**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**

**KAKINADA – 533 003, Andhra Pradesh, India**

**MASTER OF COMPUTER APPLICATIONS (MCA)**

**(For Two-Year PG Programme)**

**COMPUTER ORGANIZATION & OPERATING SYSTEMS (MCA1103)**

Course Objectives:

**The objectives of this course are to**

**• Conceptualize the basics of organizational and architectural issues of a digital computer.**

**• Learn the function of each element of a memory hierarchy.**

**• Study various data transfer techniques in digital computer.**

**Course Outcomes (COs): At the end of the course, student will be able to**

**• Understand the basic organization of computer and different instruction formats and addressing modes**

**• Analyze the concept of pipelining, segment registers and pin diagram of CPU.**

**• Understand and analyze various issues related to memory hierarchy**

**• Evaluate various modes of data transfer between CPU and I/O devices**

**• Examine various inter connection structures of multi processors**

**UNIT I:**

**Introduction:** **Basic Structure of Computers:** Computer Types, Functional units, Basic Operational concepts, Bus structures, Software, Performance, multiprocessor and multi computers, Historical perspective.

**Machine Instructions and Programs:** Numbers, Arithmetic Operations, and c Characters, Memory locations and addresses, Memory operations, Instructions and Instruction sequencing, Addressing Modes, Assembly Languages, stacks and Queues Basic Input/output Operations, role of Stacks and Queues Additional Instructions

**UNIT II:**

**Processing Unit:** Fundamental Concepts: Register Transfers, Performing an Arithmetic or Logic Operation, Fetching a Word from Memory, Execution of Complete Instruction, Hardwired Control.

**Micro Programmed Control:** Microinstructions, Micro program Sequencing, Wide Branch Addressing Microinstructions with next –Address Field

UNIT III:

Introduction to Operating System Concept: Types of Operating Systems, Operating Systems Concepts, Operating System Operations. Operating Systems Structures- Operating System Services, User Operating-System Interface, Introduction to System calls, Types of System Calls.

Process Management: Process concept, Process State Diagram, Process control block, Process Scheduling, Inter process Communication, Threads- Threading Issues, Scheduling- Basic Concepts, Scheduling Criteria, Scheduling Algorithms.

UNIT IV:

Process Synchronization: The Critical-Section Problem, Peterson’s Solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors, Principles of deadlock: System Model, Deadlock characterization, Deadlock handling, Deadlock Prevention, Detection and Avoidance, Recovery Starvation, Critical Regions form Deadlock

UNIT V:

Memory Management: Swapping, Contiguous Memory Allocation, Paging, structure of the Page Table, Segmentation Virtual Memory Management- Demand Paging, Page-Replacement Algorithms, Thrashing. File-System Interface: File Concept, Access Methods, Directory structure, File-System mounting, Files Sharing, Protection. File-System implementation- File-System Structure, Allocation Methods, Free-Space Management, Disk Structure, Disk Scheduling

**Text Books:**

**1) Computer Organization, Carl Hamacher, Zvonks Vranesic, Safea Zaky, 5th ed, McGraw Hill.**

2) Operating System concepts, 7th ed, Abraham Siliberschatz, Galvin, John Wiley & Sons, Inc

3) Advanced Programming in the Unix environment by W. Richard Stevens

Reference Books:

1) Computer Architecture and Organization , John P. Hayes ,3rd Edition, McGraw Hill

2) Computer Organization and Architecture, William Stallings 6th Edition, Pearson/PHI

3) Operating Systems, 6th Edition, William Stallings, PHI/Pearson

4) Unix and Shell Programming by B.M. Harwani, OXFORD University Press