**SRINIVASA RAMANUJAN INSTITUTE OF TECHNOLOGY**

**(AUTONOMOUS)**

III B. Tech I Sem – Question Bank

**OPERATING SYSTEMS**

**[R204GA05503]**

**(Computer Science and Engineering)**

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| **CO** | **COURSE OUTCOMES** | **BL** |
| CO1 | Explain the fundamentals of operating systems like process, memory, storage, file system, security and protection. | Understand |
| CO2 | Illustrate various operating System services, interfaces and system calls. | Apply |
| CO3 | Demonstrate critics of process management and IPC. | Apply |
| CO4 | Implement page replacement algorithms, memory management techniques and deadlock issues. | Apply |
| CO5 | Illustrate architecture of file systems and I/O systems for mass storage structures. | Apply |
| CO6 | Utilize the methods of operating system security and protection. | Apply |

**\**Note:*** *1.Remeber(****R****), 2.Understand (****U****), 3. Apply (****A****) 4. Analyze (****An****), 5. Evaluate (****E****), 6. Create(****C****)*

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| **UNIT – 1 (2 Marks)** | | | |
| **#** | **Questions** | **CO** | **BL** |
| 1 | Define System Call. | CO2 | Remember |
| 2 | Define Operating System. | CO1 | Remember |
| 3 | Classify Resources that is managed by OS. | CO2 | Remember |
| 4 | Define Process. | CO1 | Remember |
| 5 | Draw State Diagram of a Process. | CO1 | Remember |
| 6 | Compare multi-programming system and multi-tasking system | CO1 | Remember |
| 7 | Draw User Mode to Kernel Mode Transitions. | CO2 | Remember |
| 8 | Draw Memory Layout for Multi-Programmed system. | CO2 | Remember |
| 9 | Explain different operations performed by the operating system. | CO2 | Remember |
| 10 | How parameters can pass to system calls? | CO2 | Remember |

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| **UNIT – 1 (5/10 Marks)** | | | | |
| **#** | **Questions** | **M** | **CO** | **BL** |
| 1 | Illustrate operating system operations with neat sketches. | 5/10 | CO2 | Understand |
| 2 | Describe multiprogramming and Multi-tasking systems. | 5/10 | CO1 | Understand |
| 3 | Explain the illusion of virtualization with a neat diagram. | 5/10 | CO2 | Understand |
| 4 | Illustrate the importance of Security and Protection. | 5/10 | CO2 | Understand |
| 5 | Explain about the dual mode operation in OS with a neat block diagram. | 5/10 | CO2 | Understand |
| 6 | Illustrate various computing environments that need OS. | 5/10 | CO2 | Understand |
| 7 | Exemplify open system call Scenario with a neat diagram. | 5/10 | CO2 | Understand |
| 8 | Illustrate operating system services with a neat block diagram. | 5/10 | CO2 | Understand |
| 9 | Explain in detail the role of Operating system as a resource Manager. | 5/10 | CO2 | Understand |
| 10 | Explain how operating systems used in a variety of computing environments. | 5/10 | CO2 | Understand |
| 11 | Explain in detail the role of Operating system as a resource Manager. | 5/10 | CO2 | Understand |
| 12 | Explain how operating systems are used in a variety of computing environments | 5/10 | CO2 | Understand |
| 13 | Explain about the dual mode operation in OS with a neat block diagram. | 5/10 | CO2 | Understand |

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| **UNIT – 2 (2 Marks)** | | | |
| **#** | **Questions** | **CO** | **BL** |
| 1 | Draw Process Layout in Memory. | CO3 | Remember |
| 2 | Draw PCB. | CO3 | Remember |
| 3 | Give an example of a Process State Transition diagram. | CO3 | Remember |
| 4 | What is a thread? What are the differences between process and thread? | CO3 | Remember |
| 5 | What is scheduling? What criteria affect the scheduler's performance? | CO3 | Remember |
| 6 | What necessary conditions can lead to a deadlock situation in a system? | CO3 | Remember |
| 7 | List out any two reasons for process termination. | CO3 | Remember |
| 8 | Give some benefits of multithreaded programming. | CO3 | Remember |
| 9 | Define a trap. | CO3 | Remember |
| 10 | Define Race Condition. | CO3 | Remember |
| 11 | List requirements to solve critical section problem. | CO3 | Remember |

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| **UNIT – 2 (5/10 Marks)** | | | | |
| **#** | **Questions** | **M** | **CO** | **BL** |
| 1 | Construct Critical section problem with a suitable example. | 5/10 | CO3 | Understand |
| 2 | Construct IPC for message-passing Model with a suitable example. | 5/10 | CO3 | Understand |
| 3 | Write a C program to create a child process that display list of files in current working directory. | 5/10 | CO3 | Understand |
| 4 | Construct a memory layout diagram for a C Program. | 5/10 | CO3 | Understand |
| 5 | Write structural Code for a PCB. | 5/10 | CO3 | Understand |
| 6 | Define Cooperative Process. Illustrate Communication Models for IPC with a suitable example. | 5/10 | CO3 | Understand |
| 7 | Construct producer-consumer problem with a suitable example. | 5/10 | CO3 | Understand |
| 8 | Discuss about user-level threads. What are its advantages and disadvantages? | 5/10 | CO3 | Understand |
| 9 | Make a comparison between the process and threads. | 5/10 | CO3 | Understand |
| 10 | What are the essential properties of critical section implementation? Explain. | 5/10 | CO3 | Understand |
| 11 | Describe the Peterson’s solution for the race condition with algorithm. | 5/10 | CO3 | Understand |
| 12 | Draw structure of a process. | 5/10 | CO3 | Understand |
| 13 | Write C Programs that illustrate the problem of Race Condition. | 5/10 | CO3 | Apply |

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| **UNIT – 3 (2 Marks)** | | | |
| **#** | **Questions** | **CO** | **BL** |
| 1 | What is the basic function of paging? | CO4 | Understand |
| 2 | What are the differences between paging and segmentation? | CO4 | Understand |
| 3 | What is the purpose of reallocation Register? | CO4 | Understand |
| 4 | What do you by degree of multiprogramming system? | CO4 | Understand |
| 5 | Define Compaction. | CO4 | Understand |
| 6 | What do you mean by swapping? | CO4 | Remember |
| 7 | Write basic replacement Algorithm. | CO4 | Understand |
| 8 | What do you mean by Belady’s Anomaly? | CO4 | Remember |
| 9 | List methods to implement LRU Page Replacement Algorithm. | CO4 | Understand |
| 10 | Classify Counting Algorithms for a Page Relpacement. | CO4 | Understand |

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| **UNIT – 3 (5/10 Marks)** | | | | |
| **#** | **Questions** | **M** | **CO** | **BL** |
| 1 | Demonstrate the causes of trashing with a suitable diagram. | 5/10 | CO4 | Understand |
| 2 | Illustrate Continuous Memory Allocation with a suitable example. | 5/10 | CO4 | Understand |
| 3 | Briefly explain demand paging. List out advantages and disadvantages of demand paging. | 5/10 | CO4 | Understand |
| 4 | Compare and contrast the physical and virtual memory. | 5/10 | CO4 | Apply |
| 5 | Discuss about optimal page replacement algorithm.  If the contents of reference string is: 0, 2, 1, 6, 4, 0, 1, 0, 3, 1, 2, 1 and there are four frames available in the memory then find page fault and page fault rate using optimal page algorithm. | 5/10 | CO4 | Apply |
| 6 | Given page reference string: 1,2,3,2,1,5,2,1,6,2,5,6,3,1,3,6,1,2,4,3. Compare the number of page faults for LRU, FIFO and Optimal page replacement algorithm. | 5/10 | CO4 | Apply |
| 7 | What are the different methods of handling deadlock? | 5/10 | CO4 | Apply |
| 8 | Explain the difference between internal and external fragmentation. | 5/10 | CO4 | Apply |
| 9 | Given six memory partitions of 300 KB, 600 KB, 350 KB, 200 KB, 750 KB, and 125 KB (in order), how would the first-fit, best-fit, and worst-fit algorithms place processes of size 115 KB, 500 KB, 358 KB, 200 KB, and 375 KB (in order)? Rank the algorithms in terms of how efficiently they use memory. | 5/10 | CO4 | Apply |
| 10 | Consider the table given below for a system, find the need matrix and the safety sequence, using Banker’s algorithm.  Resource – 3 types  A – (10 instances)  B – (5 instances)  C – (7 instances) | 5/10 | CO4 | Apply |
| 11 | Explain any two solutions of Recovery from Deadlock | 5/10 | CO4 | Understand |
| 12 | Explain about the bankers algorithm for deadlock avoidance | 5/10 | CO4 | Understand |
| 13 | What is deadlock? Explain the conditions that lead to deadlock. | 5/10 | CO4 | Understand |
| 14 | Explain about Swapping. | 5/10 | CO4 | Understand |
| 15 | Consider the following page reference string  1,2,3,4,5,3,4,1,6,7,8,7,8,9,7,8,9,5,4,5,4,2  With four Frames. How many page faults would occur for the FIFO, Optimal page replacement algorithms? Which algorithm is efficient? (Assume all frame are initially empty) | 5/10 | CO4 | Apply |
| 16 | What is Thrashing? Explain the Causes of Thrashing. | 5/10 | CO4 | Understand |
| 17 | What is the need of Page Replacement? Consider the following reference string  7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1.  Find the number of Page Faults with FIFO, Optimal Page replacement and LRU with  four frames which are empty initially. Which algorithm gives the minimum number of  page faults? | 5/10 | CO4 | Apply |

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| **UNIT – 4 (2 Marks)** | | | |
| **#** | **Questions** | **CO** | **BL** |
| 1 | Enumerate the different RAID levels. | CO5 | Remember |
| 2 | What attributes are considered for designing the file structure for an Operating System? | CO5 | Remember |
| 3 | What is the difference between synchronous I/O and asynchronous I/O? | CO5 | Remember |
| 4 | Assume that each block of size 256 KB. Allocation method is used is contiguous allocation. Directory entry for the file is (File, Start:24, Length:16). Find the file size. | CO5 | Remember |
| 5 | Assume that size of each block in a disk is 1MB, and bit vector is 0011110011110011110111100. Find the free space in the disk. | CO5 | Remember |
| 6 | What is file access mechanism? And list out the access mechanisms. | CO5 | Remember |
| 7 | When designing the file structure for an operating system, what attributes are considered. | CO5 | Remember |
| 8 | Classify the services provided by the I/O subsystem. | CO5 | Remember |
| 9 | Define trapdoor. | CO5 | Remember |
| 10 | Define file. | CO5 | Remember |
| 11 | Classify Dimensions of Application I/O Interface. | CO5 | Remember |
| 12 | Compute the average latency of a disk spindle rotates with 7200 RPM. | CO5 | Remember |
| 13 | Define disk Bandwidth | CO5 | Remember |

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| **UNIT – 4 (5/10 Marks)** | | | | |
| **#** | **Questions** | **M** | **CO** | **BL** |
| 1 | Explain the different Disk scheduling algorithms with their comparisons | 5/10 | CO5 | Understand |
| 2 | Explain the concept of a file. Discuss the different file access mechanisms in detail. | 5/10 | CO5 | Understand |
| 3 | Explain the different components of I/O Hardware and different layers of I/O Software. | 5/10 | CO5 | Understand |
| 4 | Write the principle of working of any five disk scheduling algorithms. | 5/10 | CO5 | Understand |
| 5 | Briefly explain about Acyclic Graph Directory Structure. | 5/10 | CO5 | Understand |
| 6 | A UNIX file system has 1-KB blocks and 4-byte disk addresses. What is the maximum file size if i-node contain 10 direct entries, and one single, double, and triple indirect entry each? | 5/10 | CO5 | Understand |
| 7 | Give a note on application I/O interface. | 5/10 | CO5 | Understand |
| 8 | Explain the disk structure and disk attachment. | 5/10 | CO5 | Understand |
| 9 | Give a brief note on worm disk and tapes. | 5/10 | CO5 | Understand |
| 10 | List and explain different directory implementations | 5/10 | CO5 | Understand |
| 11 | What data are needed to manage open files? Explain | 5/10 | CO5 | Understand |
| 12 | What is the purpose of I/O system calls and device-driver? How do the devices vary | 5/10 | CO5 | Understand |
| 13 | Discuss about block and character devices. | 5/10 | CO5 | Understand |
| 14 | Suppose that a disk drive has 5000 cylinders, numbered 0 to 4999. The current head position is at cylinder 143. The queue of pending requests is: 86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130. What is the total distance that the disk arm moves to satisfy all the pending requests for each of the following Disk scheduling algorithms?  a) SSTF b) SCAN | 5/10 | CO5 | Apply |
| 15 | What is File system and what are the various File access methods? Explain. | 5/10 | CO5 | Understand |
| 16 | Suppose that a disk drive has 5000 cylinders numbered 0 to 4999. The drive is currently serving a request at cylinder 143. The queue of pending requests in FIFO order 86,1470,913,1774,948,1509, 1022, 1750, 130 starting from current head position. What is the total distance that disk arm moves to satisfy all the pending request for FCFS and SSTF disk scheduling algorithm. | 5/10 | CO5 | Apply |
| 17 | Explain about the system call for File operations. | 5/10 | CO5 | Understand |
| 18 | Explain the following disk scheduling algorithm with proper diagram | 5/10 | CO5 | Understand |
| 19 | Illustrate the methods implemented in an I/O hardware with suitable diagrams. | 5/10 | CO5 | Understand |
| 20 | Illustrate various types of storage attachment with suitable diagrams. | 5/10 | CO5 | Understand |
| 21 | Explain How I/O requests are transformed to Hardware Operations | 5/10 | CO5 | Understand |

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| **UNIT – 5 (2 Marks)** | | | |
| **#** | **Questions** | **CO** | **BL** |
| 1 | Define system threats. What is known as DOS attack? | CO6 | Remember |
| 2 | Define man in the middle in security attacks. | CO6 | Remember |
| 3 | List the goals of protection | CO6 | Remember |
| 4 | Define Access Matrix. | CO6 | Remember |
| 5 | What is Access Control? | CO6 | Understand |
| 6 | What are the main differences between capability lists and access lists | CO6 | Remember |
| 7 | List Security violation methods. | CO6 | Remember |
| 8 | List security Violation Categories. | CO6 | Remember |
| 9 | How security levels are measured? | CO6 | Remember |
| 10 | What is keystroke logger? | CO6 | Remember |
| 11 | Define Virus. | CO6 | Remember |

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| **UNIT – 5 (5/10 Marks)** | | | | |
| **#** | **Questions** | **M** | **CO** | **BL** |
| 1 | Illustrate various access matrix implementation techniques. | 5/10 | CO6 | Understand |
| 2 | Explain about access matrix in detail. | 5/10 | CO6 | Understand |
| 3 | Define Access control. Explain revocation of Access rights. | 5/10 | CO6 | Understand |
| 4 | Define system threat. Give example of system threats. | 5/10 | CO6 | Understand |
| 5 | Explain the protection mechanism illustrating the use of protection domain and access control list. | 5/10 | CO6 | Understand |
| 6 | Describe the principles of protection. Explain the access matrix in detail. | 5/10 | CO6 | Understand |
| 7 | Explain about domains of Protection | 5/10 | CO6 | Understand |
| 8 | Illustrate role-based access Control with suitable diagrams. | 5/10 | CO6 | Understand |
| 9 | Explain how Morris internet worm occurs with a suitable diagram. | 5/10 | CO6 | Understand |
| 10 | Illustrate encryption methods with suitable scenarios. | 5/10 | CO6 | Understand |
| 11 | Illustrate Authentication methods. | 5/10 | CO6 | Understand |

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