk scheduling algorithms? why SSTF is not practically feasible? Assume that we have disk with 100 tracks and currently head is at track number 35. What will be the seek time for the algorithms SCAN and LOOK for processing IO requests queue: 52, 67, 27, 11, 43, 85, 18, 75, 92, 8?

Short Answer Questions: [5 marks each]

4. What are two modes of OS? Discuss different OS structures briefly.

5. When threads are better than processes? Explain the concept of user level threads in detail.

6. Differentiate between multi programming and Monoprogramming. What will be the CPU utilization with 6 processes with 60% IO waiting time are in memory?

7. How can you manage free disk space? Explain the linked list approach of managing free disk space with example.

8. When programmed IO is suitable than other IO handling techniques? Explain the process of IO handling using DMA.

9. Differentiate between deadlock and starvation? Discuss the process of detecting deadlocks when there are multiple resources of each type.

10. What is problem associated with semaphores? Explain the concept of monitors in brief.

11. Why program relocation and protection is important? Explain the technique of achieving program relocation and protection.

12. Write short notes on:
    a. Linux File System
    b. Resource Allocation Graph