PART- A Questions

1. Given a system with n processes, how many possible ways can those processes be scheduled. Give a formula in terms of n.
2. In which state is a process in if it has the CPU?
3. Consider a logical address space of eight pages of 1024 words each, mapped onto a physical memory of 32 frames.

   a. How many bits are there in the logical address?

   b. How many bits are there in the physical address?

4. Consider the following segment table:

Segment	Base	Length
0	219	600
1	2300	14
2	90	100
3	1327	580
4	1952	96

   What are the physical addresses for the following logical addresses?
   a. 0,430 b. 2,500

5. Give an example of an application in which data in a file should be accessed in the following order: a. Sequentially b. Randomly
6. Why must the bit map for file allocation be kept on mass storage, rather than in main memory?
7. A _____ semaphore is such that it's integer value can range over an unrestricted domain
8. When is a process said to be in a critical section?
9. It is not possible to have a deadlock involving only one single process. Which among the 4 necessary and sufficient conditions is violated?
10. What is the command interpreter in Unix called?
11. Software may trigger and interrupt executing a special operation called _____.
12. A common representation for a discussion of process scheduling is a _____.
13. What is a cascading termination?
14. What is a serial schedule?
15. Define safe state?
16. _____never swaps a page into memory unless that page will be needed.

17. What are the properties of immutable file?
18. _____knows about files and their logical blocks as well as physical blocks.
19. What is the use of controller?
20. What is the use of the asymmetric multi processing?
21. Which device is used to communication in small area network?
22. What is thread cancellation?
23. What is dispatch latency?
24. What is a virtual address?
25. Mention any two techniques used to solve the external fragmentation.
26. List the two broad categories of page replacement algorithms.
27. Specify any two types of file access methods.
28. Mention any two types of velocity are used in disk track access mechanisms
29. List the two factors which decide the efficiency of the use of disk space.
30. What is the main advantage of multiprogramming?
31. The interface between the operating system and the user sitting at a terminal is called as _____.
32. What does a process control block contain?
33. Operating Systems provide a means for cooperating processes to communicate with each other through _____.
34. If the system can allocate resources to each process in some order and still avoid a deadlock, then the system is said to be in _____
35. Mention the synchronization constructs used when semaphores are used incorrectly to solve critical section problem.
36. A process is _____ if it is spending more time paging than executing.
37. Mention any two methods implemented to manage free space list in files.
38. What are the main factors to be dealt with respect to disk scheduling?
39. What are the several aspects of disk management?
40. What are the advantages of multiprocessors system?

41. State various states of a process.
42. What are the common types of thread implementation?
43. What is dispatcher?
44. State the sequence of the utilization of a resource for a process.
45. What do you mean by overlays?
46. What is a lazy swapper?
47. State the types of path names.
48. What does a file control block (FCB) contains?
49. State three major approaches of allocating disk space.
50. _____ is a program that manages the computer hardware.
51. A _____ is a collection of related information defined by its creator.
52. A thread is a _____ process.
53. The time taken for the dispatcher to stop one process and start another running process is known as dispatch _____.
54. Mention the four necessary conditions required for the occurrence of the deadlock.
55. Deadlocks can be described more precisely in terms of a directed graph called _____ graph.
56. _____ memory is a technique that allows the execution of process that may not be completely in memory.
57. The user who created the file is called as _____.
58. _____ contains information about the file, including ownership, permissions and location of the file contents.
59. Specify the three major methods used for allocating the disk space.
60. List the four components of computer system
61. Define Command Interpreter
62. What are the benefits of multithreaded programming?
63. What are the two basic models of Inter Process Communication?
64. What are the necessary conditions of deadlock situation?
65. Define Preemptive Kernel

66. Write the formula for effective access time
67. What are the benefits of slap allocator?
68. List the performance issues of tertiary – storage
69. Define Buffer
70. What is a System Call?
71. What do you mean by a Control Card?
72. Define Socket
73. Name the two fundamental models of inter process communication.
74. What do you mean by dispatch latency?
75. What is a transaction?
76. When will you say that the system is in safe state?
77. Define paging
78. What is an interrupt?
79. Brief Belady's Anomaly.
80. What is meant by resident monitor?
81. An operating system that is capable of allowing multiple software processes to run at the same time is called _____.
82. A process which has just terminated but has to relinquish the resource is called_____.
83. Define safe state.
84. What is meant by external fragmentation?
85. Who performs garbage collection?
86. The high paging activity is called _____.
87. List the different access methods of file system.
88. What is meant by physical formatting?
89. Define Kernel.
90. What is layered approach?
91. What is a state?
92. What is FCFS?

93. Write the Little's formula.
94. What do you mean by deadlock prevention?
95. State two levels of process termination.
96. The string of memory reference is called _____.
97. Write the two types of page replacement algorithms.
98. What is a controller?
99. What do you mean by sector sparing?
100. How are system calls useful?
101. What is the advantage of Microkernel approach to system design?
102. What information does an operating system generally need to keep about running processes in order to execute them?
103. Assume that a system consists of four resources of same type, they are shared by three processes, each of which needs almost two resources. Show that the system is deadlock free.
104. What are monitors?
105. What is paging?
106. What do you mean by Belady's anomaly?
107. State the use of block device.
108. What is the need of RAID concept?
109. Write the name of any one distributed operating system.
110. Define Dual-Mode operation.
111. Define Process.
112. What is meant by thread? Specify the benefits of multithreaded programming.
113. Define Dispatch latency.
114. Define fragmentation and its types.
115. What is meant by thrashing?
116. What are the different types of file access methods?
117. What are the characteristics of Deadlock?

118. Define Rotational latency.
119. What are the different types of disk formatting?
120. What are the modes of operations?
121. Write any two application programs.
122. Define RMI.
123. What is throughput?
124. What are the approaches used to handle Critical Section?
125. How do you ensure that the deadlocks never occur?
126. Write any four file attributes.
127. What is a hash table?
128. How do computers access disk storage?
129. What is seek time?
130. Software may trigger an interrupt by executing a special operation called a _____.
131. List the main advantages of multiprocessor systems.
132. Define process.
133. Mention any two properties of CPU scheduling algorithms.
134. No two processes are executing in their critical sections at the same time. Say True or False.
135. What is safe state?
136. What is thrashing?
137. Name the file access methods.
138. What is the drawback of network-attached storage systems?
139. What is a spool?
140. What is the function of an operating system?
141. What is LAN?
142. Define process.
143. What do you mean by Turnaround time?
144. What are the necessary conditions for a deadlock to occur?

145. What do you mean by compaction?
146. What is the principle of optimal page replacement algorithm?
147. What do you mean by absolute pathname?
148. Why is disk scheduling important?
149. What is RAID level1?
150. What is meant by real time operating systems?
151. Compare loosely coupled and tightly coupled system.
152. What is meant by context switch?
153. What are the benefits of multithreaded programming?
154. What are the three requirements that a solution to the critical-section problem satisfy?
155. Define deadlock.
156. What is compaction?
157. How do you compute the effective access time for a demand-page system?
158. What is latency time?
159. What are streams
160. Define the degree of Multiprogramming.
161. Specify the most heavily used system calls for File Management.
162. Define Process.
163. What is a Context Switch?
164. What is a Binary semaphore?
165. State the conditions for Deadlock.
166. What is thrashing?
167. What data type is File?
168. Define seek time.
169. What are the advantages of using disk over Main Memory for storage?
170. Define context switch.
171. What are System calls?

172. Define a thread.

173. What are preemptive and non-preemptive scheduling?

174. State the assumption behind the bounded buffer producer consumer problem.

175. List the four conditions for deadlock.

176. Define Virtual memory.

177. What is the purpose of paging the page tables?

178. Mention the importance of swap-space management.

179. What is the kernel of an OS?

180. A single-threaded process has one _____ to specifying the next instruction to execute.

181. Write the difference between Policy and Mechanism in Operating System Design.

182. A program is a_____ entity.

183. CPU Scheduler is also called _____.

184. Deadlocks can be described more precisely in terms of a directed graph called a _____.

185. An address generated by the CPU is commonly referred to as a _____.

186. A _____ never swaps a page into memory unless that page will be needed.

187. The _____ provides host-name-to-network-address translations for the entire Internet (including the World Wide Web).

188. A synchronous device performs data transfers with predictable _____.

189. The _____ is the time for the disk arm to move the heads to the cylinder containing the desired sector.

190. What are the two types of modes used in dual modes operation?

191. How is the protection for memory provided?

192. Define process.

193. What do you meant by throughput?

194. What is the use of semaphore?

195. Write some classical problems of synchronization.

196. What is meant by thrashing?

197. How is free-space managed using bit vector implementation?

198. What are the techniques used for performing I/O?

199. How can the index blocks be implemented in the indexed allocation scheme?

200 . The extended instructions are known as _____.

201. What are the two main functions of an operating system?

202. What is preemptive scheduling?

203. What is meant by race condition?

204. What is meant by critical section?

205 . The virtual address space is divided up into units called _____.

206. What is the main function of NRU algorithm?

207. _____ is a table associated with each disk block.

208. Define swap space.

209. A disk that has a boot partition is called a _____ or_____.

201. What is a sector?

PART-B Questions

1. Define the difference between preemptive and nonpreemptive scheduling.

2. Why are page sizes always powers of 2?

3. What are access control matrices?

4. Mention some complexities associated with parallel processing.

5. What is the need for condition variables in monitors and how are they different from conventional variables?

6. What are the two real time systems?

7. Define dispatcher? What are the functions of its?

8. What are the methods to eliminate deadlocks by aborting process?

9. List the attributes of files.
10. List out the Kernel I/O subsystem services.
11. Define time sharing.
12. What is semaphore?
13. List the four necessary conditions are necessary to occur deadlock.
14. Mention the advantages of virtual memory.
15. Define contiguous memory allocation
16. List the various services provided by the operating systems.
17. Compare the user-level threads and kernel- level threads.
18. What are the ways of recovering from a deadlock?
19. Give short notes on the methods used to implement directories?
20. Mention the various services provided by kernel I/O subsystem.
21. Explain five major groups of system calls categories.
22. What are the criteria recommended for evaluating CPU scheduling algorithms?
23. State and explain the necessary conditions for deadlock.
24. Write down the steps for handling the page fault.
25. Show the structure and contents of UNIX inode.
26. Differentiate compute-server systems and file server systems.
27. Differentiate asynchronous cancellation and deferred cancellation in threads issues.
28. How best fit strategy is used to select a free hole from the set of available holes?
29. Mention the various operations performed on a directory.
30. Differentiate constant linear velocity and constant angular velocity in disk structure.
31. Write a short note on Mass - Storage Management

32. What is use of fork () and exec ()?

33. Write a short note on dynamic loading

34. List the typical file attributes

35. Describe Storage – Area Network

36. List the activities of process management for which the operating system is responsible.

37. State the benefits of multithreaded programming.

38. What do you mean by Mutual exclusion?

39. Mention the two strategies for managing free memory that is assigned to kernel process.

40. What is a boot control block?

41. What is virtual machine? State its advantages and disadvantages.

42. Mention the various criteria of CPU scheduling.

43. What is the difference between deadlock and starvation? Discuss the necessary conditions for deadlock.

44. Discuss the concept of free space management briefly.

45. What are bad blocks? How do you recover the disk from the bad blocks?

46. Explain process state.

47. Write about semaphores.

48. What is paging?

49. Write the file attributes.

50. Explain caching.

51. Explain the different states of a process with a neat diagram.

52. Compare paging and segmentation.

53. Distinguish between internal and external fragmentation.

54. State producer consumer problem.

55. Explain about working sets.

56. What are the five major activities of an operating system in regard to process management?
57. List the features of process scheduling in multiprogramming scheduler.
58. What is a spin lock? What is an alternative to spin locking?
59. What are link and unlink directory operation?
60. What is the need for disk scheduling? What are the advantages of multiprocessor system?
61. What is a thread library? How it is implemented?
62. Define serial schedule and locking protocol.
63. How is the effective access time computed for a demand paging memory?
64. Define network-attached storage and storage-area network.
65. How system calls are used? Illustrate with an example.
66. Explain about dispatcher in CPU-scheduling function.
67. List the steps in processing a user program.
68. Write the functions of any six file types.
69. Summarize the interrupt-driven I / O cycle with a neat block diagram.
70. What do you mean by multiprogramming?
71. What is PCB? List out its contents.
72. Explain the TestAndSet hardware instruction.
73. What is thrashing?
74. What is seek time and latency time?
75. List any three services provided by an operating system. Explain how each provides convenience to the users.
76. Compare short-term, medium-term, and long-term schedulers.
77. Summarize the Safety Algorithm.

78. What are the various scheduling criteria for CPU scheduli What is the use of co-operating process?

79. Explain process state transition diagram.

80. Differentiate between Logical versus Physical Address space.

81. What is meant by locality of reference? What are its types?

82. Why is disk scheduling important?

83. What is low-level formatting? Enumerate the services of an operating system.

84. Can a multithreaded solution using multiple user-level threads achieve better performance on a multiprocessor system than on a single processor system? Justify.

85. Write short notes on swapping.

86. Define file. Explain its attributes.

87. What is the need for disk scheduling?

88. Write the fundamental idea behind a virtual machine?

89. Define the term Processor Affinity.

90. What are the essential conditions of Deadlock?

91. Virtual address space of a process refers to what?

92. I/O request specifies several pieces of information. List out that information.

93. Draw labeled diagram for the process state transitions.

94. What are the different ways in which a thread can be cancelled?

95. What are conditions under which a deadlock situation may arise?

96. What is meant by internal and external fragmentation?

97. What criteria should be used in deciding which strategy is best utilized for a particular file?

98. What is the need for system calls?

99. What do you mean by a process?

100. Write a brief note on paging.

101. List the components of on-disk structure of a file system.

102. Why is rotational latency usually not considered in disk scheduling?

PART-C Questions

1. 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 nonpreemptive priority (a smaller priority number implies a higher priority), and RR (quantum = 1) scheduling.

b. What is the turnaround time of each process for each of the scheduling algorithms in part a?

c. What is the waiting time of each process for each of the scheduling algorithms in part a?

d. Which of the schedules in part a results in the minimal average waiting time (over all processes)?

2. Write a note on interrupt handling.

3. Given memory partitions of 100K, 500K, 200K, 300K, and 600K (in order), how would each of the First-fit, Best-fit, and Worst-fit algorithms place processes of 212K, 417K, 112K, and 426K (in order)? Which algorithm makes the most efficient use of memory?

4. 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

5. Consider a file currently consisting of 100 blocks. Assume that the file control block (and the index block, in the case of indexed allocation) is already in memory. Calculate how many disk I/O operations are required for contiguous, linked, and indexed (single-level) allocation strategies, if, for one block, the following conditions hold. In the contiguous allocation case, assume that there is no room to grow in the beginning, but there is room to grow in the end. Assume that the block information to be added is stored in memory.

a. The block is added at the beginning.
b. The block is added in the middle.
c. The block is added at the end.
d. The block is removed from the beginning.
e. The block is removed from the middle.
f. The block is removed from the end.

6. 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 algorithms?

a. FCFS
b. SSTF
c. SCAN
d. LOOK
e. C-SCAN

7. Consider the “readers and writers” problem, where a set of reader processes and writer processes contend for shared data. Only one writer may access the data at a time, and while doing so, no readers may read. If no writers

are writing, readers may read the data at will, without excluding each other; however, no writers may access the data while it is being read. Show how to implement P_{read}, V_{read}, P_{write} and V_{write} (mutual exclusion primitives for readers and writers) using ordinary semaphores.

8. Write the 4 versions of mutual exclusive primitives as specified by Dekker.

9. Consider 5 processes P_0 through P_4 and 3 resource types A(10 instances), B(5 instances), and C(7 instances). The snapshot at time T0 is given below:

	Allocation	Max	Available
	A B C	A B C	A B C
P_0	0 1 0	7 5 3	3 3 2
P_1	2 0 0	3 2 2	
P_2	3 0 2	9 0 2	
P_3	2 1 1	2 2 2	
P_4	0 0 2	4 3 3	

Is the system in a safe state? Now P_1 requests (1,0,2). Is the system now in a safe state?

10. Write short notes on the file system in the Unix operating system.

11. Define the essential properties of the following operating system.

    a. Timesharing b. Real time c. Distributed OS.

12. Explain the following:
    a. Memory protection b. CPU protection

13. Briefly explain process scheduling with neat diagram.

14. Explain the following CPU scheduling algorithm with an example.

    a. Round Robin b. Shortest Job First

15. Explain necessary condition for deadlock to occur?

16. What is external fragmentation? Explain any one solution to this problem?

17. When do a page faults occur? Describe the actions taken by the OS when a page fault occurs.

18. Explain any three directory structure in detail.

19. Explain any two file allocation methods in disk space with its advantages and disadvantages.

20. What is swap space management? What is the use? Where it is located and managed?

21. Compare and contrast multiprogramming and multi tasking systems.

22. What are the different process states? Explain with a diagram.

23. What is multi-threading? What are the benefits of multi-threading programming?

24. Explain critical section problem in detail.

25. Explain the deadlock detection process in detail with diagrams.

26. Explain the concept of segmentation with neat diagram.

27. Explain the FIFO and LRU page replacement algorithms with examples.

28. Explain the concept of file sharing in detail.

29. Explain scan scheduling algorithms in detail. Give examples.

30. Explain in detail with an example about the swap space management

31. Explain the system components of the operating system?

32. Write short notes on: a. Virtual machines b. System calls

33. Discuss the various issues involved in implementing inter process communication in message passing system.

34. Assume that the following processes arrive at time 0, in the order given, with the length of the CPU-burst time given in milliseconds

Job	Burst time (ms)
A	10
B	29
C	3
D	7
E	12

a. Give the Gantt chart illustrating the execution of processes using FCFS, Round Robin (quantum=10) and SJF scheduling.

b. Calculate the average waiting time for each of the above algorithm

35. Explain the various classic problems of synchronization.

36. Explain the Banker's algorithm with a suitable example.

37 Discuss in detail about demand paging.

38, Briefly explain the free space management and File sharing.

39. Explain the various aspects of disk management briefly?

40. Mention the services of Kernel subsystems with respect to I/O and discuss briefly.

41. Explain the main activities and services of operating system in connection with process management, main memory management and file management in detail.

42. Explain the non-virtual and virtual machine models in detail. Also state their benefits.

43. Explain various thread models in detail. Write their advantages.

44. Five processes arrive at time 0, in the order given, with the length of the CPU-burst time in milliseconds, as shown below.

Processes	Burst time
P_1	10
P_2	29
P_3	3
P_4	7
P_5	12

Find the average waiting time, considering the following algorithms: (i) FCFS (ii) SJF (iii) RR (time quantum = 10 milliseconds). (iv) Which algorithm gives the minimum average waiting time?

44. Consider a system with 5 processes P_0 through P_4 and three resource types A, B and C. Resource type A has 10 instances, type B has 5 instances and type C has 7 instances. Suppose that at time T_0, the following snapshot of the system has been taken.

	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P_0	0	1	0	7	5	3	3	3	2
P_1	2	0	0	3	2	2			
P_2	3	0	2	9	0	2			
P_3	1	1	1	2	2	2			
P_4	0	0	2	4	3	3			

a. What is the content of the '*need*' matrix?

b. Is the system in safe state?

c. If a request from process P_1 arrives for (1, 0, 2), can this request be granted immediately?

45. Explain the concept of paging memory management scheme in detail with a neat hard support diagram.

46. Consider the following page reference string: 7 0 1 2 0 3 0 4 2 3 0 3 2 1 2 0 1 7 0 1. How many page fault would occur for the Optimal replacement algorithm, assuming three and four frames.

47. Explain various directories structures in detail.

48. Explain the concept of Contiguous allocation method of disk block with a neat diagram in detail.

49. Consider a disk queue with requests for I/O to blocks on cylinders, in FIFO order: 98, 183, 37 122, 14, 124, 65, 67. The disk head is currently at cylinder 53. Using FCFS algorithm,

a. Calculate the total head movement and

b. Suggest a mechanism to rearrange the request so that the total head movement is decreased to improve the disk performance.

50. Explain the system components in operating system structure in detail.

51. Describe the system structure in operating system in detail with diagrams.

52. Write in detail about CPU scheduling algorithms with diagrams.

53. Explain the semaphores in detail.

54. Explain the paging in detail with diagrams.

55. Describe the segmentation in detail with diagrams.

56. Write in detail about the thrashing with diagrams.

57. Explain the file sharing in detail.

58. Explain the disk scheduling algorithms in detail with diagrams.

59. Describe the file system implementation in detail with diagrams.

60. Explain different types of system calls in detail

61. Describe about Computing Environment in detail

62. Explain any three scheduling algorithm in detail

63. Describe the following:
    a. Remote Method Invocation b. Multithreading Model

64. Explain the Classic problem of Synchronization

65. a. Describe how to recover from Dead Lock
    b. Explain address binding in detail

66. Describe the following:
    a. FIFO page replacement algorithm

    b) LRU page replacement algorithm

67. Explain the following:
    a. Contiguous Allocation b. Linked Allocation

68. Discuss various disk scheduling algorithm in detail

69. Describe the following:
    a. STREAMS b. Direct Memory Access

70. What are the major categories of System Calls? Briefly describe the various types of system call that may be provided by the operating system.

71. Briefly describe how the computer system organization and major operating system components are used in a variety of computing environments.

72. Write short notes on
    a. Process b. Process State c. Process Control Block

73. Explain the following scheduling algorithms in detail with examples

    a. First-come, First served b. Shortest job first
    c. Round robin d. Priority

74. Describe paging in detail with the neat block diagram.

75. List the various page replacement strategies and explain any four strategies in detail.

76. What is a directory? Describe the most common schemes for defining the logical structure of a directory.

77. Explain the three major methods of allocating disk spaces in detail with suitable examples.

78. State the different disk scheduling algorithms and describe it in detail with examples.

79. Write short notes on:
    a. Caching b. Interrupts c. Buffering

80. Mention the services of operating systems. Discuss the different types of operating systems in detail.

81. Describe the different types of Operating System structure in detail.

82. Discuss the concept of Interprocess communication. Explain in detail how it is implemented.

83. What is meant by process? Discuss the concept of process. Explain the operation of process in detail.

84. Why is synchronization of processes required? Discuss any two classic problems of synchronization in detail.

85. What is paging? Describe the basic method of paging. Explain the structure of page table and its types in detail.

86. What is page fault? Consider the reference string 1, 2, 3, 4, 1, 2, 5, 1, 2, 3, 4, 5. There are 3 frames allotted in the memory at a time. Apply FIFO, LRU, Optimal page replacement algorithms and find the number of page faults.

87. a. What is meant by directory? Explain the techniques of directory implementation in detail

    b. Explain the concept of demand paging in detail.

88. a. Describe the RAID structure in detail.

    b. Describe the various disk scheduling in detail.

89. a. Describe the kernel I/O sub systems in detail.

    b. Explain in detail about stable-storage implementation.

90. Explain cooperating processes.

91. Write about schedulers.

92. Explain the classic problem of synchronization.

93. Write about monitors.

94. Explain the deadlock prevention, detection and avoidance in detail.

95. Write about memory allocation.

96. Write about access methods.

97. Explain Directory structure.

98. Give a detailed account of kernel I/O subsystem.

99. Explain disk management in detail.

100 a. Explain about the multi processor system.
b. Explain with examples the process management system calls.

101. Write short notes on:

a. Real time systems
b. System design and implementation.

102. a. Assume that there are 10 jobs, each of which takes 100 sec to execute. Compare the average turn around time for the 10 jobs between FIFO and round robin scheduling.

b.Compare the performance of SJF with FIFO and round robin for the case when all jobs are of same length and if the jobs have varying length.

c. Explain how the multi level feedback queue attacks both efficiency and response time problems in scheduling.

103. a. Write notes on Co-operating processes.

b. Explain naming and synchronization issues in IPC.

104. a. Gridlock is a term describing a traffic situation in which there are so many cars in the streets and the intersections that essentially no car can move in any direction because other cars are in the way. Explain how this is the same as deadlock in an operating system by showing each of four conditions for deadlock hold in this situation.

b. Explain about locking and time stamp protocols.

105. A system with following processes and resources exists. In the context of Dijkstra's algorithm discuss:

a. Whether the system is safe state or unsafe state?

b. If a state is safe, show it is possible for all processes to complete. If a state is unsafe, show how it is possible for deadlock to occur.

Process	Allocation			Max. demand			Available resources		
	X	Y	Z	X	Y	Z	X	Y	Z
P0	0	1	0	7	5	3	3	3	2
P1	2	0	0	3	2	2			
P2	3	0	2	9	0	2			
P3	2	1	1	2	2	2			
P4	0	0	2	4	3	3			

c. Explain the concept of deadlock prevention and avoidance.

106. Explain segmentation memory management scheme.

107. Write notes on:

a. Techniques for free space management.
b. LRU page replacement.

108. a. On a disk with 1000 cylinders, numbers 0 to 999, compute the number of tracks the disk arm must move to satisfy all the requests in the disk queue. Assume the last request serviced was at track 345 and head is moving to track 0. The queue in FIFO order contains requests for the following tracks: 123, 874,692, 475, 105, 376. Perform the computation for the following disk scheduling algorithms.

i. FIFO ii. SSTF iii. SCAN iv. LOOK

b. Explain the various issues of storage allocation in a file system with that of main memory allocation.

109 . Give an account on the following:

a. DMA
b. Polling and interrupts.

110. What is the purpose of System calls? Briefly explain the types of system calls provided by a typical operating system.

111. a. What are the various process states? Depict process state diagram.

b. What are the important issues involved in the design and implementation of operating systems?

112. Explain how co-operating processes communicate with each other via an IPC.

113. Consider the following set of processes, with the length of the CPU burst time given in milliseconds

Process	Burst time	Priority
P_1	8	3
P_2	3	1
P_3	4	4
P_4	2	2
P_5	6	5

The processes are assumed to have arrived in the order P_1, P_2, P_3, P_4 and 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 Round Robin (quantum=2) scheduling.

b. What is the turnaround time of each process for each of the scheduling algorithm in (a)?

c. What is the waiting time of each process for each of the scheduling algorithm in (a)?

d. Which of the schedules in (a) results in minimal average waiting time (overall processes)?

114. Explain in detail how semaphores and monitors are used to solve producer-consumer problem.

115. Discuss the methods of deadlock detection and recovery.

116. Explain the various file directory structures.

117. Explain FIFO, Optimal, LRU and LRU approximation page replacement algorithms with an example reference string. Mention the merits and demerits of each of the above algorithms.

118. On a disk with 1000 cylinders, numbers 0 to 999, compute the number of tracks the disk arm must move to satisfy all the request in the disk queue. Assume the last request received was at track 345 and the head is moving

towards track 0. The queue in FIFO order contains requests for the following tracks. 123, 874, 692, 475, 105, 367. Perform the computation for the following scheduling algorithm (i) FIFO (ii) SSTF (iii) SCAN (iv) LOOK (v) C-SCAN (vi) C-LOOK.

119. Explain briefly about various levels of RAID.

120. How is the computer system organized according to the number of general purpose processors used?

121. What are the approaches available for users to interface with the operating system?

122. Write notes on following terms:

a. Process State b. Process Control Block

123. Explain the following scheduling:

a. First Come First Served Scheduling b. Priority Scheduling

124 What is a Semaphore? Explain its usage and implementation.

125. Discuss in detail about Paging Model of logical and physical memory.

126. Write notes on the following page replacement algorithm

a. Optimal Page Replacement b. LRU Page Replacement

127. Explain the Allocating Disk Space methods: Contiguous allocation and Linked allocation.

128. Define RAID structure and explain the RAID levels.

129. a. Explain the Direct Memory Access.
b. Explain the Kernel I/O scheduling.

130. a. Discuss multiprogramming and timesharing operating systems.
b. Write notes on multimedia systems and handheld systems.

131. Discuss the important issues involved in design and implementation of operating systems.

132. Consider the following set of processes, with the CPU burst time given in milliseconds.

Process	Burst Time
P1	10

P2	29
P3	3
P4	7
P5	12

Consider FCFS, Non-preemptive SJF, RR(quantum = 10 ms) scheduling algorithms. Illustrate scheduling using Gantt chart. Calculate their waiting time and average waiting time.

133. Discuss in detail about Interprocess communication.

134. a. Discuss the critical section problem. State the basic requirements of critical section problem solution.
b. Explain segmentation hardware with suitable example.

135. State clearly four necessary conditions for deadlocks to occur. Explain Banker's algorithm for deadlock avoidance.

136. Illustrate FIFO page replacement and LRU page replacement with suitable examples.

137. Briefly explain three major methods of allocating disk space.

138. Discuss with diagrams the following disk scheduling algorithms: FCFS, SSTF, and SCAN.

139. Discuss the services provided by Kernel I / O subsystem.

140. Explain the following:

a. Distributed systems

b. System programs

141. a. Explain about the various operating system services.
b. What are the types of system calls?

142. Explain about inter process communication.

143. Compute average turnaround time and average waiting time for the following scheduling methods.

a. FIFO
b. SJF
c. Round robin (quantum = 2ns).

Process	Burst time (ns)	Arrival time
P1	4	2

P2	2	1
P3	5	1
P4	3	3

Draw the Gantt charts for the above scheduling methods.

144. a. Write and explain the monitor solution for Dining-philosopher problem.

b. What is a semaphore? What are its operations?

145. a. Explain the deadlock recovery methods.
b. Explain about paging.

146. a. Explain the basic concepts involved in demand paging.
b. Explain any two-directory structures.

147. a. Describe any 2-disk allocation methods.
b. Discuss about any 2 free space management methods.

148. Explain the various disk scheduling algorithms.

149. Write short notes

a. Kernel I/O subsystem b. Swap space management.

150. Explain how protection is provided for the hardware resources by the operating system.

151. Explain about the various systems calls.

152. Explain in detail about interprocess communication.

153. Consider the following set of processes, with the length of the CPU-burst time given in milliseconds:

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

Processes are arrived in P1, P2, P3, P4, P5 order of all at time 0. Draw Gantt charts to show execution using FCFS, SJF, non-preemptive priority (lower number implies higher priority) and RR (time quantum = 1) scheduling. Also calculate waiting and turnaround time of each process for each one of the above scheduling algorithms.

154. Explain about the Banker's algorithm for deadlock avoidance.

155. Explain about the basic concepts of paging.

156. 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 three frames? Remember all frames are initially empty.

a. FIFO replacement b. LRU replacement c. Optimal replacement

157. a. Briefly explain about the single and two level directory structures.

b. Write notes about the protection strategies provided for files.

158. Explain SSTF, SCAN, C-SCAN and LOOK disk scheduling techniques with examples.

159. Discuss about the kernel I/O subsystem.

160. Briefly explain the types of system calls provided by a typical operating system.

161. Discuss in detail on the services provided by the operating system.

162. a. What is the role of PCB? List the attributes of PCB.

b. State and explain the different mechanism for Inter process communication.

163. Explain FCFS, SJF, a non-preemptive priority and RR scheduling algorithm by considering four processes with burst time and priority. Compare the turn around and waiting times of each process for each of the above scheduling Algorithms.

164. Explain in detail how semaphores and monitors are used to solve the Dining-Philosopher problem.

165. What are the techniques involved in deadlock detection?

166. Explain the LRU approximation page replacement algorithms.

167. Explain the various file directory structures.

168. Write short notes on the following:
a. SSTF b. FCFS c. SCAN d. C-SCAN

169. Explain briefly about RAID.

170. a. Explain the various operating system services.
b. Write notes on system programs.

171. Illustrate how operating system acts as a resource manager.

172. a. Explain about inter process communication.
b. Describe the process lifecycles and PCB with neat illustrations.

173. a. Discus the various multithreading models.
b. Explain about multiple processor scheduling.

174. a. Discuss the monitor solution for Dining Philosopher problem.
b. Explain the Peterson's solution for process synchronization.

175. a. Why are segmentation and paging sometimes combined into one scheme?

b. What is the cause of thrashing? How does the system detect thrashing? Once it detects thrashing, what can the system do to eliminate this problem?

c. Explain Bankers algorithm for deadlock avoidance.

176. a. Given five memory partitions of 100kB, 500kB, 200kB, 300kB, and 600kB (in order), how would each of the first-fit, best-fit and worst-fit algorithms place processes of 212kB, 417kB, 112kB, and 426kB (in order)? Which algorithm makes the most efficient use of the memory?

b. Write short notes on segmentation.

177. Consider the following page reference string

7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1

How many page faults would occur for the following replacement algorithms: LRU, FIFO, and Optimal assuming three frames that all frames are initially empty.

178. a. List and discuss the various methods for implementing a directory.
b. Discuss the various file operations.

179. A hard disk having 500 cylinders, numbered from 0 to 499. The drive is currently serving the request at cylinder 143, and the previous request was at cylinder 125. The status of the queue is as follows: 86, 470, 13, 177, 448, 150, 102, 175, 130. 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 algorithms?

a. FCFS b. SSTF c. SCAN d. LOOK

180. An Operating system provides an environment for the execution of programs. What are the services provided for the convenience of the programmer, to make the programming task easier? Explain the services in detail.

a. List out Various Execution modes in the Operating System.
b. What is a System call? Explain the various types of system calls

181. In general a Process can be divided into Single Threaded Process and Multi Threaded Process.

a. List out the benefits of multithreaded programming.
b. Explain the Multithreading Models with proper diagram.
c. Explain Round robin scheduling with an example.

182. a. Define Critical Section.
b. There are some classical problems of synchronization and these problems are examples of a large class of concurrency–control problems. One of the problems is Dining-Philosophers problem. Explain this problem with proper example. Write the Monitor solution for this problem.

183. Explain the Banker's algorithm for deadlock avoidance with an example.

184. Paging is a memory management scheme. Draw the Paging hardware diagram. Write the working procedure of paging hardware in detail.

185. How can you handle a page fault in demand paging? Explain FIFO page replacement and Optimal Page replacement algorithms in detail.

186. Explain the various diskspace allocation methods.

187. Explain the various disk scheduling algorithms with an example.

188. Write short notes on:
a. RAID
b. Tertiary storage structure

189. Explain about the system calls in detail.

190. What are the system components of an operating system? Explain them.

191. Explain in briefly about the various CPU scheduling algorithm.

192. Discuss briefly the various issues involved in implementing Inter Process Communication (IPC) in message system.

193. Discuss how deadlocks can be avoided and detected.

194. Explain briefly about Readers/writers problem in classical Synchronization implement using critical section.

195. Explain in detail about virtual memory management.

196. Explain different schemes for defining the logical structure of a directory.

197. Explain briefly about RAID.

198. Discuss on the following disk scheduling algorithms:

Shortest Seek Time First, First Come First Served, SCAN, C-LOOK.

199. Discuss in detail about different OS structures and services.

200. Explain in detail various types of system calls.

201. Illustrate the different mechanisms to handle the interprocess communication.

202. Explain Round-Robin scheduling with an illustrative example.

203. What are Semaphores? How do you achieve process synchronization with Semaphores?

204. What are the necessary conditions for the deadlock to exist? How will you prevent and avoid deadlocks?

205. What are the causes of thrashing? Explain working-set model with an example.

206. Explain the linked allocation and indexed allocation methods used in file systems.

207. Discuss about disk scheduling and its various methods briefly.

208. With typical PC bus structure, explain the functions of various I/O hardware components.