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| **PRASAD V. POTLURI SIDDHARTHA INSTITUTE OF TECHNOLOGY** |
| BRANCH:  | CSE/IT | REGULATION:  | PVP23 |
| COURSE:  | B.TECH | COURSE NAME:  | OPERATING SYSTEMS |
| COURSE CODE: | 23CS3401/ 23IT3401 | YEAR & SEMESTER:  | II YEAR & II SEM |
| **QUESTION BANK** |

**UNIT I****Short Answer Questions (2 Marks Each)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S. NO.** | **QUESTIONS** | **CO** | **Bloom’s Level** | **MARKS** |
| 1 | Define operating system. | CO1 | L2 | 2M |
| 2 | Outline the operating system functions. | CO1 | L2 | 2M |
| 3 | Explain the two modes of operating system operations. | CO1 | L2 | 2M |
| 4 | Explain any two computing environments. | CO1 | L2 | 2M |
| 5 | List the examples of open source operating systems. | CO1 | L2 | 2M |
| 6 | Describe the operating system services. | CO1 | L2 | 2M |
| 7 | Compare the command-line interface (CLI) with graphical user interfaces (GUI). | CO1 | L2 | 2M |
| 8 | Define system call. | CO1 | L2 | 2M |
| 9 | Summarize the file management system calls. | CO1 | L2 | 2M |
| 10 | Outline the design goals of operating system. | CO1 | L2 | 2M |

**Long Answer Questions (10 Marks Each)**  |
| **S. NO.** | **QUESTION** | **CO** | **LEVEL** | **MARKS** |
| 1 | Explain the difference between the user view and system view of an operating system. | CO1 | L2 | 10 M |
| 2 | Outline different types of operating system interfaces. | CO1 | L2 | 10 M |
| 3 | Summarize the operating system operations. | CO1 | L2 | 10 M |
| 4 | Explain how an operating system handles protection and security. | CO1 | L2 | 10 M |
| 5 | Explain various operating system functions. | CO1 | L2 | 10 M |
| 6 | Summarize the operating system services. | CO1 | L2 | 10 M |
| 7 | Outline different types of user and operating system interfaces. | CO1 | L2 | 10 M |
| 8 | What is a system call? Explain exactly how a system calls switches a process to kernel mode during its execution and how is it switched back to user mode on return from a system call. | CO1 | L2 | 10 M |
| 9 | Summarize about the system programs. | CO1 | L2 | 10 M |
| 10 | Explain the purpose of all types of system calls and discuss the calls related to Process Control, device management in detail. | CO1 | L2 | 10 M |
| **UNIT II****Short Answer Questions (2 Marks Each)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S. NO.** | **QUESTIONS** | **CO** | **Bloom’s Level** | **MARKS** |
| 1 | Explain what is a process. | CO1 | L2 | 2M |
| 2 | Compare program and process. | CO1 | L2 | 2M |
| 3 | Explain about the process states. | CO1 | L2 | 2M |
| 4 | Summarize the usage of PCB (Process Control Block). | CO1 | L2 | 2M |
| 5 | Explain the functionality of dispatcher. | CO1 | L2 | 2M |
| 6 | Explain starvation and aging | CO1 | L2 | 2M |
| 7 | Differentiate between independent and cooperative process. | CO1 | L2 | 2M |
| 8 | Differentiate between a thread and a process.  | CO1 | L2 | 2M |
| 9 | Outline the advantages of inter-process communication. | CO1 | L2 | 2M |
| 10 | Outline the scheduling criteria. | CO1 | L2 | 2M |

**Long Answer Questions (10 Marks Each)**  |
| **S. NO** | **QUESTION** | **CO** | **LEVEL** | **MARKS** |
| 1 | A) Explain about the process. Show various process states.B) Explain about Process Control Block. | CO2CO2 | L2L2 | 5 M5 M |
| 2 | A) Outline Process Scheduling and Process Scheduling Queues.B) Explain briefly about different types of Schedulers. | CO2CO2 | L2L2 | 5 M5 M |
| 3 | A) Explain about Context switching.B) Explain the operations that can be performed on a process. | CO2CO2 | L2L2 | 5 M5 M |
| 4 | A) Summarize how Inter Process Communication takes place.B) Explain about Message Passing Systems. | CO2CO2 | L2L2 | 5 M5 M |
| 5 | A) Outline different Multithreading Models.B) Explain different Threading Issues in Operating Systems. | CO2CO2 | L2L2 | 5 M5 M |
| 6 | A) Consider the following set of processes arrives at time 0 with the length of CPU burst given in milliseconds for the processes P1, P2, P3.

|  |  |
| --- | --- |
| Process | Burst Time |
| P1 | 24 |
| P2 | 3 |
| P3 | 3 |

Identify the waiting time, average waiting time of the processes if the processes arrive in order P1, P2, P3 and P2, P3, P1 using FCFS scheduling.B)Consider the following set of processes, with the length of the CPU burst given in milliseconds.

|  |  |  |
| --- | --- | --- |
| Process | Arrival Time | Burst Time |
| P1 | 0.0 | 6 |
| P2 | 0.0 | 8 |
| P3 | 0.0 | 7 |
| P4 | 0.0 | 3 |

By using SJF Scheduling, inspect the weighting time and average waiting time. | CO2CO4 | L3L4 | 5 M5 M |
| 7 | A) Consider the following set of processes, with the length of the CPU burst given in milliseconds.

|  |  |  |
| --- | --- | --- |
| Process | Arrival Time | Burst Time |
| P1 | 0 | 8 |
| P2 | 1 | 4 |
| P3 | 2 | 9 |
| P4 | 3 | 5 |

Experiment with Non-Preemptive (or) SRTF scheduling to find the waiting time and average waiting time of the processes.B) Consider the following arrival time and burst time for processes P1, P2, P3, P4.

|  |  |  |
| --- | --- | --- |
| Process | Arrival Time | Burst Time |
| P1 | 0 | 7 |
| P2 | 2 | 4 |
| P3 | 4 | 1 |
| P4 | 5 | 4 |

Analyze average waiting time of processes by considering the Non-Preemptive and Preemptive Scheduling Algorithm.  | CO2CO4 | L3L4 | 5 M5 M |
| 8 | A) Consider the following arrival time and burst time for processes P1, P2, P3, P4.

|  |  |  |
| --- | --- | --- |
| Process | Arrival Time | Burst Time |
| P1 | 0 | 4 |
| P2 | 1 | 3 |
| P3 | 2 | 1 |
| P4 | 3 | 2 |
| P5 | 4 | 6 |

Identify the Total Waiting Time, Average Waiting Time and Average Turnaround Time of processes using SJF.B) Consider the following burst time and priority for different processes, find the waiting time and average waiting time of processes using Priority Scheduling.

|  |  |  |
| --- | --- | --- |
| Process | Arrival Time | Burst Time |
| P1 | 10 | 3 |
| P2 | 1 | 1 |
| P3 | 2 | 4 |
| P4 | 1 | 5 |
| P5 | 5 | 2 |

 | CO2CO2 | L3L3 | 5 M5 M |
| 9 | A) Consider the processes and burst time with time quantum of 4 milliseconds. Identify the waiting time and average waiting time of different processes using Round Robin Scheduling.

|  |  |
| --- | --- |
| Process | Burst Time |
| P1 | 24 |
| P2 | 3 |
| P3 | 3 |

B) Consider the processes and burst time with time quantum of 20 milliseconds. Identify the waiting time and average waiting time of different processes using Round Robin Scheduling.

|  |  |
| --- | --- |
| Process | Burst Time |
| P1 | 53 |
| P2 | 8 |
| P3 | 68 |
| P4 | 24 |

 | CO2CO2 | L3L3 | 5 M5 M |
| 10 | A) Consider the processes and burst time with time quantum of 4 milliseconds. Identify the waiting time and average waiting time of different processes using Round Robin Scheduling.

|  |  |
| --- | --- |
| Process | Burst Time |
| P1 | 20 |
| P2 | 12 |
| P3 | 8 |
| P4 | 16 |
| P5 | 4 |

B) Demonstrate multiple processor scheduling. | CO2CO2 | L3L2 | 5 M5 M |
| **UNIT III****Short Answer Questions (2 Marks Each)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S. NO.** | **QUESTIONS** | **CO** | **Bloom’s Level** | **MARKS** |
| 1 | Explain Race condition. | CO1 | L2 | 2M |
| 2 | Describe critical section problem. | CO1 | L2 | 2M |
| 3 | Explain Mutual Exclusion. | CO1 | L2 | 2M |
| 4 | Demonstrate operations that can be performed on semaphore. | CO1 | L2 | 2M |
| 5 | Explain Dead lock. | CO1 | L2 | 2M |
| 6 | Outline the necessary conditions for deadlock occurrence. | CO1 | L2 | 2M |
| 7 | Outline the necessary conditions for deadlock prevention. | CO1 | L2 | 2M |
| 8 | Explain safe state. | CO1 | L2 | 2M |
| 9 | Describe methods for Handling Deadlocks. | CO1 | L2 | 2M |
| 10 | Explain the usage of Monitor for synchronization construct. | CO1 | L2 | 2M |

**Long Answer Questions (10 Marks Each)**  |
| **S. NO** | **QUESTION** | **CO** | **LEVEL** | **MARKS** |
| 1 | 1. Outline critical section problem.
2. Explain Peterson solution to the critical section problem.
 | CO3CO3 | L2L2 | 5 M5 M |
| 2 | 1. Explain about Mutex Locks.
2. Illustrate about Semaphores and their usage.
 | CO3CO3 | L2L2 | 5 M5 M |
| 3 | Make use of semaphores for solving 1. Bounded buffer problem.
2. Reader-Writer classical synchronization problem.
 | CO3 | L3 | 10 M |
| 4 | 1. Develop a solution for dining philosopher’s problem using semaphores.
2. Utilize Monitors for solving process synchronization problem.
 | CO3CO3 | L3L3 | 5 M5 M |
| 5 | Explain about deadlock? Explain about the deadlock characterization in detail? | CO3 | L2 | 10 M |
| 6 | 1. Explain the different methods for handling deadlocks.
2. Summarize briefly about the prevention the occurrence of deadlocks.
 | CO3CO3 | L2L2 | 5M5M |
| 7 | 1. Explain about deadlock avoidance.
2. Explain in detail about Banker’s algorithm.
 | CO3CO3 | L2L2 | 5 M5 M |
| 8 | Consider the following snapshot of a system:Answer the following questions by applying the Banker's Algorithm:1. What is the content of the matrix Need?
2. Is the system in a safe state?
3. If a request from process P1 arrives for (0, 4, 2, 0), can the request be granted immediately?
 | CO3 | L3 | 10 M |
| 9 | Consider five processes P0 , P1 , P2 , P3 , P4 with three resource types: A, B, C with 10, 5, 7 instances. A snapshot of the system taken at time T0 is shown belowsafetyBy considering Bankers Algorithm, analyze the following:1. What will be the content of the Need matrix?
2. Is the system in a safe state? If Yes, then what is the safe sequence?
3. What will happen if process P1 requests one additional instance of resource type A and two instances of resource type C?
 | CO4 | L4 | 10 M |
| 10 | 1. Summarize about deadlock detection?
2. Explain how to recover from deadlocks?
 | CO3CO3 | L2L2 | 5 M5 M |
| **UNIT IV** **Short Answer Questions (2 Marks Each)**

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| --- | --- | --- | --- | --- |
| **S. NO.** | **QUESTIONS** | **CO** | **Bloom’s Level** | **MARKS** |
| 1 | Explain virtual address. | CO1 | L2 | 2M |
| 2 | Outline contiguous memory allocation? | CO1 | L2 | 2M |
| 3 | Explain hole? | CO1 | L2 | 2M |
| 4 | Explain External fragmentation? | CO1 | L2 | 2M |
| 5 | Explain Internal fragmentation? | CO1 | L2 | 2M |
| 6 | Describe paging? | CO1 | L2 | 2M |
| 7 | Explain Compaction? | CO1 | L2 | 2M |
| 8 | Summarize the steps in page fault service? | CO1 | L2 | 2M |
| 9 | Describe Belady’s anomaly? | CO1 | L2 | 2M |
| 10 | Explain thrashing? | CO1 | L2 | 2M |

**Long Answer Questions (10 Marks Each)**  |
| **S. NO.** | **QUESTION** | **CO** | **LEVEL** | **MARKS** |
| 1 | 1. Explain in detail about swapping technique and its purpose?
2. Explain about contiguous memory allocation?
 | CO2CO2 | L2L2 | 5 M5 M |
| 2 | 1. Summarize about memory fragmentation?
2. Explain about internal fragmentation and external fragmentation?
 | CO2CO2 | L2L2 | 5 M5 M |
| 3 | Explain about Paging. | CO2 | L2 | 10 M |
| 4 | 1. Explain about segmentation hardware?
2. Outline various page table structures.
 | CO2CO2 | L2L2 | 5 M5 M |
| 5 | 1. Summarize about virtual memory?
2. Explain about demand paging?
 | CO2CO2 | L2L2 | 5 M5 M |
| 6 | A) Explain the steps in handling page fault?B)Explain about page replacement? | CO2CO2 | L2L2 | 5 M5 M |
| 7 | Identify the number of page faults occurred When FIFO, LRU page replacement algorithms applied on the following memory string

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 7 | 0 | 1 | 2 | 0 | 3 | 0 | 4 | 2 | 3 | 0 | 3 | 2 | 1 | 2 | 0 | 1 | 7 | 0 | 1 |

The number of frames available are 4. | CO2 | L3 | 10 M |
| 8 | Given five memory partitions of 100Kb, 500Kb, 200Kb, 300Kb, 600Kb (in order), Choose the first-fit, best-fit, and worst-fit algorithms place processes of 212 Kb, 417 Kb, 112 Kb, and 426 Kb (in order), Examine which algorithm makes the most efficient use of memory? | CO4 | L4 | 10 M |
| 9 | Consider the page reference string 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1. If the page frame size is 3, Analyze the number of page faults by applying the following page replacement algorithms.1. FIFO Page Replacement
2. Optimal Page Replacement
3. LRU Page Replacement
 | CO4 | L4 | 10 M |
| 10 | Consider the order of request is 82, 170, 43, 140, 24, 16, 190. The current position of read/write head is 50. Identify the total seek time for the following1. FCFS Disk Scheduling
2. SSTF Disk Scheduling
3. SCAN Disk Scheduling
4. CSCAN Disk Scheduling
5. LOOK Disk Scheduling
 | CO2 | L3 | 10 M |
| **UNIT V** **Short Answer Questions (2 Marks Each)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S. NO.** | **QUESTIONS** | **CO** | **Bloom’s Level** | **MARKS** |
| 1 | Explain about file. | CO1 | L2 | 2M |
| 2 | Explain about the different types of files attributes. | CO1 | L2 | 2M |
| 3 | Outline the different access methods of a file. | CO1 | L2 | 2M |
| 4 | Explain file allocation table (FAT). | CO1 | L2 | 2M |
| 5 | Explain various common file types. | CO1 | L2 | 2M |
| 6 | Explain random access. | CO1 | L2 | 2M |
| 7 | Explain the advantages of tree structured directory. | CO1 | L2 | 2M |
| 8 | Outline the ways to implement directory structure. | CO1 | L2 | 2M |
| 9 | Explain about mounting. | CO1 | L2 | 2M |
| 10 | Outline the types of files sharing in remote file systems. | CO1 | L2 | 2M |

**Long Answer Questions (10 Marks Each)**  |
| **S. NO** | **QUESTION** | **CO** | **LEVEL** | **MARKS** |
| 1 | Explain about file, file attributes, file operations, file types and file structure. | CO1 | L2 | 10 M |
| 2 | Explain different file access methods. | CO1 | L2 | 10 M |
| 3 | Illustrate file system mounting. | CO1 | L2 | 10 M |
| 4 | Summarize various schemes for defining logical structure of directory. | CO1CO1 | L2L2 | 10 M10 M |
| 5 | Distinguish contiguous and linked file allocation methods. | CO1 | L2 | 10 M |
| 6 | Dissect various file allocation methods and analyze the performance of each method for allocating disk space. | CO4 | L4 | 10 M |
| 7 | Summarize free space management. | CO1 | L2 | 10 M |
| 8 | Explain about the following1. Domain of protection
2. Access Matrix
 | CO1 | L2 | 10 M |
| 9 | Demonstrate file sharing. | CO1 | L2 | 10 M |
| 10 | Explain file system structure. | CO1 | L2 | 10 M |

**Course Coordinator HOD**