Lovely Professional University, Punjab

Course Code	Course Title	Course Planner	Lectures	Tutorials	Practicals	Credits
CSE316	OPERATING SYSTEMS	20506::Navjot Kaur	3	0	0	3
Course Weightage	ATT: 5 CA: 25 MTT: 20 ETT: 50	**Exam Category: 13: Mid Term Exam: All MCQ – End Term Exam: MCQ + Subjective**				
Course Orientation	COMPETITIVE EXAMINATION (Higher Education), KNOWLEDGE ENHANCEMENT, PLACEMENT EXAMINATION					

	TextBooks (T)		
Sr No	**Title**	**Author**	**Publisher Name**
T-1	OPERATING SYSTEM CONCEPTS	ABRAHAM SILBERSCHATZ, GALVIN	WILEY

	Reference Books (R)		
Sr No	**Title**	**Author**	**Publisher Name**
R-1	OPERATING SYSTEMS	D.M.DHARDHERE	MCGRAW HILL EDUCATION
R-2	DESIGN OF THE UNIX OPERATING SYSTEM	MAURICE J. BACH	Pearson Education India
R-3	REAL-TIME SYSTEMS	JANE W. S. LIU	Pearson Education India

Other Reading (OR)	
Sr No	**Journals articles as Compulsary reading (specific articles, complete reference)**
OR-1	http://academic.research.microsoft.com/Journal/190/sigops-operating-systems-review ,
OR-2	http://anale-informatica.tibiscus.ro/download/lucrari/8-2-02-Opeyemi.pdf ,

Relevant Websites (RW)		
Sr No	**(Web address) (only if relevant to the course)**	**Salient Features**
RW-1	http://cs.uttyler.edu/Faculty/Rainwater/COSC3355/Animations/diskschedulingscan.htm	SCAN disk scheduling algorithm
RW-2	http://cs.uttyler.edu/Faculty/Rainwater/COSC3355/Animations/diskschedulingsstf.htm	SSTF disk scheduling algorithm
RW-3	http://cs.uttyler.edu/Faculty/Rainwater/COSC3355/Animations/diskschedulingfcfs.htm	FCFS disk scheduling
RW-4	http://cs.uttyler.edu/Faculty/Rainwater/COSC3355/Animations/virtualmemory.htm	Virtual Memory
RW-5	http://cs.uttyler.edu/Faculty/Rainwater/COSC3355/Animations/optimalpagereplacement.htm	Optimal page replacement algorithm
RW-6	http://cs.uttyler.edu/Faculty/Rainwater/COSC3355/Animations/lrupagereplacement.htm	Least recently used page replacement algorithm
RW-7	http://cs.uttyler.edu/Faculty/Rainwater/COSC3355/Animations/fifopagereplacement.htm	First in first out page replacement algorithm

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RW-8	http://cs.uttyler.edu/Faculty/Rainwater/COSC3355/Animations/deadlock.htm	Deadlock resource allocation graph
RW-9	http://cs.uttyler.edu/Faculty/Rainwater/COSC3355/Animations/sjf.htm	Shortest job first algorithm animation
RW-10	http://cs.uttyler.edu/Faculty/Rainwater/COSC3355/Animations/fcfs.htm	First come first serve algorithm animation
RW-11	http://williamstallings.com/OS-Animation/Queensland/PROCESS.SWF	Process states
RW-12	http://courses.cs.vt.edu/csonline/OS/Lessons/Processes/index.html	States of a proces
RW-13	https://www.cs.rutgers.edu/~pxk/416/notes/01-intro.html	Evolution of OS
RW-14	http://www.yolinux.com/TUTORIALS/LinuxTutorialPosixThreads.html	Information and Sample program of Thread
RW-15	https://github.com/nu11secur1ty/Kernel-and-Types-of-kernels/blob/master/Kernel%20and%20Types%20of%20kernels.md	Kernel and its types
RW-16	https://github.com/dcastl2/operating-systems/tree/master/notes/sched	Multiprocessor scheduling
RW-17	http://nptel.ac.in/downloads/106105086/	Real time scheduling

LTP week distribution: (LTP Weeks)	
Weeks before MTE	7
Weeks After MTE	7
Spill Over (Lecture)	

Detailed Plan For Lectures

Week Number	Lecture Number	Broad Topic(Sub Topic)	Chapters/Sections of Text/reference books	Other Readings, Relevant Websites, Audio Visual Aids, software and Virtual Labs	Lecture Description	Learning Outcomes	Pedagogical Tool Demonstration/ Case Study / Images / animation / ppt etc. Planned	Live Examples
Week 1	Lecture 1	Introduction to OS concepts (Evolution of OS)	T-1 R-1	RW-13	Discuss Lecture #0 and to give general idea of operating system and its working	Student will come to know how operating system came into existence and how they have evolved over time	Peer to peer Discussion	
	Lecture 2	Introduction to OS concepts (Operating system (OS) modes, services and functions)		RW-15	To teach students about the structure and working of kernel and shell	Student will learn about how operating system work in different modes to provide protection and security	Peer to peer Discussion	

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Week 1	Lecture 2	Introduction to OS concepts (OS structure - kernel and its types, shell)		RW-15	To teach students about the structure and working of kernel and shell	Student will learn about how operating system work in different modes to provide protection and security	Peer to peer Discussion	
	Lecture 3	Introduction to Operating System(Operating System Operations and Functions)	R-1		To teach about the types of operating systems and their functions	Students will learn about the working the operating system in multi-process environment	Peer to peer Discussion	
		Introduction to Operating System(Multiprogramming and Multiprocessing System)	T-1		To teach about the types of operating systems and their functions	Students will learn about the working the operating system in multi-process environment	Peer to peer Discussion	
Week 2	Lecture 4	Operating System Structure (System Calls)	R-1		To teach students about system calls like read, write and open	Student learns how to interact with the operating system directly by using system calls	Peer to peer Discussion, Demonstration using LINUX	MS-DOS has simple structure while Windows has layered architecture
	Lecture 5	Process Management (Process states)	T-1	RW-11 RW-12	To introduce the notion of a process	Student learns the basic concepts about a process and its various states	Peer to peer Discussion	
		Process Management (Process concept)	T-1		To introduce the notion of a process	Student learns the basic concepts about a process and its various states	Peer to peer Discussion	
		Process Management(Life cycle)	T-1		To introduce the notion of a process	Student learns the basic concepts about a process and its various states	Peer to peer Discussion	
		Process Management (Process control box)	T-1		To introduce the notion of a process	Student learns the basic concepts about a process and its various states	Peer to peer Discussion	
	Lecture 6	Process Management (Process scheduling)	T-1		To introduce the concept of scheduling	Student learns parameters upon which scheduling is done	Peer to peer Discussion	
		Process Management (Operations on processes)	T-1		To introduce the concept of scheduling	Student learns parameters upon which scheduling is done	Peer to peer Discussion	

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Week 3	Lecture 7	CPU Scheduling(CPU scheduler and dispatcher)	R-3		To introduce CPU scheduling, which is the basis for multi programmed operating systems	Student will learn the conditions under which scheduling is required and criteria for choosing a scheduling algorithm	Peer to peer Discussion	
		CPU Scheduling(Scheduling criteria)	T-1		To introduce CPU scheduling, which is the basis for multi programmed operating systems	Student will learn the conditions under which scheduling is required and criteria for choosing a scheduling algorithm	Peer to peer Discussion	
		CPU Scheduling(CPU scheduler - preemptive and non preemptive)	T-1		To introduce CPU scheduling, which is the basis for multi programmed operating systems	Student will learn the conditions under which scheduling is required and criteria for choosing a scheduling algorithm	Peer to peer Discussion	
	Lecture 8	CPU Scheduling(First come first serve)	T-1	RW-10	To teach the working of first come first serve scheduling algorithm	Student learns how to use first come first serve algorithm	Peer to peer Discussion and animation	A queue for booking railway tickets
	Lecture 9	CPU Scheduling(Shortest job first)	T-1	RW-9	To teach the working of shortest job first scheduling algorithm	Student learns how to use shortest job first scheduling algorithm	Peer to peer Discussion and animation	
		CPU Scheduling(Priority)	T-1	RW-9	To teach the working of shortest job first scheduling algorithm	Student learns how to use shortest job first scheduling algorithm	Peer to peer Discussion and animation	
Week 4	Lecture 10	CPU Scheduling(Round robin)	T-1	OR-1	To teach students about the working of round robin and multi level feedback queue scheduling algorithms	Student will come to know how to use round robin and multi level feedback queue scheduling algorithms	Peer to peer Discussion	
		CPU Scheduling(Multi level feedback queue)	T-1	OR-1	To teach students about the working of round robin and multi level feedback queue scheduling algorithms	Student will come to know how to use round robin and multi level feedback queue scheduling algorithms	Peer to peer Discussion	
	Lecture 11	CPU Scheduling (multiprocessor scheduling, real time scheduling)		RW-16 RW-17	To teach students about the working of multiprocessor scheduling and real time scheduling	Student learns about the use of multiprocessor scheduling and real time scheduling	Peer to peer Discussion	

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Week 4	Lecture 12	CPU Scheduling (multiprocessor scheduling, real time scheduling)		RW-16 RW-17	To teach students about the working of multiprocessor scheduling and real time scheduling	Student learns about the use of multiprocessor scheduling and real time scheduling	Peer to peer Discussion	
Week 5	Lecture 13	Threads(Overview)	T-1	RW-14	To introduce the notion of a thread	Student learns about the use of fundamental unit of CPU utilization	Peer to peer Discussion	
		Threads(Multithreading Models)	T-1		To introduce the notion of a thread	Student learns about the use of fundamental unit of CPU utilization	Peer to peer Discussion	in Word two threads are working - one for taking input from the user and the other for checking spellings.
	Lecture 14	Process Synchronization (Critical Section Problem)	T-1		To introduce the critical-section problem	Student learns how to avoid synchronization problems	Peer to peer Discussion	
		Process Synchronization (Critical section problem - Two process solution)	T-1		To introduce the critical-section problem	Student learns how to avoid synchronization problems	Peer to peer Discussion	
	Lecture 15				Test 1			
Week 6	Lecture 16	Process Synchronization (Synchronization hardware)	T-1		To teach about various software and hardware based solution for critical section problem	Student learns how to avoid critical section problem	Peer to peer Discussion	
		Process Synchronization (Peterson's Solution)	T-1		To teach about various software and hardware based solution for critical section problem	Student learns how to avoid critical section problem	Peer to peer Discussion	
	Lecture 17	Process Synchronization (Semaphores)	T-1		To teach about semaphores	Student learns how to overcome critical section problem	Peer to peer Discussion	
	Lecture 18	Process Synchronization (Dining Philosopher Problem,Reader-writer Problem etc)	T-1		To introduce students to some of the classical problems of synchronization	Student learns how to use semaphores to find solutions to synchronization problems	Peer to peer Discussion	
Week 7	Lecture 19	Process Synchronization (Monitors)	T-1		To introduce the fundamentals of monitor, a high level synchronization construct	Student learns an alternative to semaphores to handle critical-section problems more effectively	Peer to peer Discussion	

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		SPILL OVER						
Week 7	Lecture 21				Spill Over			
		MID-TERM						
Week 8	Lecture 22	Deadlock(Critical regions)	R-1	RW-8	To develop a description of deadlocks	Student learns about the conditions under which a deadlock can occur in a system	Peer to peer Discussion and animation	
	Lecture 23	Deadlock(Handling)	T-1		To present different methods of preventing deadlocks in computer system	Student learns how to prevent the occurrence of a deadlock in computer system	Peer to peer Discussion	
		Deadlock(Handling of deadlocks- Deadlock Prevention)	T-1		To present different methods of preventing deadlocks in computer system	Student learns how to prevent the occurrence of a deadlock in computer system	Peer to peer Discussion	
	Lecture 24	Deadlock(Deadlock Avoidance & Detection)		OR-2	To present different methods of avoiding deadlocks in computer system	Student learns about resource allocation graph and banker's algorithm	Peer to peer Discussion	
Week 9	Lecture 25	Deadlock(Deadlock Recovery)	T-1		To present different methods for deadlock detection and recovery	Student learns how to deal with deadlock if it all happens	Peer to peer Discussion	
		Deadlock(Starvation)	T-1		To present different methods for deadlock detection and recovery	Student learns how to deal with deadlock if it all happens	Peer to peer Discussion	
	Lecture 26	Information management (Files and directories)	T-1		To describe the details of implementing local file systems and directory structures	Student learns how files management is currently done in systems	Peer to peer Discussion	
		Information management (Directory structure)	T-1		To describe the details of implementing local file systems and directory structures	Student learns how files management is currently done in systems	Peer to peer Discussion	
		Information management (Directory implementation - linear list and hash table)	T-1		To describe the details of implementing local file systems and directory structures	Student learns how files management is currently done in systems	Peer to peer Discussion	
	Lecture 27	File Management(Allocation methods)	T-1		To discuss block allocation and free block algorithms and trade-offs	Student learns how to design effective memory allocation methods	Peer to peer Discussion	

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Week 9	Lecture 27	File Management(Free-Space Management)	T-1		To discuss block allocation and free block algorithms and trade-offs	Student learns how to design effective memory allocation methods	Peer to peer Discussion	
Week 10	Lecture 28	Memory Management (Objectives and functions)	R-2		To provide a detailed description of various ways of organizing memory	Student learns about how memory is managed	Peer to peer Discussion	
		Memory Management (Simple resident monitor program)	T-1		To provide a detailed description of various ways of organizing memory	Student learns about how memory is managed	Peer to peer Discussion	
		Memory Management (Overlays - swapping)	T-1		To provide a detailed description of various ways of organizing memory	Student learns about how memory is managed	Peer to peer Discussion	
	Lecture 29	Memory Management (Fragmentation - internal and external)	T-1		To discuss how memory wastage can be reduced	Learns how to optimally assign memory to processes	Peer to peer Discussion	
	Lecture 30				Test 2			
Week 11	Lecture 31	Memory Management (Schemes - Paging - simple and multi level)	T-1		To discuss methods of non contiguous memory allocation	Student learns technique of effective memory management	Peer to peer Discussion	
		Memory Management (Segmentation - simple, multi-level and with paging)	T-1		To discuss methods of non contiguous memory allocation	Student learns technique of effective memory management	Peer to peer Discussion	
	Lecture 32	Memory Management (Virtual memory concept)		RW-4	To describe the benefits of a virtual memory system	Student learns how to increase memory virtually and run programs that require high amount of RAM	Discussion and animation	
		Memory Management (Demand paging)	T-1		To describe the benefits of a virtual memory system	Student learns how to increase memory virtually and run programs that require high amount of RAM	Peer to peer Discussion	
	Lecture 33	Memory Management(Page interrupt fault)		RW-5 RW-6 RW-7	To understand various page replacement algorithms	Student learns which technique to use to effectively manage page requirements of a process	Peer to peer Discussion and animation	
		Memory Management(Page replacement algorithms)		RW-5 RW-6 RW-7	To understand various page replacement algorithms	Student learns which technique to use to effectively manage page requirements of a process	Peer to peer Discussion and animation	

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Week 12	Lecture 34	Memory Management(Page interrupt fault)		RW-5 RW-6 RW-7	To understand various page replacement algorithms	Student learns which technique to use to effectively manage page requirements of a process	Peer to peer Discussion and animation	
		Memory Management(Page replacement algorithms)		RW-5 RW-6 RW-7	To understand various page replacement algorithms	Student learns which technique to use to effectively manage page requirements of a process	Peer to peer Discussion and animation	
	Lecture 35				Assignment - Simulation based			
	Lecture 36	Device management (Dedicated, shared and virtual devices)	T-1		To describe the physical structure of secondary storage devices	Student learns about the basic working of mass storage devices	Peer to peer Discussion	
		Device management(Serial access and direct access devices)	T-1		To describe the physical structure of secondary storage devices	Student learns about the basic working of mass storage devices	Peer to peer Discussion	
		Device management(Direct Access Storage Devices – Channels and Control Units)	T-1		To describe the physical structure of secondary storage devices	Student learns about the basic working of mass storage devices	Peer to peer Discussion	
Week 13	Lecture 37	Device management(Disk scheduling methods)		RW-1 RW-2 RW-3	To explain the algorithms that effect the performance characteristics of mass storage devices	Student learns techniques to optimize access to secondary storage devices	Peer to peer Discussion	
	Lecture 38	Inter process communication (Introduction to IPC (Inter process communication) Methods)	T-1		To introduce the concept of inter process communication	Student learns how to mass information between processes	Peer to peer Discussion	
		Inter process communication (Pipes - popen and pclose functions)	T-1		To introduce the concept of inter process communication	Student learns how to mass information between processes	Peer to peer Discussion	
		Inter process communication (Shared memory)	R-2		To introduce the concept of inter process communication	Student learns how to mass information between processes	Peer to peer Discussion	

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Week 13	Lecture 38	Inter process communication (Message queues)	R-2		To introduce the concept of inter process communication	Student learns how to mass information between processes	Peer to peer Discussion	
	Lecture 39	Protection and Security (Goals of protection)	T-1		To teach about various threats to a system	Student learns how to secure the system from viruses and other threats.	Peer to peer Discussion	
		Protection and Security (Domain of protection)	T-1		To teach about various threats to a system	Student learns how to secure the system from viruses and other threats.	Peer to peer Discussion	
		Protection and Security (Access matrix)	T-1		To teach about various threats to a system	Student learns how to secure the system from viruses and other threats.	Peer to peer Discussion	
		Protection and Security (System and network threats)	T-1		To teach about various threats to a system	Student learns how to secure the system from viruses and other threats.	Peer to peer Discussion	
		Protection and Security(User authentication)	T-1		To teach about various threats to a system	Student learns how to secure the system from viruses and other threats.	Peer to peer Discussion	
Week 14	Lecture 40	Protection and Security (System and network threats)	T-1		To teach about various threats to a system	Student learns how to secure the system from viruses and other threats.	Peer to peer Discussion	
		Protection and Security(User authentication)	T-1		To teach about various threats to a system	Student learns how to secure the system from viruses and other threats.	Peer to peer Discussion	
		SPILL OVER						
Week 14	Lecture 42				Spill Over			
Week 15	Lecture 43				Spill Over			
	Lecture 44				Spill Over			
	Lecture 45				Spill Over			

Scheme for CA:

CA Category of this Course Code is:C010102 (Total 3 tasks, 1 compulsory and out of remaining 1 best out of 2 to be considered)

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Component	Iscompulsory	Weightage (%)
Assignment - Simulation based	Yes	50
Test	NO	50
Test	NO	50

Details of Academic Task(s)

Academic Task	Objective	Detail of Academic Task	Nature of Academic Task (group/individuals)	Academic Task Mode	Marks	Allottment / submission Week
Assignment - Simulation based	To check the conceptual understanding and to improve coding ability of the students.	In this academic task, the students' will be writing and simulating different standard algorithms of operating system in C.	Individual	Online	30	5 / 12
Test 1	To assess the conceptual understanding of students.	Test will be conducted of syllabus covered till 5th week.	Individual	Offline	30	4 / 5
Test 2	To assess the conceptual understanding of students.	Test will be conducted of syllabus covered till 10th week.	Individual	Offline	30	9 / 10

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