Course Code	USA20302J	Course Name	OPERATING SYSTEMS	Course Category	C	Professional Core	L	T	P	C
							4	0	4	6

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Science	Data Book / Codes/Standards		Nil	

Course Learning Rationale (CLR):	The purpose of learning this course is to:
CLR-1 :	Utilize operating systems based on its features and utility
CLR-2 :	Utilize the Process Management functions of an Operating system
CLR-3 :	Utilize the features of Memory Management concepts of an Operating system
CLR-4 :	Analyze how Device Management part of an Operating system functions
CLR-5 :	Utilize the File Management functions of an Operating system
CLR-6 :	Analyze the practical operating systems and evaluate their utility

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning: Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Program Learning Outcomes (PLO): 1 Engineering Knowledge	2 Problem Analysis	3 Design & Development	4 Analysis, Design, Research	5 Modern Tool Usage	6 Society & Culture	7 Environment & Sustainability	8 Ethics	9 Individual & Team Work	10 Communication	11 Project Mgt. & Finance	12 Life Long Learning	13 PSO - 1	14 PSO - 2	15 PSO – 3
CLO-1 :	Identify functions of an operating system, analyze the process management functions	2	80	70	H	H	H	H	H	M	L	M	H	M	-	H	H	H	M
CLO-2 :	Analyze CPU scheduling and synchronization process of an operating system	3	85	75	H	H	H	H	H	M	L	M	H	M	-	H	H	H	M
CLO-3 :	Analyze the need of Memory management functions of an operating system	3	75	70	H	H	H	H	H	M	L	M	H	M	-	H	H	H	M
CLO-4 :	Identify the significance of device management and file management's role of an operating system	3	85	80	H	H	H	H	H	M	L	M	H	M	-	H	H	H	M
CLO-5 :	Identify the essentials of inter process communication in an operating system, evaluate hypervisors	3	85	75	H	H	H	H	H	M	L	M	H	M	-	H	H	H	M
CLO-6 :	Analyze how operating systems are constructed, analyze the features and aspects of different operating environments	3	80	70	H	H	H	H	H	M	L	M	H	M	-	H	H	H	M

Duration (Hour)		24	24	24	24	24
S-1	SLO-1	Introduction Operating Systems (OS): Operating System overview ,Operating system as a	Process concept : Introduction	Process Synchronization - Background	Deadlocks - System model	Memory management: introduction
	SLO-2		Process states : Process creation	The Critical section problem		

		resource management	and process termination			
S-2	SLO-1	Operations, Assembler, Compiler, loader, linker	Process state transition diagram	Two process Solutions	Deadlock characterization - Necessary conditions	Logical Vs physical address space
	SLO-2	Evolution of Operating Systems ,serial processing and batch processing	Operation on process	Multi process Solutions		
S-3	SLO-1	Batch: Simple, Multiprogramming	Symmetric multiprocessing	Synchronization hardware solution	Resource Allocation Graph	swapping
	SLO-2	Multiprocessor, Time Sharing, parallel systems			Methods for handling deadlocks	Organization : physical and logical organization
S-4	SLO-1	Distributed (client-server, peer-to-peer), Real-Time (hard, soft Clustering (symmetric, asymmetric, parallel)) , Network,)	Concurrent process	Semaphores – Usage	Deadlock Prevention - Mutual exclusion, Hold and Wait	Memory allocation method
	SLO-2				No Preemption, Circular Wait	Single partition allocation
S 5-8	SLO-1	Laboratory 1: Comparison between various Operating Systems	Laboratory 4: Simulation of FCFS CPU scheduling algorithm	Laboratory 7: Write a procedure for timer interrupt handler	Laboratory 10: Program to implement Bankers Algorithm	Laboratory 13: multiple partition (dynamic)
	SLO-2					
S-9	SLO-1	Microkernel: Architecture, Kernel mode, user mode, Monolithic, differences	CPU Scheduling: Process Scheduler (long, short, medium term)	Semaphores –Implementation	Deadlock Avoidance - Safe state	Multiple partition memory management : contiguous (fixed, dynamic)
	SLO-2	System Call Types	Scheduling criteria	Binary semaphores	Resource Allocation Graph Algorithm	
S-10	SLO-1	((a) process control: fork(), exit(), wait()b)file manipulation: open(), read(), write(), close() (c)device mgt: ioctl(), read(), write()	CPU utilization, throughput, time: (a) turnaround (b) waiting (c) response Scheduling Types: FCFS, SJF	Classic Problems of Synchronization - The Bounded Buffer problem	Banker's Algorithm - Safety Algorithm	Contiguous Types: memory protection, allocation, fragmentation (c) partitioned
	SLO-2	b)file manipulation: open(), close()	Scheduling Types: FCFS, SJF	The Readers - Writers Problem		Compaction
S-11	SLO-1	read(), write()	Priority Scheduling: Preemptive, non-preemptive	The Dinning philosophers problem	Resource request algorithm	Paged memory management, Paging technique
	SLO-2					
S-12	SLO-1	Operating System services	Other Scheduling Types: Round Robin	Critical Regions: Race condition and process synchronization	Examples	Segmentation
	SLO-2					Segmentation with paging
S 13-16	SLO-1	Laboratory 2: Booting process in GNU/Linux OS	Laboratory 5: Priority CPU scheduling algorithm	Laboratory 8: classical inter process communication problem (Producer consumer)	Laboratory 11: Program to implement memory allocation with pages	Laboratory 14 : Simulation of FIFO page replacement algorithm
	SLO-2					
S-17	SLO-1	System Programs: file management, status info	multilevel queue	Implementation of Critical region	Deadlock Detection - Single instance of each resource type	Demand paging
	SLO-2		multilevel feedback queue	Mutual Exclusion Algorithm: Peterson , Monitors	Several instances of a Resource type	

S-18	SLO-1	File modification, language support Loading and execution, communications,	multiple processor Scheduling	Producer consumer problem	Recovery from deadlock	Page replacement algorithms
	SLO-2	Communications Threads: Single thread, Multi-thread			Process termination	Page Replacement - FIFO Page replacement
S-19	SLO-1	Operating System structure	Real time scheduling	IPC : Inter process communication	Resource preemption	Optimal
	SLO-2	Layered approach				
		Micro kernels				
S-20	SLO-1	Multithreading	Performance comparison	Message passing	Concurrency mechanism	LRU page replacement
	SLO-2	Symmetric multiprocessing		Bounded Buffer Problem	Comparison between deadlock and starvation	Thrashing
S 21-24	SLO-1	Laboratory 3: Multi-thread Programming	Laboratory 6: Simulation of Round Robin CPU scheduling algorithm	Laboratory 9: Write a procedure to make message passing in inter process communication	Laboratory 12: Simulation of FIFO page replacement algorithm	Laboratory 15: Simulation of optimal page replacement algorithm
	SLO-2					

Learning Resources	1.Abraham Silberschatz, Peter Baer Galvin, Greg Gagne,(2013), "Operating Systems", 9thEd., John Wiley & Sons 2.William Stallings, (2012), "Operating Systems-Internals and Design Principles", 7thEd., Prentice Hall	1. Andrew S. Tanenbaum, Herbert Bos,(2015), "Modern Operating Systems", 4th ed., Pearson 2. Bryant O'Hallaxn, (2015), "Computer systems- A Programmer's Perspective", Pearson

Learning Assessment											
Bloom's Level of Thinking		Continous Learning Assessment(50% Weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4# (10%)			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	20%	20%	15%	15%	15%	15%	15%	15%	15%	15%
	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	15%	15%
	Create										
	Total	100 %		100 %		100 %		100 %		100%	

Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
Dr.P.J,Mr. S. Karthik, IT Analyst, Tata Consultancy Services	Dr. Neelanarayanan,, Professor, School of Computer Science and Engineering, VIT Chennai	1.Mr.D.RajKumar 2.Dr .P.J. Arul Leena Rose

Course Code	UCS20D01J	Course Name	WEB DEVLEOPMENT USING NODEJS AND MONGO	Course Category	E	Discipline Specific Electives	L	T	P	C
							4	0	4	6

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Science		Data Book / Codes/Standards	Nil	

Course Learning Rationale (CLR):	The purpose of learning this course is to:	Learning	Program Learning Outcomes (PLO)

		1	2	3
CLR-1 :	Understand the benefits of combining language and data formats while creating web applications			
CLR-2 :	Encourage the reusability of programming resources			
CLR-3 :	Utilize the light weight applications across distributed devices			
CLR-4 :	Understand multiuser conversations and data serialization			
CLR-5 :	Understand the request and response model that works for client and server side applications			
CLR-6 :	Take up the role of a full stack developer			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
					Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
CLO-1 :	Write code for client and server	2	85	85	H	L	M	M	H	-	-	-	-	-	-	-	M	M	H
CLO-2 :	Create modules and use the same in applications	3	90	90	H	M	M	M	H	-	-	-	-	-	-	-	M	M	H
CLO-3 :	Code using callback functions for scaLaboratoryle functions	3	85	85	H	M	M	M	H	-	-	-	-	-	-	-	M	M	H