INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

COMPUTER ARCHITECTURES AND OPERATING SYSTEMS							

III Semester: CSE / CSE (CS) / CSE(DS) / CSE (AI & ML) / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACSD09	Core	3	0	0	3	40	60	100
Contact Classes: 48	**Tutorial Classes: Nil**	**Practical Classes: Nil**				**Total Classes: 48**		
Prerequisite: Python Programming								

I. COURSE OVERVIEW:

Computer Architecture And Operating Systems course provides theoretical knowledge about the computer architecture; the structure of operating systems, process, memory management and virtual memory implementation principles, input-output management and deadlock avoidance, file system structure. It deals with the transfer of programs in and out of memory; organizes processing time between programs and users. Learned knowledge will be implemented in design and development of hybrid operating systems, command control systems, and in real time environments.

II. COURSE OBJECTIVES:
The students will try to learn
I.   The concepts of register transfer logic and arithmetic operations, instruction format and instruction cycle.
II. The basic components of computer systems besides the computer arithmetic operations
III. The functionalities of main components in operating systems and analyze the algorithms used in process management.
IV. Algorithms used in memory management and I/O management
V.   Different methods for preventing or avoiding deadlocks and File systems.

III. COURSE OUTCOMES:
At the end of the course students should be able to:
CO1 Demonstrate the implementation of micro-operations with the help of register transfer language and electronic circuits.
CO2 Identify appropriate addressing modes for specifying the location of an operand and Make use of number system for data representation and binary arithmetic in digital computers.
CO3 Solve problems related to process scheduling, and deadlock handling in UNI and multi-processing systems.
CO4 Choose memory allocation algorithms for effective utilization of resources and select various page replacement algorithms applied for allocation of frames..
CO5 Make use of different file allocation and disk scheduling algorithms applied for efficient utilization of storage.

IV. COURSE CONTENT:

MODULE – I: INTRODUCTION (10)
Central Processing Unit: Introduction, General Register Organization, Stack organization Computer Organization, Register transfer: Register transfer language, register transfer, bus and memory transfers, arithmetic micro operations, logic micro operations, shift micro operations;
Control unit: Control memory, address sequencing, micro program example, and design of control unit.

MODULE – II: CPU AND COMPUTER ARITHMETIC (09)
CPU design: Instruction cycle, data representation, memory reference instructions, input-output, and interrupt,addressing modes, data transfer and manipulation, program control.

Computer arithmetic: Addition and subtraction, floating point arithmetic operations, decimal arithmetic unit.

MODULE – III: PROCESS MANAGEMENT (10)
Introduction: Operating system structures, System components, OS services.

Process Management: Processes, Process concepts, Process scheduling, CPU scheduling, Scheduling algorithms, Preemptive strategies, Non-preemptive strategies.

MODULE – IV: MEMORY MANAGEMENT AND I/O MANAGEMENT (09)
Storage Management Strategies , Contiguous vs. non-contiguous storage allocation, Paging , Segmentation, demand paging , Page replacement strategies

I/O Management: Basic approaches in I/O (polled, overlapped – e.g. interrupt driven, DMA), Structure of disk sectors, Disk scheduling (FCFS, Shortest Seek Time First, Elevator algorithm, Cyclic scan)

MODULE –V: DEADLOCKS AND FILE SYSTEM (10)
Deadlocks - Deadlock characterization, Prevention, Avoidance, Detection, Recovery.
File System: The concept of a file, access methods, directory structure, file system mounting, file sharing, protection, file system structure, file system implementation, allocation methods

V. TEXT BOOKS:
1. M.Morris Mano, ;Computer System Architecture", Prentice-Hall Publishers, 3rd edition, 2002.
2. John P Hayes, 'Computer Architecture and Organization', McGraw Hill international edition, 3rd edition, 2005.
3. Abraham Silberschatz,Peter Galvin and Gagne, "Operating System Concepts", Addison Wesley, 6th edition 2002.

VI. REFERENCE BOOKS:
1. Carl Hamachar, Zvonco Vranesic and Safwat Zaky, "Computer Organization", McGraw-Hill.
2. Harvey M.Deitel, "Operating System", Addison Wesley, 2nd edition, 2000.

VII. ELECTRONICS RESOURCES:
1. https://cse.iitkgp.ac.in/~ksrao/caos2018files/caos-intro.pdf
2. https://cs.sdsu.edu/master-exams/operating-systems-architecture/

VIII. MATERIALS ONLINE
1. Course template
2. Tutorial question bank
3. Tech-talk topics
4. Open-ended experiments
5. Definitions and terminology
6. Assignments
7. Model question paper – I
8. Model question paper – II
9. Lecture notes
10. PowerPoint presentation
11. E-Learning Readiness Videos (ELRV)