Department of Mathematics & Computing
IIT(ISM) Dhanbad-826004

Course Type	Course Code	Name of Course	L	T	P	Credit
DC	MCC510	Operating Systems	3	0	0	9

Course Objective
The objective of the course is to inculcate the fundamental ideas from where the computing resources belong

Learning Outcomes
Upon successful completion of this course, students will:
• able to know the fact and figures of computing resources available with system, dynamics of the system and computing resources

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	**Introduction to Operating System:** Introduction and Role and Goal of Operating systems (OS), Categories of OS, Computer System Architecture, Interrupts, common function of interrupt, Interrupt handling, Operating System Structures, operations and services, Protection and security, system calls, implementation and parameter passing, Operating system design and Implementation, Virtual machines, advantages and its disadvantages.	9	Understanding of fundamentals of Operating Systems and its advantages and disadvantages
2	**Processes and Threads:** Process Concept, Process Sate, Process Control Block (PCB), Process Scheduling, Schedulers, Process Creation, Process Termination, Co-operating Process, Producer Consumer Problem, Inter-process Communication, Threads, Types of Threads (User level Thread, Kernel level Thread), Advantages and disadvantages, Multithreading models (One to One, Many to One and Many to Many Models), Thread library, Threading issues: Thread Cancellation, Signal handling, Thread Pools.	10	This unit will help student in understanding concept of process creation and termination and their advantages. Also, student will come to know about the thread creation and management for multithreading models
3	**CPU Scheduling and Process Synchronization:** CPU Scheduler, Scheduling Criteria, Scheduling Algorithms: First Come First Serve Scheduling (FCFS), Shortest Job First Scheduling (SJF), Priority Scheduling, Round Robin Scheduling, Race condition, Critical Section, Busy Waiting, Critical Section Problem, Semaphores, Types of Semaphore,	10	This will help in understanding about the scheduling of processes and its synchronization

	Semaphore with and without busy waiting, Reader's Writer's Problem, Dining Philosopher's Problem.		
4	**Deadlock and Memory Management:** Deadlock and its characterization, Resource Allocation Graph Algorithm applicable for single instance of resource type, Deadlock Prevention and Avoidance, Bankers Algorithm applicable for multiple instance of resource type, Deadlock Detection and Recovery, Memory and its Types, Address Binding, Logical and Physical Addresses, Dynamic Loading and Linking, Swapping, Contiguous and Non-contiguous Memory allocations, Fragmentation (Internal and External) and Segmentation, Virtual Memory, Paging, Demand Paging, Page Replacement Algorithms, Thrashing, File System/I/O System	10	This will help in understanding about managing the resources and memory available in the system.

Text Books:
1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, Operating Systems Principles, John Wiley and Sons, 2005

Reference Books:
1. J. Archer Harris, Operating Systems, Mc Graw Hill,2002
2. Y P Kanetkar, Unix Shell Programming, BPB Publication, New Delhi,1996.

Sd.
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