**PART A**

1. Define an Operating System.
2. List out the functions of OS.
3. What is Operating System? List its functions.
4. Summarize the objectives and functions of an operating system.
5. State the objectives of operating system.
6. Define symmetric multiprocessing.
7. What is the responsibility of OS in connection with file management?
8. What is the responsibility of OS in connection with process management?
9. What is the responsibility of OS in connection with memory management?
10. What is the responsibility of OS in connection with mass storage management?
11. Define protection.
12. What are the functions of OS under process management?
13. What is dual mode operation?
14. Define booting.
15. Define System Call.
16. What is Virtualization?
17. State the purpose of System Calls.
18. What are the categories of System programs?
19. Define process.
20. Differentiate between process and program.
21. What is PCB?
22. What is meant by the state transition “scheduler dispatch”?
23. Is context switching an overhead? Justify your answer.
24. What is meant by context switching?
25. Differentiate between long term and short term scheduler.
26. List out the process states.
27. Differentiate between job scheduler and CPU scheduler.
28. What do you mean by swapping?
29. What is cascading termination?
30. Justify why and when medium term schedulers are necessary?
31. Define a thread.
32. Define multithreading.
33. What is implicit threading?
34. State the advantages of threads.
35. Define a thread. State its advantages.
36. What is meant by multicore programming?
37. Mention the various multithreading models.
38. Under what circumstances are user level threads better than the kernel level threads? Justify your answer.
39. Differentiate between user and kernel threads.
40. List out the various multithreading models.
41. Mention the various threading issues.
42. Give an example of a multithreaded application.
43. What is preemptive scheduling?
44. What is non-preemptive scheduling?
45. Differentiate between preemptive and non-preemptive scheduling.
46. List out the non-preemptive scheduling algorithms.
47. List out the preemptive scheduling algorithms.
48. Mention the various CPU scheduling algorithms.
49. What is the function of CPU scheduler?
50. Define throughput.
51. Mention the functions of a dispatcher.
52. Define arrival time.
53. Mention the various scheduling criteria.
54. What is CPU Scheduling?
55. Define waiting time.
56. Define response time.
57. For a good scheduling algorithm how should the waiting time and turnaround time be?
58. Define turnaround time.
59. For a good scheduling algorithm how should the response time and turnaround time be?
60. For a good scheduling algorithm how should the CPU Utilization and throughput be?

**Part – B ( 5 x 13 = 65 Marks)**

**Unit 1**

1. Is OS a Resource Manager? Justify.
2. Explain the interrupt driven I/O cycle with a neat diagram.
3. Give a detailed account of the organization of the computer system.
4. Categorize the computer system on the number of processors used and explain. (13)
5. Discuss in detail about the organization and architecture of computer systems.(13)
6. Elaborate in detail the functions performed by operating system for resource management.(13)
7. With neat diagrams explain the various structures of OS.(13)
8. Categorize system calls and explain.(13)
9. Explain the process of building and booting an OS.(13)
10. How does an OS handle system calls? (13)
11. Give a detailed account of the operating system structures.(13)
12. Explain in detail the various ways in which system calls are used by the OS.(13)
13. Explain the different types of schedulers and scheduling queues.(13)
14. Draw the Process state transition diagram and explain in detail.(13)
15. Explain Process concept with a neat state transition diagram.(13)
16. Draw the Process state transition diagram and explain in detail.(13)
17. Write short notes on
    1. Schedulers(7)
    2. Scheduling Queues(6)
18. Explain the different types of schedulers and scheduling queues.(13)
19. Give a detailed account of inter process communication.(13)
20. Explain IPC in message-passing systems.(13)
21. Explain IPC in shared memory systems.(13)
22. Elaborate in detail about IPC.(13)
23. What is the need for IPC? Explain.(13)
24. Compare and Contrast IPC in message passing systems and shared memory systems.(13)

**Unit 2**

1. Discuss in detail about the programming challenges in multicore programming.(13)
2. Discuss in detail about the types of parallelism in multicore programming.(13)
3. Explain the various multithreading models in detail.(13)
4. Describe the models of multithreading.(13)
5. Write a detailed account of multicore programming. (13)
6. What is multithreading? Discuss the various models of multithreading. (13)
7. Write a note on implicit threading.(13)
8. Explain Grand Central Dispatch.(13)
9. Describe thread pools.(13)
10. Explain in detail about implicit threading. (13)
11. Write short notes on
    1. Implicit threading. (7)
    2. Grand Central Dispatch (6)
12. Explain thread pools.(13)
13. Explain multilevel queue scheduling.(13)
14. Discuss about multilevel feedback queue scheduling.(13)
15. Write short notes on
    1. Multilevel Queue Scheduling (7)
    2. Multilevel Feedback Queue Scheduling (6)
16. Write short notes on
    1. Swapper (7)
    2. Context switch (6)
17. Write short notes on
    1. Process Control Block (7)
    2. Context switch (6)
18. Write short notes on
    1. Process Control Block (7)
    2. Swapper (6)
19. Describe real time CPU Scheduling.(13)
20. Explain multiprocessor scheduling.(13)
21. Discuss about thread scheduling.(13)
22. Write short notes on
    1. Multiprocessor scheduling (7)
    2. Thread scheduling (6)
23. Write short notes on
    1. Multiprocessor scheduling (7)
    2. Real time CPU scheduling (6)
24. Write short notes on

(iii) Thread scheduling (7)

(iv) Real time CPU scheduling (6)

1. Describe the various operations on processes.(13)
2. Name the 2 basic operations on a process and explain in detail.(13)
3. Write short notes on
   1. Process Creation(7)
   2. Process Termination (6)
4. Discuss in detail about the threading issues.
5. Give a detailed account on the various issues in threading.(13)
6. Explain Process Creation and Termination.(13)
7. Discuss the preemptive versions of First Come First Serve , Shortest Job First and Priority with your own example.(13)
8. Give an account of the advantages and disadvantages of all the CPU scheduling algorithms with necessary examples.(13)
9. Consider three processes, all arriving at time zero, with total execution time of 10, 20 and 30 units respectively. Each process spends the first 20% of execution time doing I/O, the next 70% of time doing computation, and the last 10% of time doing I/O again. The operating system uses a shortest remaining compute time first scheduling algorithm and schedules a new process either when the running process gets blocked on I/O or when the running process finishes its compute burst. Assume that all I/O operations can be overlapped as much as possible. For what percentage of does the CPU remain idle? (13)
10. Three processes P1, P2 and P3 arrive at time zero. The total time spent by the process in the system is 10ms, 20ms, and 30ms respectively. They spent first 20% of their execution time in doing I/O and the rest 80% in CPU processing. What is the percentage utilization of CPU using FCFS scheduling algorithm?(13)
11. Three processes p1, P2 and P3 arrive at time zero. Their total execution time is 10ms, 15ms, and 20ms respectively. They spent first 20% of their execution time in doing I/O, next 60% in CPU processing and the last 20% again doing I/O. For what percentage of time was the CPU free? Use Round robin algorithm with time quantum 5ms.(13)
12. A uniprocessor computer system has three processes, which alternate 20ms CPU bursts with 80ms I/O bursts. All the processes were created at nearly the same time. The I/O of all the processes can proceed in parallel. What will be the CPU utilization (over a long period of time) using FCFS and Round Robin (time quantum 10ms) for this system?

**Part – C ( 1 x 15 = 15 Marks)**

1. Give the queuing diagram representation of process scheduling and explain.
2. Describe the Process Scheduling Queuing diagram in detail.
3. Discuss Process Scheduling Queuing by adding Medium term Scheduling to the representation.
4. Explain process scheduling and the various events under which a process can be removed from the CPU with the help of a neat diagram.
5. Describe the Process Scheduling Queuing diagram in detail.
6. Explain the various events under which a process could be removed from the CPU with the help of a neat diagram.

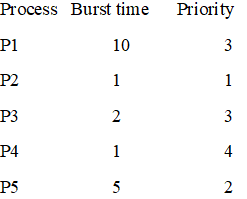
7. Analyze the performance of the various CPU Scheduling algorithms for

a)FCFS (3)

b)SJF (4)

c)Priority (4)

d)RR (Quantum Slice: 3ms) (4)



8. Analyze the performance of the various CPU Scheduling algorithms for

a)FCFS (3)

b)SJF (4)

c)Priority (4)

d)RR (Quantum Slice: 4 ms) (4)

Process Burst time Priority

P1 15 3

P2 17 1

P3 8 2

9. Analyze the performance of the various CPU Scheduling algorithms for

a)FCFS (3)

b)SJF (4)

c)Priority (4)

d)RR (Quantum Slice: 3ms) (4)

Process Burst time Priority

P1 12 2

P2 1 3

P3 8 1

P4 7 4

P5 5 5

10. Analyze the performance of the various CPU Scheduling algorithms for

a)FCFS (3)

b)SJF (4)

c)Priority (4)

d)RR (Quantum Slice: 3ms) (4)

Process Burst time Priority Arrival time

P1 12 2 2

P2 1 3 0

P3 8 1 1

P4 7 4 3

P5 5 5 4

11. Analyze the performance of the various CPU Scheduling algorithms for

a)FCFS (3)

b)SJF (4)

c)Priority (4)

d)RR (Quantum Slice: 4 ms) (4)

Process Burst time Priority Arrival time

P1 15 3 2

P2 17 1 0

P3 8 2 1

12.Analyze the performance of the various CPU Scheduling algorithms for

a)FCFS (3)

b)SJF (4)

c)Priority (4)

d)RR (Quantum Slice: 4 ms) (4)

**Process Burst time Priority Arrival time**

P1 12 1 2

P2 14 3 0

P3 7 2 1