**IMS Engineering College, Ghaziabad**

**Department of Computer Science & Engineering**

**Session 2015-16**

Subject Name: Operating System

Subject Code: NCS-401

Year and Branch: 2nd Year, CS1, CS2,CS3, 2CS

**Course Objective**

1. To study functions, structures and history of operating systems
2. To study and apply concepts relating to operating systems, such as concurrency and control of asynchronous processes, deadlocks, memory management, processor and disk scheduling, parallel processing, and file system organization
3. Demonstrate an understanding of:
   1. the differences between processes and threads.
   2. the different process or thread synchronization methods and the tradeoffs between them.
   3. the different memory management techniques used in Operating Systems.
   4. the different I/O management techniques used in Operating Systems.
   5. the tradeoffs in design and implementation concepts used in the development of Operating Systems

**Course Outcome**

CO 1: Analyze basic system information, perform troubleshooting and optimize the system performance.

CO 2: Analyze Deadlock and Process Scheduling.

CO 3: Examine Memory Management and Paging System.

CO 4: Examine the differences and similarities of Linux GUI’s and select the appropriate Linux GUI.

**Programme Outcomes**

1. An ability to apply knowledge of computing, mathematics, science and engineering fundamentals appropriate to the discipline.
2. An ability to analyze the feasibility of various computational solutions to a given problem.
3. An ability to design & develop computational solutions to a given problem,
4. An ability to conduct experiments, as well as to analyze and interpret the data & results of the solutions.
5. An ability to analyze the local and global impact of computing on individuals, organizations, and society.
6. Recognition of the need for and an ability to engage in continuing knowledge enhancement & professional development.
7. An understanding of engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects.

As Per the University Syllabus

**Assignment 1**

**Q1.** Everyone is using a mobile phones and each mobile phone has a unique mobile operating system. So, compare and contrast your mobile operating system with other available mobile operating system.

**OBJECTIVE**

* To understand the basics of mobile operating system.
* To give an idea about the various types and latest version available in the market.

**OUTCOME**

* The student will be able to identify the percepts of various mobile operating systems.

**Assignment 2**

**Q1.** Consider a system in which there are two processes T1 and T2 both wants to enter into critical region and the value of a semaphore s is initially 1. What could happen in the following situation?

**T1**  **T2**

V(s); P(s);

critical region critical region

P(s); V(s);

* a) Deadlock will ensue
* b)T1 and T2 can both enter their critical regions simultaneously
* c)Neither T1 nor T2 can enter its critical region
* d) T1 can never enter its critical region, but T2 can enter its own
* e) T1 can enter its critical region, but T2 can never enter its own

Q2. Give the solution of Dinning Philosophers problem using Semaphore.

**OBJECTIVE**

* The Students should understand the use and application of synchronization mechanism.
* The Students should understand the basics of Deadlock and its implementation.

**OUTCOME**

* The student will be able to understand and identify the synchronization mechanism in real world problem.

**Assignment 3**

**Q1.** Consider the snapshot of a system.

|  |  |  |  |
| --- | --- | --- | --- |
| Process | Allocation | Max | Available |
| P0 | 010 | 753 | 332 |
| P1 | 200 | 322 |  |
| P2 | 302 | 902 |  |
| P3 | 211 | 222 |  |
| P4 | 002 | 433 |  |

Answer the following question using the banker’s Algorithm

a. What is the content of matrix need?

b. Is the system in safe state?

c. If a request for process P1arrives for (1,0,2) can the request be granted immediately?

**OBJECTIVE**

* The Students should understand the use of resource utilization.
* The Students should learn the banker’s algorithm.

**OUTCOME**

* The student will be able to understand allocation of resources to avoid deadlock.

**Assignment 4**

Q1 Consider the following page reference string 2,3,2,1,5,2,4,5,3,2,5,2. How many pagefaults would occur in the case?

a. LRU

b. FIFO

c. Optimal algorithms assuming three frames

**Note:** that initially all frames are empty.

**OBJECTIVE**

* To understand the how the different page replacement algorithms actually works through a pictorial representation.

**OUTCOME**

* The Student will be able to make formulation for implementation of page replacement problems.
* The Student will be able to analyze the real scenario of various page replacement problems.

**Assignment 5**

**Q1.Define the following-**

* Seek Time
* Rotational Latency

**Q2.** On a disk with 200 cylinders, numbers 0 to 199, compute the number of tracks the disk arm must move to satisfy all the requests in the disk queue. Assume the last request serviced was at track 100 and the head is moving toward track 0.The queue in FIFO order contains requests for the following tracks: 23,89,132,42,187.Perform the computation for the following scheduling algorithms :

a. FIFO

b. SSTF

c. SCAN

d. LOOK

e. C-SCAN

f. C-LOOK

**OBJECTIVE**

* The Students should understand the use and application of disk scheduling Algorithms and also the performance metrics of Disk.
* The Students should learn comparisons between different disk scheduling Algorithms.

**OUTCOME**

* The student will be able to understand and identify which disk scheduling algorithm is suitable in a particular given scenario.

**Title of the Mini-project/Case study:**

1. CPU SCHEDULING ALGORITHM
2. DISK SCHEDULING ALGORITHM
3. PAGE REPLACEMENT ALGORITHM

**Description:**

1. Design the project to implement the various CPU Scheduling Algorithm in C and analyze the performance of these algorithms as per your input data.
2. Design the project to implement the various DISK Scheduling Algorithm in C and analyze the performance of these algorithms as per your input data.
3. Design the mini project to implement the various Page Replacement Algorithm in C and analyze the performance of these algorithms as per your input data.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Task** | **Objective** | **Expected Outcome** | **Co-relation with POs** | **Co-relation with PSOs** |
| **Task 1** | **1. Objective 1: To make understand the concept of CPU scheduling algorithm.**  **2. Objective 2: The student should capable to analyze its real world application.**  **3. Objective 3: The student should able to analysis the performance of CPU scheduling algorithm.** | Outcome 1: The student will learn and able to understand the concept of all the CPU Scheduling algorithm.  Outcome 2: The student will able to implement and analyze the performance of various CPU Scheduling algorithm with various input sample |  |  |
| **Task 2** | **1. Objective 1: To make understand the concept of Disk scheduling algorithm.**  **2. Objective 2: The student should capable to analyze its real world application.**  **3. Objective 3: The student should able to analysis the performance of Disk scheduling algorithm.** | Outcome 1: The student will learn and able to understand the concept of the -Disk Scheduling through various algorithm.  Outcome 2: The student will able to implement and analyze the performance of the Disk Scheduling with various input sample. |  |  |
|  | **Objective 1: To make understand the concept of several Page Replacement algorithm.**  **2. Objective 2: The student should capable to analyze its real world application.**  **3. Objective 3: The student should able to analysis the performance of all Page Replacement Algorithm.** | Outcome 1: The student will learn and able to understand the concept of the various Page Replacement algorithm.  Outcome 2: The student will able to implement and analyze the performance of the all Page Replacement algorithm with various input sample. |  |  |

**Text Book &References**

* Silberschatz, Galvin and Gagne, “Operating Systems Concepts”, Wiley
* SibsankarHalder and Alex A Aravind, “Operating Systems”, Pearson Education
* Harvey M Dietel, “ An Introduction to Operating System”, Pearson Education
* D M Dhamdhere, “Operating Systems : A Concept basedApproach”, McGraw Hill.
* Charles Crowley, “Operating Systems: A Design-Oriented Approach”, Tata McGraw Hill Education”.
* Stuart E. Madnick & John J. Donovan. Operating Systems. McGraw Hill.

**Suggested Web Links**

* <http://nptel.ac.in/>