UNIT-1

Apply:

(4-marks)Apply the benefits of threads to show why a multimedia application (e.g., video player) should use multithreading.

(6-marks) Apply the functions of the operating system to explain how it manages device drivers for a printer and a disk drive simultaneously.

(6-marks) A computer runs both CPU-bound and I/O-bound processes. Apply the scheduling objectives to decide which process type should get higher priority.

(8-marks)Apply the concept of Process Control Block (PCB) to explain what happens when a process is interrupted and later resumed.

(8-marks)A system has two processes that share a printer. Apply the concept of mutual exclusion to explain how deadlock can occur if not handled properly.

Analysis:-

(4-marks)Compare preemptive and non-preemptive scheduling policies in terms of fairness and response time.

(6-marks)Analyze the role of dispatcher in switching between processes. How does it affect system performance?

(6-marks)Analyze the advantages and disadvantages of swapping (suspended processes) in a multiprogramming environment.

(8-marks)Analyze the effect of blocking system calls on user-level threads versus kernel-level threads.

(8-marks)Given the evolution of operating systems (serial processing → batch → multiprogramming → time sharing), analyze how each solved the limitations of the previous generation.

Execute:-

(4-marks)Show step-by-step execution of a process moving through the seven-state model (New → Ready → Running → Blocked → etc.).

(6-marks)Execute a Round Robin scheduling with a quantum of 3 units for processes having burst times: P1 = 7, P2 = 4, P3 = 9. Find the average waiting time.

(6-marks)Demonstrate with execution steps how a deadlock occurs using four processes and four resources (use resource allocation graph).

(8-marks)Execute Shortest Job Next (SJN) scheduling on a set of 4 processes with given burst times, and compute waiting and turnaround times.

(8-marks)Execute a synchronization solution using semaphores for the producer-consumer problem with buffer size = 3.

UNIT-2

Apply:-

(8 marks) Apply the **five-state process model** to describe how a process moves through *New* → *Ready* → *Running* → *Blocked* → *Exit* states with an example of an online exam system.

(8 marks) Apply the **Banker's Algorithm** to a given system of 3 processes and 3 resources, and decide whether a request keeps the system in a safe state.

(4 marks) Apply the concept of **binary semaphore** to explain how mutual exclusion is achieved between two processes.

Analysis:-

(8 marks) Analyze the difference between **deadlock, starvation, and livelock**, with one real-world analogy for each.

(8 marks) Compare **readers-priority vs. writers-priority solutions** to the Readers-Writers problem, analyzing which one risks starvation and why.

(4 marks) Analyze why **circular wait** is the most critical condition in the occurrence of deadlock.

Execute:-

(8 marks) Execute the **Round Robin scheduling** with quantum = 3 for processes P1(7), P2(4), P3(9), and calculate average waiting time and turnaround time.

(8 marks) Execute the **Dining Philosophers problem** where all philosophers pick up the left fork first. Trace step-by-step how the deadlock forms.

(4 marks) Execute a **deadlock detection algorithm** using a small resource allocation graph with 2 processes and 2 resources.
