**DHANEKULA INSTITUTE OF ENGINEERING & TECHNOLOGY**

**GANGURU: VIJAYAWADA – 521 139**

**INSTRUCTIONAL PLAN**

Unit Plan and Lesson Plan

Name of the Program : B. Tech in Computer Science & Engineering Academic Year : 2023-24

Year & Semester : III Year I Semester Section: B No of Credits : 03

Name of the Course : Operating Systems Code : R20C302

Course : **Core** /Elective/Allied/Humanities/Management Regulation : R20

Course Area/Module : No of students registered: 62

Name of the Faculty :Mrs.A.Sri Chaitanya Designation : Asst. Professor

No. of Lecture Hours per week: 4 No. of Tutorial Hours/Makeup hours / per week: 1

**Unit Plan**

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| **Unit**  **No** | **Description** | **Scheduled Duration (Date)** | | **COs\*** | **POs\*** | **PSOs\*** |
| **From** | **To** |
| **1** | Operating system overview and operating system structure. |  |  | R20C302.1 | 1 | 1,2 |
| **2** | Process concepts, multithreaded programming and Inter-Process Communication. |  |  | R20C302.2 | 1 | 1,2 |
| **3** | Memory-Management and Virtual-Memory Management |  |  | R20C302.3 | 1 | 1,2 |
| **4** | Deadlocks and Secondary-Storage Structure |  |  | R20C302.4 | 1 | 1,2 |
| **5** | System Protection and System Security |  |  | R20C302.5 | 2 | 1,2 |
|  | MID-I |  |  |  |  |  |
|  | MID-II |  |  |  |  |  |
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| **Lecture NO** | **Topic Description** | **Student topic wise Learning Outcome** | | **Teaching learning Resources** | | **CO’s** | **Compt**  **Date** | | **Remarks** |
| **Unit-I**  **Operating System Overview and System Structures** | | | | | | | | | |
| L1 | Operating system Functions | Know about the concepts of functions of operating system. | | T1 | R20C302.1 | |  | |  |
| L2 | Structure of an Operating system and its Operations. | Know about the structure and its operations. | | T1 | R20C302.1 | |  | |  |
| L3 | Computing Environments. | Know about the various computing environments. | | T1 | R20C302.1 | |  | |  |
| L4 | Open-source operating systems. | Knowing about and different types of open-source operating system. | | T1 | R20C302.1 | |  | |  |
| L5 | Different types of Operating systems | Understand the usage of different types of operating systems | | T1 | R20C302.1 | |  | |  |
| L6 | Operating System Services | Understand the services provided by an operating systems | | T1 | R20C302.1 | |  | |  |
| L7 | Interfaces provided by an operating system. | Know about the interfaces of an operating system. | | T1 | R20C302.1 | |  | |  |
| L8 | System calls | Understand the concept of system calls | | T1 | R20C302.1 | |  | |  |
| L9 | Different types of systems calls | Know about how to Documenting software architectures | | T1 | R20C302.1 | |  | |  |
| L10 | System programs | Understand the concepts of System programs | | T1 | R20C302.1 | |  | |  |
| L11 | System programs | Understand the concepts of System programs | | T1 | R20C302.1 | |  | |  |
| L12 | Operating system structure | Understand the concepts of operating system structures | | T1 | R20C302.1 | |  | |  |
| L13 | Operating system structure | Understand the concepts of operating system structures | | T1 | R20C302.1 | |  | |  |
| L14 | System Boot | Knowing about the system Booting | | T1 | R20C302.1 | |  | |  |
|  | CLASS TEST |  | |  |  | |  | |  |
| L15 | Debugging | Knowing about the Debugging | | T1 | R20C302.1 | |  | |  |
| **Unit-II**  **Process Scheduling and Inter-Process communication** | | | | | | | | | |
| L16 | Process, Process Scheduling | Understand how the process and process control block. | | T1 | R20C302.2 | |  | |  |
| L17 | Operations on processes | Knowing about operations on processes | | T1 | R20C302.2 | |  | |  |
| L18 | Process states | Understand the states in process | | T1 | R20C302.2 | |  | |  |
| L19 | Introduction to scheduling | Understand the concept of scheduling | | T1 | R20C302.2 | |  | |  |
| L20 | Scheduling algorithms | Knowing about different scheduling algorithms like FCFS | | T1 | R20C302.2 | |  | |  |
| L21 | Scheduling algorithms | Understand to find out the calculation of average waiting time and average turnaround time on SJF . | | T1 | R20C302.2 | |  | |  |
| L22 | Scheduling algorithms | Understand to find out the calculation of average waiting time and average turnaround time on SJF . | | T1 | R20C302.2 | |  | |  |
| L23 | Priority, Round robin scheduling algorithms | Understand to find out the calculation of average waiting time and average turnaround time on priority, RR with time slicing. | | T1 | R20C302.2 | |  | |  |
| L24 | Threading | Understand the concept of threads and multi-threading process | | T1 | R20C302.2 | |  | |  |
| L25 | Threading | Understand the concept of threads and multi-threading process | | T1 | R20C302.2 | |  | |  |
| L26 | Inter-process Communication Message-passing system | Knowing about inter-process communication with message-passing system. | | T1 | R20C302.2 | |  | |  |
| L27 | Inter-process Communication Message-passing system | Knowing about inter-process communication with message-passing system. | | T1 | R20C302.2 | |  | |  |
|  | CLASS TEST |  | |  |  | |  | |  |
| L28 | Race-condition, Mutual-Exclusion  With busy-wait | Understanding the race-condition with critical section problem and mutual-exclusion concept with busy-wait | | T1 | R20C302.2 | |  | |  |
| L29 | Race-condition, Mutual-Exclusion  sleep and wake | Understanding the race-condition with critical section problem and mutual-exclusion concept with, sleep and wake protocols. | | T1 | R20C302.2 | |  | |  |
| L30 | Semaphores | Understand the concept to provide solution for mutual-exclusion by using semaphores. | | T1 | R20C302.2 | |  | |  |
| L31 | Semaphores | Understand the concept to provide solution for mutual-exclusion by using semaphores. | | T1 | R20C302.2 | |  | |  |
| L32 | Producer-consumer problem | Understand the concept of producer-consumer problem. | | T1 | R20C302.2 | |  | |  |
| L33 | Dining-Philosophers problem | Understand the concept of Dining-Philosopher’s problem. | | T1 | R20C302.2 | |  | |  |
| L34 | Monitors | Knowing the solution for mutual-exclusion by using Monitors. | | T1 | R20C302.2 | |  | |  |
| L35 | Monitors | Knowing the solution for mutual-exclusion by using Monitors. | | T1 | R20C302.2 | |  | |  |
| **Unit-III**  **Memory-Management Strategies and Virtual memory management System** | | | | | | | | | |
| L36 | Introduction to memory –management | Understand the concept of memory-management strategies | | T1 | R20C203.3 | | |  |  |
| L37 | Swapping | Knowing about the swapping and paging basic methods and its addressing. | | T1 | R20C203.3 | | |  |  |
|  | MID-I |  | |  |  | | |  |  |
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| L38 | Paging | Understanding the concept of paging with memory address locations. | | T1 | R20C302.3 | | |  |  |
| L39 | Segmentation | Knowing about segmentation and its techniques and the advantages of segmentation over paging. | | T1 | R20C302.3 | | |  |  |
| L40 | Segmentation | Knowing about segmentation and its techniques and the advantages of segmentation over paging. | | T1 | R20C302.3 | | |  |  |
| L41 | Introduction to virtual memory management :Demand Paging | Knowing about virtual memory and usage of paging on demand. | | T1 | R20C302.3 | | |  |  |
| L42 | Copy-on write problem | Understand the concept of copy-on write problem by using virtual memory. | | T1 | R20C302.3 | | |  |  |
| L43 | Page-Replacement algorithms | Knowing about different replacement techniques like FIFO etc.. | | T1 | R20C302.3 | | |  |  |
| L44 | Page-Replacement algorithms | Knowing about different replacement techniques like FIFO etc.. | | T1 | R20C302.3 | | |  |  |
| L45 | LRU | Knowing about and implementation of least recently used algorithm and optimal to minimize the number of page faults to increase the efficiency. | | T1 | R20C302.3 | | |  |  |
| L46 | OPTIMAL | Knowing about and implementation of least recently used algorithm and optimal to minimize the number of page faults to increase the efficiency. | | T1 | R20C302.3 | | |  |  |
| L47 | Thrashing | Understand the concept of thrashing in the system. | | T1 | R20C302.3 | | |  |  |
| L48 | Thrashing | Understand the concept of thrashing in the system. | | T1 | R20C302.3 | | |  |  |
| L49 | Memory-mapped files | Knowing about the memory mappings in virtual memory and the disk at run time. | | T1 | R20C302.3 | | |  |  |
| L50 | Memory-mapped files | Knowing about the memory mappings in virtual memory and the disk at run time. | | T1 | R20C302.3 | | |  |  |
| L51 | Kernel-Memory allocation | Understand the concept of kernel-memory allocation. | | T1 | R20C302.3 | | |  |  |
| L52 | Kernel-Memory allocation | Understand the concept of kernel-memory allocation. | | T1 | R20C302.3 | | |  |  |
| L53 | Continues-Memory allocation | Knowing about continues memory allocation in the virtual-memory environment. | | T1 | R20C302.3 | | |  |  |
| L54 | Continues-Memory allocation | Knowing about continues memory allocation in the virtual-memory environment. | | T1 | R20C302.3 | | |  |  |
| **Unit-IV**  **Deadlocks, Secondary-Storage structure** | | | | | | | | | |  |  |  | R16C105.3 | 27/8/2016 |  |
| L55 | Resources for deadlocks | | Understand the resource conditions for deadlock | T1 | R20C302.4 | |  | |  |
| L56 | Conditions for resource deadlocks, Ostrich algorithm | | Understand resource conditions for deadlock, Knowing about Ostrich algorithm | T1 | R20C302.4 | |  | |  |
| L57 | Deadlock detection. | | Knowing about deadlock detection technique. | T1 | R20C302.4 | |  | |  |
| L58 | Deadlock recovery, Deadlock avoidance. | | Knowing about deadlock recovery, avoidance technique. | T1 | R20C302.4 | |  | |  |
|  | CLASS TEST | |  |  |  | |  | |  |
| L59 | Deadlock prevention. | | Knowing about prevention algorithms in deadlock. | T1 | R20C302.4 | |  | |  |
| L60 | File Systems: Files, Directories, File system implementation | | Understanding about the file structures and its implementation on files in the operating system. | T1 | R20C302.4 | |  | |  |
| L61 | File system management and optimization. | | Understanding about the file structures and its implementation on files in the operating system. | T1 | R20C302.4 | |  | |  |
| L62 | Optimization | | Knowing about different optimization techniques | T1 | R20C302.4 | |  | |  |
| L63 | Overview of disk structure, and attachment | | Knowing about disk and its structure for storage in the memory. | T1 | R20C302.4 | |  | |  |
| L64 | Disk scheduling | | Knowing about different scheduling algorithms . | T1 | R20C302.4 | |  | |  |
| L65 | RAID structure | | Understand the different RAID levels | T1 | R20C302.4 | |  | |  |
| L66 | Stable storage implementation | | Understand the different RAID levels and its implementations | T1 | R20C302.4 | |  | |  |
| **Unit-V**  **System Protection, System Security** | | | | | | | | | |
| L67 | Goals of protection, Principles and domain of protection | Understand the concept of protection and the important goals of protection in the operating system. | | T2 | R20C302.5 | |  | |  |
| L68 | Access matrix, Access control | Knowing about access matrix and its implementation. | | T2 | R20C302.5 | |  | |  |
|  | CLASS TEST |  | |  |  | |  | |  |
| L69 | Revocation of access rights, Introduction- Program threats | Knowing the concept of revocation of access rights in the system protection, Understand the concept of security and identification of program threats | | T2 | R20C302.5 | |  | |  |
| L70 | Cryptography for security, User authentication | Known about the cryptography techniques for providing security by using different encryption and decryption algorithms and authentication process | | T2 | R20C302.5 | |  | |  |
| L71 | Implementing security defenses | Knowing the security defenses and its implementation in the systems. | | T2 | R20C302.5 | |  | |  |
| L72 | Firewalling to protect systems and networks | Understand the concept of system firewalls protection and network systems. | | T2 | R20C302.5 | |  | |  |
| L73 | Computer security classification, System and network threats | Understand the concept of computer security and its classification, firewalls protection | | T2 | R20C302.5 | |  | |  |
|  | MID-II |  | |  |  | |  | |  |
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|  | MID-II |  | |  |  | |  | |  |

**Teaching & Learning Resources:**

**Prescribed Text books**

T1: Silberschatz A, Galvin P B, and Gagne G, Operating System Concepts, 9th edition, Wiley, 2013.

T2: Tanenbaum A S, Modern Operating Systems, 3rd edition, Pearson Education, 2008. (for Interprocess Communication and File systems.) .

**Prescribed Reference Text books**

R1. Dhamdhere D M, Operating Systems A Concept Based Approach, 3rd edition, Tata McGraw-Hill, 2012.

R2. Stallings W, Operating Systems -Internals and Design Principles, 6th edition, Pearson Education, 2009.

R3. Nutt G, Operating Systems, 3rd edition, Pearson Education, 2004.

**Additional Text books**

A1. System concepts, Essentials Abraham Silbertchatz,10the, wiely,2013.

A2. Modern operating systems, Andrew S. Tannebaum,4th edition

**Journals:**

J1. www.inderscience.com/jhome.php?jcode=IJSET

Signature of Course Coordinator Head of Department

Date