Teaching Method

Department of Information Technology
Teaching Plan – Operating Systems
Course: BCA
As per: GU-NEP 2020
Paper Code: (To be assigned)
Paper Name: Operating Systems
Course Instructor: Rupjyoti Ray
Paper Credit: 3 + 1 (T + P)
Semester: 4
Course Type: Compulsory
Course Level: 200–299

Unit I: Introduction (7 Lectures)

Lecture No(s)	Topics	Mode of Teaching	Assessment Method
1	Application vs System Software; OS as System Software	Classroom	
2	OS Structures; Types of OS (Batch, Multiprogramming)	Classroom	
3	Types of OS (Real-time, Distributed, Multiuser, Multitasking)	Classroom	
4	OS Functions – Process, Memory, File, I/O Management	Classroom	
5	Security, Virtualization, Cloud Computing	Classroom	
6	History, Shell, System Call	Classroom	
7	System Boot; Revision	Classroom	

Unit II: Process and Threads (10 Lectures)

Lecture No(s)	Topics	Mode of Teaching	Assessment Method
8	Process, Process States, PCB	Classroom	Quiz
9	Scheduling Queues & Schedulers	Classroom	
10	Swapping; Multiprogramming Degree	Classroom	
11	IPC: Shared Memory, Message Passing, Sockets	Classroom + Lab Demo	
12	RPC, Threads: User vs Kernel	Classroom	
13	Multithreading Models	Classroom	
14	CPU Scheduling: Criteria, FCFS, SJF	Classroom	
15	Scheduling: Priority, Round-Robin	Classroom	
16	Multilevel Queue & Feedback Scheduling	Classroom	
17	Summary & Revision	Classroom	

Unit III: Process Synchronization (8 Lectures)

Lecture No(s)	Topics	Mode of Teaching	Assessment Method
18	Race Condition, Critical Section	Classroom	Quiz
19	Peterson's Algorithm, Bakery Algorithm	Classroom	
20	Synchronization Hardware: Locking	Classroom + Lab Demo	

21	Mutex Lock, Semaphore (Binary & Counting)	Classroom + Lab Demo	
22	Classical Problems (Bounded Buffer, Reader–Writer)	Classroom	
23	Dining Philosophers Problem	Classroom	
24	Monitors, Windows/Linux Synchronization	Classroom	
25	Summary & Problem Solving	Classroom	

Unit IV: Deadlock (10 Lectures)

Lecture No(s)	Topics	Mode of Teaching	Assessment Method
26	Deadlock Concept, Resource Usage	Classroom	Quiz
27	Deadlock Conditions: Mutual Exclusion, Hold & Wait	Classroom	
28	No Preemption, Circular Wait	Classroom	
29	Resource Allocation Graph	Classroom	
30	Deadlock Prevention Methods	Classroom	
31	Safe State, Banker’s Algorithm	Classroom + Lab Demo	
32	RAG-based Algorithm	Classroom	
33	Deadlock Detection: Wait-for Graph	Classroom	
34	Single vs Multi-instance Detection Algorithms	Classroom	

35	Recovery from Deadlock	Classroom	

Unit V: Memory Management (10 Lectures)

Lecture No(s)	Topics	Mode of Teaching	Assessment Method
36	Memory Hierarchy, Address Binding	Classroom	Quiz
37	Contiguous Allocation: Fixed, Variable Partition	Classroom	
38	Allocation Strategies: First, Best, Worst Fit	Classroom	
39	Paging, Segmentation	Classroom + Lab Demo	
40	Fragmentation, TLB, Virtual Memory	Classroom	
41	Demand Paging, Page Fault, Locality	Classroom	
42	Page Replacement: FIFO, LRU, Optimal	Classroom + Lab Demo	
43	Frame Allocation: Equal, Proportional	Classroom	
44	Global vs Local Replacement, Thrashing	Classroom	
45	Summary & Revision	Classroom	Final Evaluation

Laboratory Sessions (15 Practical Classes)

Session No(s)	Topics	Mode of Teaching	Assessment Method
1	Shell Commands, Shell Script Basics	Lab Demonstration	Assignment, Viva
2	System Calls in Linux (fork, exec)	Lab Demo	
3	Process Management & Status Checking	Lab Demo	
4	IPC using Pipes, Message Queues	Lab Demo	
5	Shared Memory & Sockets	Lab Demo	
6	Pthreads Programming	Lab Demo	
7	CPU Scheduling Simulation	Lab Demo	
8	Semaphores – Implementation & Demo	Lab Demo	
9	Synchronization Problems in Code	Lab Demo	
10	Banker's Algorithm – Coding Lab	Lab Demo	
11	Deadlock Detection Algorithms	Lab Demo	
12	Paging Simulation	Lab Demo	
13	Page Replacement Algorithm in C	Lab Demo	
14	Memory Allocation Simulation	Lab Demo	
15	Viva, Code Review, Remedial for Slow Learners	Special Lab	Viva