Operating Systems

Unit-I		Marks
1	Outline the essential properties of the following types of operating systems: A. Batch B. Time sharing C. Network D. Parallel E. Distributed	[10M]
2	Summarize the operating systems structure objectives and its functions with neat diagrams.	[10M]
3	Demonstrate with a neat sketch, by describing the services that an operating system provides to users, processes and other systems.	[10M]
4(a)	Compare and contrast the difference between kernel mode and user mode.	[5M]
(b)	Illustrate the major differences between symmetric and asymmetric multiprocessing with neat diagrams.	[5M]
5(a)	Choose the system calls used in process management and memory management of OS	[5M]
(b)	Build the system calls that are used in file management and I/O management functionalities of OS	[5M]
6	Model the developments happened in the generations of operating systems in chronological order	[10M]
7	Explain in brief the case study of Windows OS	[10M]
8(a)	Inspect the differences between multi programming and multi-processing with examples.	[5M]
(b)	Categorize the differences between a tightly coupled and loosely coupled systems with examples	[5M]
9	Explain in brief the case study of Unix OS	[10M]
10	Classify the major grouping in system calls and mention their significance. Justify with examples.	[10M]

UNIT-II		Marks
1(a)	Illustrate with examples the difference between pre-emptive and non-pre-emptive scheduling.	[5M]
(b)	Infer why is it important for the scheduler to distinguish I/O-bound programs	[5M]
2	Compare and contrast the differences between user-level threads and kernel-level threads	[10M]
3	Outline how operating system use different CPU Schedulers in process management	[10M]
4(a)	Summarize the importance of Process Control Block.	[5M]
(b)	Define Process. Explain about all the steps involved between process creation and process termination.	[5M]

<table>
<tr><td>5(a)</td><td>Build the scenarios where operating system uses the different Inter Process Communication models.</td><td>[5M]</td></tr>
<tr><td>(b)</td><td>Define Thread. Identify how OS make use of the different multithreading models</td><td>[5M]</td></tr>
<tr><td>6</td><td>Construct the Gantt chart for a) Shortest job first b) Round Robin with q=3 for the following.
<table>
<tr><td>Process</td><td>P1</td><td>P2</td><td>P3</td><td>P4</td><td>P5</td></tr>
<tr><td>Arrival Time</td><td>0</td><td>0</td><td>2</td><td>1</td><td>3</td></tr>
<tr><td>CPU Burst Time (in ms)</td><td>10</td><td>6</td><td>12</td><td>8</td><td>5</td></tr>
</table>
Calculate the average waiting time and average turnaround time for each scheduling algorithms.</td><td>[10M]</td></tr>
<tr><td>7(a)</td><td>Choose any three major activities of an OS with respect to process management and describe their significance.</td><td>[5M]</td></tr>
<tr><td>(b)</td><td>Model the various states of a process with a neat diagram. Comment on what queues are used by process management its process state life cycle.</td><td>[5M]</td></tr>
<tr><td>8(a)</td><td>Identify the benefits of multi-threaded programming and build the available multi-threading models in OS</td><td>[5M]</td></tr>
<tr><td>(b)</td><td>Utilize the following phrases to highlight the working of scheduling queues, schedulers and content switching with examples</td><td>[5M]</td></tr>
<tr><td>9</td><td>Assume that the following set of processes arrive at time 0, with the length of the CPU burst given in milliseconds arrive for execution at the times indicated. Each process will run for the amount of time listed. In answering the questions, use non-pre-emptive scheduling and base all decisions on the information you have at the time the decision must be made.
<table>
<tr><td>Process</td><td>Burst Time</td></tr>
<tr><td>P1</td><td>24</td></tr>
<tr><td>P2</td><td>3</td></tr>
<tr><td>P3</td><td>3</td></tr>
</table>
What is the average turnaround time for these processes with the FCFS and SJF scheduling algorithm? Justify with Gantt charts.
What is the average waiting time for these processes with the FCFS and SJF scheduling algorithm? Justify with Gantt charts.</td><td>[10M]</td></tr>
<tr><td>10</td><td>Inspect the following set of processes, with the length of the CPU burst given in milliseconds. The processes are assumed to have arrived in the order P1, P2, P3, P4, P5, all at time 0.
<table>
<tr><td>Process</td><td>Burst Time</td><td>Priority</td></tr>
<tr><td>P1</td><td>10</td><td>3</td></tr>
<tr><td>P2</td><td>1</td><td>1</td></tr>
<tr><td>P3</td><td>2</td><td>3</td></tr>
<tr><td>P4</td><td>1</td><td>4</td></tr>
<tr><td>P5</td><td>5</td><td>2</td></tr>
</table>
Draw Gantt charts that illustrate the execution of the processes using the following scheduling algorithms: FCFS, non-pre-emptive priority scheduling (a smaller priority number implies a higher priority)
Calculate the average waiting time and average turnaround time for each scheduling algorithms</td><td>[10M]</td></tr>
</table>

	UNIT-III	Marks
1 (a)	Show the structure of a semaphore when defined by the wait and signal operations	[5M]
(b)	Demonstrate the implementation of the bounded-buffer problem with semaphores	[5M]
2	Summarize the importance of any two classic problems of synchronization	[10M]
3	Outline how Peterson's solution is used to critical section problem	[10M]
4	Illustrate with examples the importance of critical section problems and justify how the concurrent control is done in a cooperative processes	[10M]
5(a)	Making use of a critical section mention how interleaving is done in producer-consumer problem.	[5M]
(b)	Model the readers-writers process synchronization problem by making use of semaphores.	[5M]
6	Utilizing monitors discuss how a solution is given to the dining philosopher's problem.	[10M]
7(a)	Shows a schematic view of a monitor and illustrate how a monitor includes condition variables	[5M]
(b)	Identify the difference between binary semaphore and counting semaphore?	[5M]
8	Inspect how a Peterson's solution is used a classic software-based solution to the critical section problems, justify whether all the conditions of critical sections are met or not.	[10M]
9(a)	Survey on circumstances where swap function and test and set functions are implemented on critical section problems	[5M]
(b)	Discover how locking mechanism in implemented in synchronization hardware of a critical section.	[5M]
10(a)	Define semaphore and categorize its different types of implementation	[5M]
(b)	Classify the significant features that the solution of critical section problem must satisfy.	[5M]