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| **OPERATING SYSTEMS**  **(Effective from the academic year 2018 -2019) SEMESTER – IV** | | | | |
| **Course Code** | **18CS43** | **CIE Marks** | 40 | |
| **Number of Contact Hours/Week** | 3:0:0 | **SEE Marks** | 60 | |
| **Total Number of Contact Hours** | 40 | **Exam Hours** | 03 | |
| **CREDITS –3** | | | | |
| **Course Learning Objectives:** This course (18CS43) will enable students to: | | | | |
| * Introduce concepts and terminology used in OS * Explain threading and multithreaded systems * Illustrate process synchronization and concept of Deadlock * Introduce Memory and Virtual memory management, File system and storage techniques | | | | |
| **Module 1** | | | | **Contact Hours** |
| **Introduction to operating systems, System structures:** What operating systems do; Computer System organization; Computer System architecture; Operating System structure; Operating System operations; Process management; Memory management; Storage management; Protection and Security; Distributed system; Special-purpose systems; Computing environments. **Operating System Services;** User - Operating System interface; System calls; Types of system calls; System programs; Operating system design and implementation; Operating System structure; Virtual machines; Operating System generation; System boot. **Process Management** Process concept; Process scheduling; Operations on processes; Inter process communication  **Text book 1: Chapter 1, 2.1, 2.3, 2.4, 2.5, 2.6, 2.8, 2.9, 2.10, 3.1, 3.2, 3.3, 3.4 RBT: L1, L2, L3** | | | | 08 |
| **Module 2** | | | |  |
| **Multi-threaded Programming**: Overview; Multithreading models; Thread Libraries; Threading issues. Process Scheduling: Basic concepts; Scheduling Criteria; Scheduling Algorithms; Multiple-processor scheduling; Thread scheduling. **Process Synchronization:** Synchronization: The critical section problem; Peterson’s solution; Synchronization hardware; Semaphores; Classical problems of synchronization; Monitors.  **Text book 1: Chapter 4.1, 4.2, 4.3, 4.4, 5.1, 5.2, 5.3, 5.4, 5.5, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7 RBT: L1, L2, L3** | | | | 08 |
| **Module 3** | | | |  |
| **Deadlocks :** Deadlocks; System model; Deadlock characterization; Methods for handling deadlocks; Deadlock prevention; Deadlock avoidance; Deadlock detection and recovery from deadlock. **Memory Management:** Memory management strategies: Background; Swapping; Contiguous memory allocation; Paging; Structure of page table; Segmentation.  **Text book 1: Chapter 7, 8.1 to 8.6 RBT: L1, L2, L3** | | | | 08 |
| **Module 4** | | | |  |
| **Virtual Memory Management**: Background; Demand paging; Copy-on-write; Page replacement; Allocation of frames; Thrashing. **File System, Implementation of File System:** File system: File concept; Access methods; Directory structure; File system mounting; File sharing; Protection: Implementing File system: File system structure; File system implementation; Directory implementation; Allocation methods; Free space management.  **Text book 1: Chapter 91. To 9.6, 10.1 to 10.5**  **RBT: L1, L2, L3** | | | | 08 |

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| **Module 5** |  |
| **Secondary Storage Structures, Protection:** Mass storage structures; Disk structure; Disk attachment; Disk scheduling; Disk management; Swap space management. Protection: Goals of protection, Principles of protection, Domain of protection, Access matrix, Implementation of access matrix, Access control, Revocation of access rights, Capability- Based systems. **Case Study: The Linux Operating System:** Linux history; Design principles; Kernel modules; Process management; Scheduling; Memory Management; File systems, Input and output; Inter-process communication.  **Text book 1: Chapter 12.1 to 12.6, 21.1 to 21.9 RBT: L1, L2, L3** | 08 |
| **Course Outcomes:** The student will be able to : | |
| * Demonstrate need for OS and different types of OS * Apply suitable techniques for management of different resources * Use processor, memory, storage and file system commands * Realize the different concepts of OS in platform of usage through case studies | |
| **Question Paper Pattern:** | |
| * The question paper will have ten questions. * Each full Question consisting of 20 marks * There will be 2 full questions (with a maximum of four sub questions) from each module. * Each full question will have sub questions covering all the topics under a module. * The students will have to answer 5 full questions, selecting one full question from each module. | |
| **Textbooks:** | |
| 1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, Operating System Principles 7th edition, Wiley-India, 2006 | |
| **Reference Books:** | |
| 1. Ann McHoes Ida M Fylnn, Understanding Operating System, Cengage Learning, 6th Edition 2. D.M Dhamdhere, Operating Systems: A Concept Based Approach 3rd Ed, McGraw- Hill, 2013. 3. P.C.P. Bhatt, An Introduction to Operating Systems: Concepts and Practice 4th Edition, PHI(EEE), 2014. 4. William Stallings Operating Systems: Internals and Design Principles, 6th Edition, Pearson. | |