Marwadi University

Syllabus for Bachelor of Technology

Computer Engineering

Subject Code: 01CE1401
Subject Name: Operating System
B.Tech. Year – II

Objective: Student will understand Modern Operating System and their principles. The course will cover theory as well as practice aspects of a subject through scheduled lectures and labs, course will cover details of processes, CPU scheduling, memory management, file system, storage subsystem, and input/output management.

Credits Earned: 4 Credits

Course Outcomes: After completion of this course, student will be able to

- Understanding the role of operating system with its function and services.
- Application and comparison of various CPU scheduling and memory management algorithms.
- Apply various concepts and asses the requirement for inter process communication and deadlock.
- Comprehend the mechanism of I/O and File Management
- Implement algorithms and acquire a detailed understanding of various Unix commands

Pre-requisite: Data structures like stack, queue, linked list, tree, graph, hashing, file structures, any structured programming language (like C or python).

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	Mid Sem (M)	Internal (I)	Viva (V)	Term work (TW)	
3	0	2	4	50	30	20	25	25	150

Contents:

Unit	Topics	Contact Hours
1	**Operating System:** Computer system overview, Architecture, Goals & Structures of O.S, Functions of operating systems, protection and security, distributed systems, operating Systems structures, services, Role & Function Of Kernel, system calls and their working.	3

2	**Process and Threads:** Process and Threads - Process concepts, threads, scheduling-criteria, Algorithms, and their evaluation. Process Scheduling, Scheduling, Thread Scheduling, Real Time Scheduling. System calls like ps, fork, join, exec family, wait, Microkernel's architecture and benefits, case studies UNIX.	12
3	**Concurrency Control(IPC)**: Process synchronization, critical-section problem. classic problems of Synchronization, Software Solutions for synchronization problem. Hardware Solutions for synchronization problem. Synchronization and Their applications. [Understanding of Semaphore – Mutex – Monitor – Event Counters]	8
4	**Memory Management:** Memory: Swapping, contiguous memory allocation, paging, page table, segmentation, virtual memory, demand paging, page- replacement, Allocation of frames, Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault, Working Set, Dirty page/Dirty bit – Demand paging (Concepts only) – Page Replacement policies: Least Recently used (LRU) Optimal (OPT), Second Chance (SC), First in First Out (FIFO), Not recently used (NRU)	10
5	**Principles of Deadlock**: Deadlock - system model, deadlock and its characterization with example, deadlock prevention techniques with example, detection and avoidance of a deadlock, methods to get recovery form deadlock	4
6	**File System Interface**: File system Interface- the concept of a file, Access Methods. Directory Structure. File system mounting, file protection and sharing mechanism. File System implementation- File system structure, file/directory implementation, efficiency and performance, file allocation methods, Free-space management. **I/O systems** - Hardware, application l/o interface, kernel I/O subsystem, Transforming I/O requests to Hardware operations. STREAMS, performance	5
	Total Hours	42

References:

1. Operating System Concepts- Abraham Silberchatz, Peter B. Galvin, Greg Gagne, 10th edition.
2. Operating Systems - Internals and Design Principles. Stallings, 6th Edition 2009. Pearson education.
3. Modern Operating Systems, Andrew S Tanenbaum 4th edition PHI.

4. Sumitabha Das, Unix Concepts and Applications, 4th Edition TMH Publications.
5. Yashvant Kanetkar, Shell Programming, publication date 1996,New Delhi: BPB publisher.
6. Maurice Bach, The Design of Unix Operating System, Pearson Education India; 1st edition (1 January 2015)

Suggested Theory distribution:

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyse	Evaluate	Create
20 %	25 %	25 %	15 %	15 %	00 %

Laboratory work:

Laboratory work will be based on different shell script, scheduling algorithms and process synchronization problems with 14 experiments to be incorporated that will be considered for evaluation.

Instructional Method:

a) The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.
b) The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.
c) Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.
d) Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory.

Supplementary Resources:

a) http://nptel.ac.in/courses/106106144/
b) http://nptel.ac.in/courses/106108101/
c) http://codex.cs.yale.edu/avi/os-book/OS9/slide-dir