Information Technology, IV-Semester

IT-4003 Operating System

Course Objectives:

This course provides a comprehensive introduction to understand the fundamental principles, techniques and approaches related to CPU, memory and files which requires the complete knowledge of operating systems. The course will highlight the various functionality of CPU scheduling, memory management, disk management and security of operating system.

Software, type of software, introduction to Operating Systems, function, services, types of operating systems, kernel, system call, process concept, process states, process control block, type of scheduler, context switching, threads, type of threads, multithreading model.

Process management, concepts of CPU scheduling, scheduling criteria, scheduling algorithms, algorithm evaluation, multiple processors scheduling, cooperating process, Interprocess communication, process synchronization, critical section problem, semaphores, classical problems of synchronization.

Deadlock, necessary conditions, resource allocation graph, deadlock prevention, deadlock avoidance, deadlock detection, deadlock recovery, introduction to memory management, address binding, logical and physical addressing, MMU, contiguous memory allocation, memory management techniques, single partition, multi-partition, best fit, worst fit, first fit.

Paging, paging issues, TLB, page fault, segmentation, segmentation with paging, effective access time, concepts of virtual memory, demand paging, demand segmentation, page replacement algorithms, allocation of frames, thrashing, security in operating system, security techniques.

File system, file and directory concepts, attributes, operation, file type, directory structure, LINUX file system, FAT, I-node, file access methods, allocation methods, free space managements, disk management, disk access time, disk scheduling algorithm.

Course Outcomes:

On the completion of this course students will be able to understand:

1. The services and functions of operating systems.
2. Design issues associated with operating systems.
3. Various process management concepts including scheduling, synchronization, deadlocks.
4. The concept of multithreading, memory management, disk management and file system.
5. Protection and security mechanisms.
6. Various types of operating systems including Linux.

Reference Books:

1. Silberschatz,"Operating system", Willey Pub.
2. S.Haldar and Alex A. Arvind " Operating Systems" 2nd Edition Pearson.
3. D. M. Dhamdhere, "Operating System- A concept- Based Approach", TMH.
4. Pabitra Pal Choudhury, "Operating System-Principle and Design", PHI Learning.

List of Experiment

1. Program to implement FCFS CPU scheduling algorithm.

2. Program to implement SJF CPU scheduling algorithm.

3. Program to implement Priority CPU Scheduling algorithm.

4. Program to implement Round Robin CPU scheduling algorithm.

5. Program to implement classical inter process communication problem (producer consumer).

6. Program to implement classical inter process communication problem (Reader Writers).

7. Program to implement classical inter process communication problem (Dining Philosophers).

8. Program to implement FIFO page replacement algorithm.

9. Program to implement LRU page replacement algorithm

10. Program to implement LFU and optimal page replacement.