

**BRANCH: CSE**

**YEAR: II**

**SEMESTER: II**

**ACADEMIC YEAR: 2024-25**

**COURSE TITLE: OPERATING SYSTEMS**

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IMPORTANT QUESTIONS FOR ASSIGNMENT

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **S.No** | **Question** | | | | **C O** | **B L** | **Marks** |
| **MODULE-I** | | | | | | | |
| **1** | What is an operating system, and what is its primary purpose? | | | | **1** | **2** | **10** |
| **2** | List and briefly describe functions of an operating system? | | | | **1** | **2** | **10** |
| **3** | What are the main operations of an operating system? | | | | **1** | **2** | **10** |
| **4** | What are computing environments. Explain in detail? | | | | **1** | **2** | **10** |
| **5** | Explain operating system services? | | | | **1** | **2** | **10** |
| **6** | Explain different types of system calls? | | | | **1** | **2** | **10** |
| **7** | What factors should be considered when designing an operating system? | | | | **1** | **2** | **10** |
| **8** | What is the process of building and booting an operating system? | | | | **1** | **2** | **10** |
| **2 MARKS QUESTIONS** | | | | | | | |
| **1** | Define an operating system? | | | | **1** | **2** | **2** |
| **2** | List two primary functions of an operating system? | | | | **1** | **2** | **2** |
| **3** | What are the two main types of operating system operations? | | | | **1** | **2** | **2** |
| **4** | Give examples of two computing environments where operating systems are used? | | | | **1** | **2** | **2** |
| **5** | Name any two services provided by an operating system? | | | | **1** | **2** | **2** |
| **6** | What is the purpose of system calls in an operating system? | | | | **1** | **2** | **2** |
| **7** | Differentiate between user interface and system interface? | | | | **1** | **2** | **2** |
| **8** | What is the role of system programs in an operating system? | | | | **1** | **2** | **2** |
| **9** | Define operating system structure? | | | | **1** | **2** | **2** |
| **10** | What is the purpose of booting an operating system? | | | | **1** | **2** | **2** |
| **MODULE-II** | | | | | | | |
| **1** | Explain with a neat diagram various process states and the importance of Process Control Block? | | | | **2** | **3** | **10** |
| **2** | Explain with a neat diagram the concept of scheduling queues? | | | | **2** | **2** | **10** |
| **3** | What is inter-process communication (IPC), and how does it function in an operating system? | | | | **2** | **3** | **10** |
| **4** | a) Consider the following five processes, with the length of the CPU burst time given in milliseconds. Find Average Waiting Time and Turnaround time for given process using FCFS  algorithm? | | | | **2** | **3** | **5** |
|  | Process | Burst Time |  |
| P0 | 4 |
| P1 | 10 |
| P2 | 7 |
| P3 | 2 |
| P4 | 5 |
| b) What is process scheduling, and why is it important in an operating system? | | | | **2** | **2** | **5** |
| **5** | List and explain the different multithreading models? | | | | **2** | **2** | **10** |
| **6** | a) What is the role of thread libraries in thread management? | | | | **2** | **2** | **5** |
| b) Consider the following five processes, with the length of the CPU burst time given in milliseconds. Find Average Waiting Time and Turnaround time for given process using SJF algorithm  (non-preemptive)?   |  |  | | --- | --- | | Process | Burst Time | | P1 | 5 | | P2 | 3 | | P3 | 1 | | P4 | 3 | | P5 | 5 | | | | | **2** | **3** | **5** |
| **7** | Compare and contrast the following CPU scheduling algorithms: FCFS, SJF, and Round Robin? | | | | **2** | **2** | **10** |
| **8** | What are the advantages of multiple processor scheduling in operating systems? | | | | **2** | **4** | **10** |
| **2 MARKS QUESTIONS** | | | | | | | |
| **1** | What is a process, and how is it different from a program? | | | | **2** | **3** | **2** |
| **2** | List the main states of a process? | | | | **2** | **2** | **2** |
| **3** | What are the three types of schedulers in an operating system? | | | | **2** | **3** | **2** |
| **4** | Differentiate between preemptive and non-preemptive scheduling? | | | | **2** | **2** | **2** |
| **5** | What happens when a process is terminated? | | | | **2** | **2** | **2** |
| **6** | What is the difference between a parent process and a child process? | | | | **2** | **3** | **2** |
| **7** | What is the purpose of inter-process communication (IPC)? | | | | **2** | **2** | **2** |
| **8** | Differentiate between shared memory and message passing in IPC. | | | | **2** | **2** | **2** |
| **9** | Define a thread and explain its importance? | | | | **2** | **3** | **2** |
| **10** | Explain the many-to-one threading model? | | | | **2** | **2** | **2** |
| **MODULE-III** | | | | | | | |
| **1** | Explain critical section problem in the context of synchronization? | | | | **3** | **2** | **10** |
|  | | | |  |  |  |
| **2** | How does Peterson’s solution address the critical section problem? | | | | **3** | **2** | **10** |
| **3** | a) What are semaphores, and how do they differ from mutex locks in managing synchronization? | | | | **3** | **2** | **5** |
| b) What is the purpose of the wait and signal operations in semaphore-based synchronization? | | | | **3** | **2** | **5** |
| **4** | What is the producer-consumer problem, and how can semaphores be used to solve it? | | | | **3** | **2** | **10** |
| **5** | a) What is the system model in the context of deadlocks? | | | | **3** | **1** | **2** |
| b) What is deadlock characterization, and how is it useful in identifying deadlock situations? | | | | **3** | **2** | **8** |
| **6** | Explain with an example the Banker’s algorithm for deadlock avoidance? | | | | **3** | **2** | **10** |
| **7** | What is the difference between deadlock detection and deadlock prevention in terms of system design? | | | | **3** | **2** | **10** |
| **8** | a) What are the various recovery techniques that can be used when a deadlock is detected? | | | | **3** | **2** | **5** |
| b) What role does resource allocation play in deadlock avoidance strategies? | | | | **3** | **2** | **5** |
| **2 MARKS QUESTIONS** | | | | | | | |
| **1** | What are the three requirements of a solution to the critical section problem? | | | | **3** | **2** | **2** |
| **2** | How does Peterson’s solution ensure mutual exclusion and progress? | | | | **3** | **2** | **2** |
| **3** | What is the role of a mutex lock in process synchronization? | | | | **3** | **2** | **2** |
| 4 | Differentiate between binary semaphores and counting semaphores? | | | | **3** | **2** | **2** |
| **5** | How do monitors help in process synchronization? | | | | **3** | **2** | **2** |
| **6** | What is the Dining Philosophers Problem, and why is it significant? | | | | **3** | **2** | **2** |
| **7** | How is the Producer-Consumer problem solved using semaphores? | | | | **3** | **2** | **2** |
| **8** | Define a deadlock and explain its four necessary conditions? | | | | **3** | **2** | **2** |
| **9** | What is the difference between deadlock avoidance and deadlock prevention? | | | | **3** | **2** | **2** |
| **10** | Explain the steps involved in detecting a deadlock in a system. | | | | **3** | **2** | **2** |
| **MODULE-IV** | | | | | | | |
| **1** | What are the main goals of memory management in an operating system? | | | | **4** | **2** | **10** |
| **2** | Explain contiguous memory allocation and its advantages and disadvantages? | | | | **4** | **2** | **10** |
| **3** | a) Explain briefly about Thrashing? | | | | **4** | **2** | **5** |
| b) What is the role of a page table in translating logical addresses to physical addresses? | | | | **4** | **2** | **5** |
| **4** | Explain page swapping, and how does it impact system performance? | | | | **4** | **2** | **10** |
| **5** | a) What is virtual memory, and why is it needed in modern computing? | | | | **4** | **2** | **5** |
| b) Explain in detail about Paging? | | | | **4** | **2** | **5** |
| **6** | Explain in detail about the structure of page table? | | | | **4** | **2** | **10** |
| **7** | Explain in detail about page replacement? | | | | **4** | **2** | **10** |
| **8** | Explain the concept of HDD scheduling? | | | | **4** | **2** | **10** |
|  | **2 MARKS QUESTIONS** | | | |  |  |  |
| **1** | What is contiguous memory allocation, and how does it manage memory? | | | | **4** | **2** | **2** |
| **2** | Explain the difference between logical and physical addresses in memory management? | | | | **4** | **2** | **2** |
| **3** | Describe the structure of a page table and its role in paging? | | | | **4** | **2** | **2** |
| **4** | What is swapping, and when is it used in memory management? | | | | **4** | **2** | **2** |
| **5** | What is virtual memory, and how does it extend physical memory? | | | | **4** | **2** | **2** |
| **6** | What is thrashing, and how does it affect system performance? | | | | **4** | **2** | **2** |
| **7** | What is copy-on-write, and how does it optimize memory usage in process creation? | | | | **4** | **2** | **2** |
| **8** | Explain the purpose of page replacement algorithms in virtual memory management? | | | | **4** | **2** | **2** |
| **9** | What are the main components of a mass storage structure? | | | | **4** | **2** | **2** |
| **10** | What is the purpose of the seek time in HDD scheduling? | | | | **4** | **2** | **2** |
| **MODULE-V** | | | | | | | |
| **1** | What is a file, and why is it an important concept in an operating system? | | | | **5** | **2** | **10** |
| **2** | What is the role of file system operations in file management? | | | | **5** | **2** | **10** |
| **3** | How are directories implemented in a file system, and what is the role of allocation methods? | | | | **5** | **2** | **10** |
| **4** | How does the process of mounting a file system work in an operating system? | | | | **5** | **2** | **10** |
| **5** | a) Describe free space management. List the methods required for free space management? | | | | **5** | **2** | **5** |
| b) Explain various files accessing methods? | | | | **5** | **2** | **5** |
| **6** | Explain primary goals of protection in computer systems? | | | | **5** | **2** | **10** |
| **7** | What are the principles of protection, and how do they contribute to secure systems? | | | | **5** | **2** | **10** |
| **8** | What is the purpose of access matrix? Explain about access matrix with a neat diagram? | | | | **5** | **2** | **10** |
| **2 MARKS QUESTIONS** | | | | | | | |
| **1** | What is the file concept, and how are files structured? | | | | **5** | **2** | **2** |
| **2** | How does a hierarchical directory structure organize files? | | | | **5** | **2** | **2** |
| **3** | What is the role of the file-system structure in managing data storage? | | | | **5** | **2** | **2** |
| **4** | What are the main methods used to implement directories? | | | | **5** | **2** | **2** |
| **5** | Compare the contiguous and linked allocation methods for file storage? | | | | **5** | **2** | **2** |
| **6** | What is the purpose of file-system mounting, and how is it performed? | | | | **5** | **2** | **2** |
| **7** | What is the difference between partitions and file-system mounting? | | | | **5** | **2** | **2** |
| **8** | Explain how file sharing is managed in a multi-user system? | | | | **5** | **2** | **2** |
| **9** | What are the main goals of protection in an operating system? | | | | **5** | **2** | **2** |
| **10** | Explain the principle of least privilege in the context of protection? | | | | **5** | **2** | **2** |