Paper code : ARI 315	L	T/P	Credits
Subject : Operating Systems	4	0	4

Marking Scheme:
Teachers Continuous Evaluation: As per university examination norms from time to time.
End Term Theory Examination: As per university examination norms from time to time.

INSTRUCTIONS TO PAPER SETTERS: Maximum Marks: As per University Norms

- ➢ There should be 9 questions in the end term examination question paper
- ➢ Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions.
- ➢ Apart from Question No. 1, the rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, students may be asked to attempt only 1 question from each unit.
- ➢ The questions are to be framed keeping in view the learning outcomes of course/paper. The standard/ level of the questions to be asked should be at the level of the prescribed textbooks.
- ➢ The requirement of (scientific) calculators/ log-tables/ data-tables may be specified if required

Course Outcomes [Bloom's Knowledge Level (KL)]:

CO1	To learn and understand the basic concepts of Operating System and memory management. **[K1,K2]**
CO2	To apply the concept of process management. **[K3]**
CO3	To describe the concept of device management. **[K2]**
CO4	To understand the concept of virtualization. **[K2]**

CO/ PO	**PO01**	**PO02**	**PO03**	**PO04**	**PO05**	**PO06**	**PO07**	**PO08**	**PO09**	**PO10**	**PO11**	**PO12**
CO1	3	3	3	3	1	-	-	-	-	-	1	2
CO2	3	3	3	3	1	2	-	-	-	-	1	2
CO3	3	3	3	3	1	2	-	-	-	1	2	3
CO4	3	3	3	3	1	2	-	-	-	2	2	3

Course Content	**No. of Lectures**

Unit I **Introduction:** Introduction: What is an Operating System, Simple Batch Systems, Multiprogrammed Batches systems, TimeSharing Systems, Personal-computer systems, Parallel systems, Distributed Systems, Real-Time Systems, OS – A Resource Manager. **Processes:** Introduction, Process states, process management, Interrupts, Interprocess Communication **Threads:** Introduction, Thread states, Thread Operation, Threading Models. Processor Scheduling: Scheduling levels, preemptive vs nonpreemptive scheduling, priorities, scheduling objective, scheduling criteria, scheduling algorithms, demand scheduling, real time scheduling. **Process Synchronization:** Mutual exclusion, software solution to Mutual exclusion problem, hardware solution to Mutual exclusion problem, semaphores, Critical section problems. Case study on Dining philosopher problem.	[10]
Unit II **Memory Organization & Management:** Memory Organization, Memory Hierarchy, Memory Management Strategies, Contiguous versus non- Contiguous memory allocation, Partition Management Techniques, Logical versus Physical Address space, swapping, Paging, Segmentation, Segmentation with Paging **Virtual Memory**: Demand Paging, Page Replacement, Page-replacement Algorithms, Performance of Demand Paging, Thrashing, Demand Segmentation, and Overlay Concepts	[10]
Unit III **Deadlocks:** Examples of deadlock, resource concepts, necessary conditions for deadlock, deadlock solution, deadlock prevention, deadlock avoidance with Bankers algorithms, deadlock detection, deadlock recovery. **Device Management:** Disk Scheduling Strategies, Rotational Optimization, System Consideration, Caching and Buffering **File System:** Introduction, File Organization, Logical File System, Physical File System , File Allocation strategy, Free Space Management, File Access Control, Data Access Techniques, Data Integrity Protection.	[10]
Unit IV **Virtualization :** Introduction to Virtualization, Virtual Machine, Type of virtualization, Hypervisors	[10]
Text Books: [T1] Deitel, H. M. (1990). *An introduction to operating systems*. Addison-Wesley Longman Publishing Co., Inc.. [T2] Silberschatz, A., Galvin, P. B., & Gagne, G. (2006). *Operating system concepts*. John Wiley & Sons. [T3] Portnoy, M. (2012). *Virtualization essentials* (Vol. 19). John Wiley & Sons.	
Reference Books: [R1] Tannenbaum (2000).*Operating Systems*. PHI, 4th Edition. [R2] Godbole, A. S. (2005). *Operating systems*. Tata McGraw-Hill Education. [R3] Dhamdhere, D. M. (2006). *Operating systems: a concept-based approach*, 2E. Tata McGraw-Hill Education.	