SRM INSTITUTE OF SCIENCE AND TECHNOLOGY

RAMAPURAM CAMPUS, BHARATHISALAI, RAMAPURAM, CHENNAI - 600089

**FACULTY OF ENGINEERING AND TECHNOLOGY**

# DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

****

**QUESTION BANK**

DEGREE / BRANCH: B.TECH-CSE

IV SEMESTER

**18CSC205J / OPERATING SYSTEMS**

2018 Regulation

Academic Year 2021-2022 EVEN SEMESTER

# SRM INSTITUTE OF SCIENCE AND TECHNOLOGY

**RAMAPURAM CAMPUS, BHARATHI SALAI, RAMAPURAM, CHENNAI-600089**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**QUESTIONBANK**

**SUBJECT : 18CSC205J/Operating Systems**

**SEM/YEAR: II/IV**

**Course Outcomes**

CLO-1 : Identify the need of an Operating system

CLO-2 : Know the Process management functions of an Operating system

CLO-3 : Understand the need of Memory Management functions of an Operating system

CLO-4 : Find the significance of Device management role of an Operating system

CLO-5 : Recognize the essentials of File Management part of an Operating system

CLO-6 :Gain an insight of Importance of an Operating system through practical

|  |  |  |  |
| --- | --- | --- | --- |
| **UNIT I** | | | |
| Operating System Objectives and functions - Gaining the role of Operating systems - The evolution of operating system, Major Achievements - Understanding the evolution of Operating systems from early batch processing systems to modern complex systems - Process Concept– Processes, PCB - Understanding the Process concept and Maintenance of PCB by OS -Threads – Overview and its Benefits - Understanding the importance of threads - Process Scheduling : Scheduling Queues, Schedulers, Context switch - Understanding basics of Process Scheduling - Operations on Process – Process creation, Process termination - Understanding the system calls – fork(),wait(),exit() - Inter Process communication : Shared Memory, Message Passing ,Pipe() -Understanding the need for IPC - Process synchronization: Background, Critical section Problem - Understanding the race conditions and the need for the Process synchronization | | | |
| **PART B (4 Marks)** | | | |
| **1** | Illustrate the factors that usually determine the degree of Multi Programming   1. The number of Programs residing in Primary memory. 2. Passing of the control of the CPU rapidly between these programs. 3. Protection of user process from one another. | CO1 | BT2 |
| **2** | What are the Benefits of Multi Programming?   1. Improves the System Performance. 2. Allows Time Sharing. 3. Supports multiple simultaneous interactive users | CO1 | BT1 |
| **3** | What are the types of memory?  i) Internal Processor Memory  ii) Primary or Main Memory  iii) Secondary/Auxiliary/Backing Store are the types of memory. | CO1 | BT1 |
| **4** | What is Memory?  A Memory is the place for storage of data & information (or) it can be Defined as the work area of the computer where the microprocessor finds its data & instructions while the computer is working. | CO1 | BT1 |
| **5** | Explain Off-Line Processing and On-Line Processing?               Rather than the CPU reading directly from the input, copying the content into CPU AND PROCESS.  Transferring the contents from the input directly on to the CPU and transferring the Processed contents onto the printer is On-Line | CO1 | BT2 |
| **6** | Give examples of Real Time Application  Ex’s are   1. Flight Control 2. Real Time Simulation 3. Military Application 4. Petroleum Refinery 5. Process Control etc. | CO1 | BT1 |
| **7** | Define Real Time Systems .  It is another form of OS which are used in environments where a large number of events mostly external to the computer system must be accepted and processed in a short time or within certain deadlines. | CO1 | BT1 |
| **8** | What is Time Sharing?  Time Sharing ( or Multi tasking) is a logical extension of Multi Programming.  It is a form of Multi Programmed OS which operates in an interactive mode with Quick response time | CO1 | BT1 |
| **9** | What is Asymmetric Multi Processing?  It is one in which each processor is assigned a specific task.  A Master Processor controls the system and the other Processors are allocated work by the Master Processor. | CO1 | BT1 |
| **10** | What is the advantage of Multi Processing Systems?  A Multi Processing System is one in which there are more than one CPU, interleaved with each other.  So it helps in improving the amount of work done. | CO1 | BT1 |
| **11** | How does a process differ from a job?  A process is an active entity with a program counter specifying the next instructions to execute and a set to associated resources, whereas a batchSystem executes jobs.(which is a collection of processes). | CO1 | BT1 |
| **12** | What are the information contained in a PCB?                    A PCB contains pieces of information associated with a specific process,                    Namely   1. Identifier 2. process state 3. program counter 4. Context data 5. CPU scheduling information 6. Memory management information 7. Accounting information 8. I/O status information | CO1 | BT1 |
| **13** | What are the operations on process?  a.create  a process  b.destroy a process  c.suspend a process  d.resume a process  e.change the priority of a process  f.block a process  g.wakeup  a process  h.dispatch a process  i.enable a process to communicate with another | CO1 | BT1 |
| **14** | Elaborate the function of the ready queue?  The ready queue stores threads that aren't currently running, that are capable of resuming execution. There may be several ready queues for each priority level, depending on the scheduling algorithm. The scheduler consults the ready queue to determine which process/thread to run next. As the name suggests, the ready queue is a *queue,*in order to schedule fairly. | CO1 | BT1 |
| **15** | What is the relationship between threads and processes?               A processes is a container for threads, which has it's own memory space. A process may contain one or more threads, which share that memory space, all of the file descriptors and other attributes. The threads are the units of execution  within the process, they posess a register set, stack, program counter, and scheduling attributes - *per thread.* | CO1 | BT1 |
| **16** | What is the function of a process control block?.                   A (PCB) contains many pieces of information associated with a specific                   Process. It serves as the repository for any information that may vary                   From process to process. | CO1 | BT1 |
| **17** | What are the various process states?                    The various process states are   1. New 2. Ready 3. Running 4. Blocked 5. Exit. | CO1 | BT1 |
| **18** | How does a process differ from a job?  A process is an active entity with a program counter specifying the next instructions to execute and a set to associated resources, whereas a batchSystem executes jobs.(which is a collection of processes | CO1 | BT1 |
| **19** | What are the main functions of the kernel?  To provide mechanism for   1. creation and deletion of processes 2. inter process communication 3. synchronization of processes. | CO1 | BT1 |
| **20** | Write the functions of an OS .        (i)     Memory Management.        (ii)    Processor management.        (iii)    Interrupt Handling.        (iv)    Accounting.        (v)    Automatic job sequencing.        (vi)  Management and control of  I/O devices | CO1 | BT1 |
| **PART C (12 Marks)** | | | |
| **1** | Explain  the following                   i) The basic elements of a computer system                   ii)Processor register | CO1 | BT2 |
| **2** | Explain the essential properties of the following operating systems.                  a)Batch                        b)Interactive                  c)Time sharing           d)Real Time                  e)Network                  f)parallel                  g)Distributed             h)clustered | CO1 | BT2 |
| **3** | Explain  the following                   i) OS control structures                   ii)Process control structures | CO1 | BT2 |
| **4** | i)Explain in detail the various reasons involved in process creation and termination.  ii)Compare mode switching and process switching. | CO1 | BT2 |
| **5** | Explain in detail the single thread and multithread process model with diagrams | CO1 | BT2 |
| **6** | Compare user level and kernel level threads with necessary diagrams. | CO1 | BT1 |
| **7** | Explain how micro kernel architecture differs from layered kernel architecture. | CO1 | BT2 |
| **8** | With neat diagram explain the five states involved in process model. | CO1 | BT1 |
| **9** | Explain in detail                   i)how interrupts are processed.                   ii)how multiple interrupts are handled. | CO1 | BT2 |
| **10** | Explain the different I/O communication techniques | CO1 | BT2 |

|  |  |  |  |
| --- | --- | --- | --- |
| **UNIT II** | | | |
| PROCESS SYNCHRONIZATION : Peterson’s solution, Synchronization Hardware, Understanding the two-process solution and the benefits of the synchronization hardware, Process synchronization: Semaphores, usage, implementation, Gaining the knowledge of the usage of the semaphores for the Mutual exclusion mechanisms, Classical Problems of synchronization – Readers writers problem, Bounded Buffer problem, Good understanding of synchronization mechanisms, Classical Problems of synchronization – Dining Philosophers problem (Monitor ), Understanding the synchronization of limited resources among multiple processes, CPU SCHEDULING : FCFS,SJF,Priority, Understanding the scheduling techniques, CPU Scheduling: Round robin, Multilevel queue Scheduling, Multilevel feedback Scheduling, Understanding the scheduling techniques, Real Time scheduling: Rate Monotonic Scheduling and Deadline Scheduling, Understanding the real time scheduling, DEADLOCKS: Necessary conditions, Resource allocation graph, Deadlock prevention methods, Understanding the deadlock scenario, Deadlocks :Deadlock Avoidance, Detection and Recovery, Understanding the deadlock avoidance, detection and recovery mechanisms | | | |
| **PART B (4 Marks)** | | | |
| **1** | What is busy waiting? | CO2 | BT2 |
| **2** | Write short notes on turn around time, waiting time and response time | CO2 | BT1 |
| **3** | What is a binary semaphore? | CO2 | BT1 |
| **4** | What is the difference between synchronization and mutual exclusion? | CO2 | BT2 |
| **5** | List the Coffman’s conditions that lead to a deadlock. | CO2 | BT2 |
| **6** | List the three requirements that must be satisfied by critical section problem. | CO2 | BT1 |
| **7** | Write short notes on semaphore | CO2 | BT1 |
| **8** | Illustrate about Petersons solution | CO2 | BT2 |
| **9** | Examine about mutex locks | CO2 | BT1 |
| **10** | Discuss about priority inversion with an example | CO2 | BT2 |
| **11** | Define CPU Scheduling. | CO2 | BT1 |
| **12** | What is Preemptive and Non - Preemptive scheduling? | CO2 | BT1 |
| **13** | What are the various scheduling criteria for CPU Scheduling? | CO2 | BT1 |
| **14** | Define Entry Section and Exit Section. | CO2 | BT1 |
| **15** | Give two hardware instructions and their definitions which can be used for implementing Mutual Exclusion. | CO2 | BT2 |
| **16** | How can we say the First Come First Served scheduling algorithm is Non Preemptive? | CO2 | BT2 |
| **17** | Differentiate Long Term Scheduler and Short Term Scheduler | CO2 | BT1 |
| **18** | What are a Safe State and an Unsafe State? | CO2 | BT1 |
| **19** | What is a Gantt Chart? | CO2 | BT1 |
| **20** | Define Request Edge and Assignment Edge. | CO2 | BT1 |
| **PART C (12 Marks)** | | | |
| **1** | Outline a solution using semaphores to solve dinning philosopher problem. | CO2 | BT2 |
| **2** | Compute non-preemptive SJF scheduling algorithm   |  |  |  | | --- | --- | --- | | Process | Arrival time | Burst time | | P1 | 0 | 7 | | P2 | 2 | 4 | | P3 | 4 | 1 | | P4 | 5 | 4 | | P5 | 3 | 4 | | CO2 | BT3 |
| **3** | Consider the following set of processes with the length of the CPU-burst time in given  ms:   |  |  |  | | --- | --- | --- | | Process | Arrival time | Burst time | | P1 | 8 | 0 | | P2 | 4 | 1 | | P3 | 9 | 2 | | P4 | 5 | 3 | | P5 | 3 | 4 |   Draw four Gantt charts illustrating the execution of these processes using FCFS, SJF, priority and RR (quantum=2) scheduling. Also calculate waiting time and turnaround time for each scheduling algorithms. | CO2 | BT3 |
| **4** | Show how wait () and signal() semaphore operations could be implemented in multiprocessor environments, using Test and Set instructions. The solution should exhibit minimal busy waiting. Develop pseudo code for implementing operations. | CO2 | BT2 |
| **5** | Explain in detail about multilevel queue scheduling | CO2 | BT1 |
| **6** | Describe about multilevel feedback scheduling | CO2 | BT1 |
| **7** | With an example explain about resource allocation graph | CO2 | BT1 |
| **8** | Illustrate Bankers algorithm with an example | CO2 | BT2 |
| **9** | Describe Deadlock prevention in detail. | CO2 | BT2 |
| **10** | Explain the methods for handling deadlocks. | CO2 | BT2 |
| **11** | Consider the following snapshot of a system-  https://easyexamnotes.com/wp-content/uploads/2022/03/image.png  Answer the following questions using the Banker’s algorithm- (i) What is the content of the matrix need?  (ii) Is the system in a safe state?  (iii) If a request from process P1 arrives for (0,4,2,0), can the request be granted immediately? | CO2 | BT3 |
| **12** | Consider a system that contains five processes P1, P2, P3, P4, P5 and the three resource types A, B and C. Following are the resources types: A has 10, B has 5 and the resource type C has 7 instances.  Answer the following questions using the banker's algorithm:   |  |  |  |  | | --- | --- | --- | --- | | **Process** | **Allocation A         B         C** | **Max A         B         C** | **Available A         B         C** | | P1 | 0         1          0 | 7         5         3 | 3         3         2 | | P2 | 2         0         0 | 3         2         2 |  | | P3 | 3         0         2 | 9         0         2 |  | | P4 | 2         1         1 | 2         2         2 |  | | P5 | 0         0         2 | 4         3         3 |  |  1. Construct the need matrix? 2. Determine if the system is safe or not. 3. What will happen if the resource request (1, 0, 0) for process P1 can the system accept this request immediately? | CO2 | BT3 |

|  |  |  |  |
| --- | --- | --- | --- |
| **UNIT III** | | | |
| MEMORY MANAGEMENT: Memory Management: Logical Vs Physical address space, Swapping and understanding the basics of Memory management Contiguous Memory allocation – Fixed and Dynamic partition Getting to know about Partition memory management and issues: Internal fragmentation and external fragmentation problems Strategies for selecting free holes in Dynamic partition Understanding the allocation strategies with examples Paged memory management Understanding the Paging technique.PMT hardware mechanism Structure of Page Map Table Understanding the components of PMT Example : Intel 32 bit and 64 –bit Architectures Understanding the Paging in the Intel architectures Example : ARM Architectures Understanding the Paging with respect to ARM Segmented memory management Understanding the users view of memory with respect to the primary memory Paged segmentation Technique Understanding the combined scheme for efficient management | | | |
| **PART B (4 Marks)** | | | |
| **1** | How is memory protected in a paged environment? | CO3 | BT1 |
| **2** | What is External Fragmentation? | CO3 | BT1 |
| **3** | What is the use of Valid-Invalid Bits in Paging? | CO3 | BT2 |
| **4** | Explain memory management without swapping or paging | CO3 | BT1 |
| **5** | Explain page replacement algorithms | CO3 | BT2 |
| **6** | Why page sizes are always power of 2? | CO3 | BT1 |
| **7** | List two differences between logical and physical addresses. | CO3 | BT4 |
| **8** | Define demand paging in memory management. | CO3 | BT1 |
| **9** | What are the steps required to handle a page fault in demand paging? | CO3 | BT1 |
| **10** | Tell the significance of LDT and GDT in segmentation. | CO3 | BT1 |
| **11** | Explain dynamic loading. | CO3 | BT2 |
| **12** | What is Demand Paging? | CO3 | BT1 |
| **13** | How the problem of external fragmentation can be solved | CO3 | BT1 |
| **14** | Formulate how long a paged memory reference takes if memory reference takes 200 nanoseconds.Assume a paging system with page table stored in memory | CO3 | BT6 |
| **15** | Define Address binding. | CO3 | BT1 |
| **16** | What is Internal Fragmentation? | CO3 | BT1 |
| **17** | What do you mean by Compaction? | CO3 | BT1 |
| **18** | What is the difference between user-level instructions and privileged instructions? | CO3 | BT1 |
| **19** | What is memory stall? | CO3 | BT1 |
| **20** | Define logical address space | CO3 | BT1 |
| **21** | 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. | CO3 | BT3 |
| **PART C (12 Marks)** | | | |
| **1** | Elaborate about the free space management on I/O buffering and blocking. | CO3 | BT6 |
| **2** | Explain about given memory management techniques. (i) Partitioned allocation (ii) Paging and translation look-aside buffer. | CO3 | BT5 |
| **3** | When page faults will occur? Describe the actions taken by operating system during page fault. | CO3 | BT1 |
| **4** | Explain about the difference between internal fragmentation and external fragmentation | CO3 | BT5 |
| **5** | Why are segmentation and paging sometimes combined into one scheme? | CO3 | BT1 |
| **6** | Compare paging with segmentation in terms of the amount of memory required by the address translation structures in order to convert virtual addresses to physical addresses. | CO3 | BT2 |
| **7** | Most systems allow programs to allocate more memory to its address space during execution. Data allocated in the heap segments of programs is an example of such allocated memory. What is required to support dynamic memory allocation in the following schemes? | CO3 | BT1 |
| **8** | Explain the difference between logical address and physical address. | CO3 | BT1 |
| **9** | Define Compaction and explain why it is used. | CO3 | BT1 |
| **10** | Define Contiguous Allocation. | CO3 | BT5 |

|  |  |  |  |
| --- | --- | --- | --- |
| **UNIT IV** | | | |
| VIRTUAL MEMORY– Background-Understanding the need of demand paging-VIRTUAL MEMORY – Basic concepts – page fault handling -Understanding , how an OS handles the page faults-Performance of Demand paging-Understanding the relationship of effective access time and the page fault rate-Copy-on write-Understanding the need for Copy-on write -Page replacement Mechanisms: FIFO, Optimal, LRU and LRU approximation Techniques-Understanding the Pros and cons of the page replacement techniques-Counting based page replacement and Page Buffering Algorithms -To know on additional Techniques available for page replacement strategies-Allocation of Frames - Global Vs Local Allocation -Understanding the root cause of the Thrashing-Thrashing, Causes of Thrashing -Understanding the Thrashing -Working set Model-Understanding the working set model for  controlling the Working set Model | | | |
| **PART B (4 Marks)** | | | |  |
| **1** | Define Swapping. what is its purpose? | CO4 | BT 1 |
| **2** | What is the basic method of Segmentation? | CO4 | BT 1 |
| **3** | Explain fragmentation and its types? | CO4 | BT 1 |
| **4** | What is the basic approach of Page Replacement? | CO4 | BT 1 |
| **5** | What is virtual memory? Mention its advantages | CO4 | BT 2 |
| **6** | Explain about contiguous memory allocation? | CO4 | BT 1 |
| **7** | Explain about advantages and disadvantages of paging? | CO4 | BT 3 |
| **8** | Differentiate local and global page replacement algorithm. | CO4 | BT 2 |
| **9** | Explain the need of copy-on-write ? | CO4 | BT 2 |
| **10** | Define dynamic loading. | CO4 | BT 3 |
| **11** | What is hit ratio and effective access time? | CO4 | BT 2 |
| **12** | Define page offset and page number | CO4 | BT 2 |
| **13** | Explain segment tables and its entries? | CO4 | BT 3 |
| **14** | What is compaction and need of compaction? | CO4 | BT 2 |
| **15** | What is page fault and page hit? | CO4 | BT 2 |
| **16** | What is a working set model? | CO4 | BT 3 |
| **17** | What are the essential content(s) in each entry of a page table? | CO4 | BT 2 |
| **18** | Define logical and physical address spaces? | CO4 | BT 2 |
| **19** | Draw the structure of page table | CO4 | BT 2 |
| **20** | Define: STBR and STLR | CO4 | BT 1 |
| **PART C (12 Marks)** | | | |  |
| **1** | Explain how paging supports virtual memory. With neat diagram explain how logical address is translated into physical address | CO4 | BT 2 |
| **2** | Explain the basic concepts of segmentation in detail. | CO4 | BT 2 |
| **3** | Explain about the following page replacement algorithms a)FIFO b)OPR, c)LRU | CO4 | BT 2 |
| **4** | Describe Structure of Paging Table and its process? | CO4 | BT 2 |
| **5** | What is thrashing and explain the methods to avoid thrashing? | CO4 | BT 2 |
| **6** | Write about the techniques for structuring the page table? | CO4 | BT 3 |
| **7** | Explain about Logical & Physical Addressing? | CO4 | BT 3 |
| **8** | Describe Allocation of Frames mechanisms? | CO4 | BT 3 |
| **9** | Explain working set model in detail and how it is controlled? | CO4 | BT1 |
| **10** | Explain Counting based page replacement and Page Buffering Algorithms | CO4 | BT 2 |
| **11** | Consider page reference string 1, 3, 0, 3, 5, 6, 3 with 3 page frames.Find the number of page faults.  fifo2.png | CO4 | BT 3 |
| **12** | Consider the page references 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, with 4 page frame. Find number of page fault.  optimal.png | CO4 | BT 3 |
| **13** | Consider the page reference string 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2 with 4 page frames.Find number of page faults.  optimal2.png | CO4 | BT 3 |

|  |  |  |  |
| --- | --- | --- | --- |
| **UNIT V** | | | |
| STORAGE MANAGEMENT: Mass storage structure – Overview of Mass storage – Magnetic Disks – Understanding the Basics in storage management – Disk Scheduling – Understanding the various scheduling with respect to the disk – FILE SYSTEM INTERFACE: File concept, File access methods – Understanding the file basics – File sharing and Protection – FILE SYSTEM IMPLEMENTATION: File system structure – Directory Implementation – Understanding the various levels of directory structure- Free space Management – Swap space Management | | | |
| **PART B (4 Marks)** | | | |
| **1** | Discuss the criteria for choosing a file organization? | CO5 | BT1 |
| **2** | List the common file types along with their extensions and describe each file type? | CO5 | BT1 |
| **3** | Differentiate among the following disk scheduling algorithms?  a) FCFS b) SSTF | CO5 | BT2 |
| **4** | Explain the following in detail with respect to disk? a) Seek time b) Latency c) Access time d) Transfer time | CO5 | BT1 |
| **5** | Give an example of an application in which data in a file should be accessed in the following order: i. sequential ii. Random | CO5 | BT2 |
| **6** | Define the terms – file, file path, directory? | CO5 | BT1 |
| **7** | Explain any four common file attributes? | CO5 | BT1 |
| **8** | Explain any four file operations? | CO5 | BT1 |
| **9** | What are the advantages and disadvantages of contiguous  and non-contiguous memory allocation? | CO5 | BT2 |
| **10** | Discuss in detail about various allocation methods | CO5 | BT1 |
| **11** | Prepare a general graph directory in file system | CO5 | BT1 |
| **12** | Express the views on –disk structure in file system  implementation | CO5 | BT2 |
| **13** | Give the importance of swap space management | CO5 | BT2 |
| **14** | Conclude which disk scheduling algorithm would be the best to Optimize the performance of a RAM disk. | CO5 | BT2 |
| **15** | Summarize the characteristics that determine the disk  access speed. | CO5 | BT2 |
| **16** | Discuss about a Disk space management | CO5 | BT1 |
| **17** | Discuss about Swap -space management | CO5 | BT1 |
| **18** | Define log structured file. What are the disadvantages of log  Structured file systems? | CO5 | BT2 |
| **19** | Discuss the advantage and disadvantages of supporting  links to files that cross mount points | CO5 | BT2 |
| **20** | Discuss the objectives of file management system. | CO5 | BT2 |
| PART C (12 Marks) | | | |
| **1** | Describe indexed file and indexed sequential file organization? | CO5 | BT1 |
| **2** | Describe the file system of UNIX? | CO5 | BT1 |
| **3** | Differentiate among the following disk scheduling algorithms? a) SCAN b) C-SCAN c) LOOK d) C-LOOK | CO5 | BT2 |
| **4** | Explain the following file concepts: a) File attributes b) File operations c) File types d) Internal file structure | CO5 | BT1 |
| **5** | Discuss the following a) File system mounting b) Thrashing | CO5 | BT1 |
| **6** | Explain the concept of file sharing? What are the criteria to be followed in systems which implement file sharing? | CO5 | BT1 |
| **7** | Describe the following Directory Implementation methods?  a) Linear List b) Hash Table | CO5 | BT1 |
| **8** | Explain the concept and techniques of free space management? | CO5 | BT1 |
| **9** | Discuss in detail the performance issues of secondary storage management? | CO5 | BT2 |
| **10** | Consider that a disk drive has 5,000 cylinders, numbered 0 to 4,999. The drive is currently serving request at cylinder 143, and the previous request was at cylinder 125. The queue of pending requests, in FIFO order, is: 86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130 Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all pending requests for each of the following disk scheduling algorithms? A. FCFS B. SSTF C. SCAN D. C-SCAN E. LOOK F. C-LOOK | CO5 | BT5 |
| **11** | Consider a disk with 200 tracks and the queue has random requests from different processes in the order: 55, 58, 39, 18, 90, 160, 150, 38, 184  Initially arm is at 100. Find the Average Seek length using FIFO, SSTF, SCAN and C-SCAN algorithm. | CO5 | BT5 |

**Note:**

1. **BT Level –** Blooms Taxonomy Level
2. **CO – Course Outcomes**

BTL1 –Remember BTL2 – Understand BTL3 – Apply BTL4 – Analyze BTL5 – Evaluate BTL6 – Create