

**INTERNATIONAL INSTITUTE OF PROFESSIONAL STUDIES
DEVI AHILYA UNIVERSITY, INDORE**

MCA (6 Years)

VII SEMESTER



Sub. Code	Subject Name	Credit
IC-702A	Design & Analysis of Algorithms	4
IC-701	Computer Architecture	4
IC-707B	Advanced Java	4
IC-705	Operating Systems	4
IC-708B	Analog Electronics	4
IC-709A	Advanced Java Lab	2
IC-709B	Design & Analysis of Algorithms Lab	2
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INTERNATIONAL INSTITUTE OF PROFESSIONAL STUDIES, DAVV, INDORE
MCA (6 Years) VII SEMESTER

IC-702A: Design & Analysis of Algorithms

Aim of Course: Aim of Course: This course aims to introduce the classic algorithms in various domains, and techniques for designing efficient algorithms.

Objectives:

The course is designed to make students:

- Learn to analyze the running time of the algorithms
- Understand the application of algorithms and design techniques to solve problems.
- Learn to analyze the complexities of various problems in different domains and design efficient algorithms.
- Understand asymptotic notation to provide a rough classification of algorithms
- Study algorithms for fundamental problems in computer science and engineering work and compare with one another.
- Understand the problems for which it is unknown whether there exist efficient algorithms or even algorithm

Units 1.

Introduction to Algorithms, What is an Algorithm, Algorithm Specification, Performance analysis., Review of Data Structures, Stacks and Queues, Trees ,Graphs

Units 2.

Divide and Conquer, Genaral Method, Binary Search, Finding the Maximum and Minimum , Merge Sort , Strassen's Matrix Multiplication ,

Units 3.

The Greedy Method , General Method , Knapsack Problem , Job Sequencing with deadlines , Minimum Cost Spanning Trees , Prim's Algorithm, Kruskal's Algorithm

Units 4.

Dynamic Programming, The General Method, Multistage Graphs, All Pairs Shortest Paths, Single Source Shortest Paths, 0/1 Knapsack, Traveling Salesperson Problem

Units 5.

Basic Traversal and Search Techniques, Techniques for Binary Trees, Techniques for Graphs , Back Tracking, The Genaral Method , The 8-Queens Problem , Sum of Sub sets , NP-Hard and NP-Complete Problems, The Basic Concepts , Non-Deterministic Algorithms , The Classes NP-Hard & NP-Complete.

RECOMMENDED BOOKS

[1] T.H. Coreman, C.E. Leiserson and R.L. Rivest, Introduction to Algorithms, Prentice Hall of India, 1990.

[2] E. Horowitz, S. Sahni, S Rajasekaran, Computer Algorithms, Galgotia Publications.

[3] Saara Base, Computer Algorithms: Introduction to Design and Analysis, Addison Wesley, 2/e, 1988.

[4] Knuth, D, The art of computer programming, Vols. 1-2-3, Addison Wesley 1968-73.

[5] A V Aho, J E Hopcroft & J D Ullman, The Design and Analysis of Computer Algorithms, Addison Wesley, 1974.

INTERNATIONAL INSTITUTE OF PROFESSIONAL STUDIES, DAVV, INDORE
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IC-701: Computer Architecture

Aim of Course: To understand the concepts of design and analysis of the hardware of a computer system and its components such as control unit, arithmetic and logical (ALU) unit, input/output, and memory unit.

Objectives:

The course is designed to make students:

- Learn concepts of microprogramming in the design of the central processing unit of a computer system.
- Understand various ways for interconnecting I/O devices to the system.
- Understand basic concepts of parallel processing

Course Contents:

UNIT I

Introduction and vocabulary, History of computer architecture, Overview of computer organization, Difference between Computer architecture & organization, von Neumann/Turing, IBM 360 series, Moore's law, Performance measurement: IPC, CPI, MIPS, Amdahl's law, CPU performance equation, Speeding it up, Performance Mismatch & Solutions, Instruction cycle, Interrupt cycle, Bus interconnections: Types, Arbitration, PCI.

UNIT II

CPU Structure, Registers, User Visible Registers, General Purpose Registers, accumulator organization, general register organization, stack organization of CPU, High level issues in CPU design, Memory: Location, Capacity, Unit of transfer, Access method, Performance (Access, cycle, transfer rate), Physical type (semi conductor or magnetic), Physical characteristics (volatile, erasable etc.), Locality of references, Cache mapping techniques, Cache write policies, Cache initialization, External memory, RAID organization of hard disks.

UNIT III

Input/Output: Programmed I/O, Interrupt Driven I/O, Direct Memory Access. Representing information digitally, Byte Ordering: Big-Endian & Little-Endian. Instruction sets, Elements of an Instruction, Instruction Representation, Instruction types, Number of Addresses, Design Decisions [CISC/RISC], Addressing Modes, Large Register File in RISC.

Register and data flow design, data fetch and instruction fetch in indirect instruction cycle, CPU control unit, Functions of Control Unit, Micro-Operations, Micro Programmed Control and Hardwired control unit and their advantages-disadvantages.

UNIT IV

Instruction level parallelism: Pipeline design, Synchronous & Asynchronous Pipeline conflicts: Resource conflict, Data dependency, and Branch difficulties. Solutions to deal with pipelining: Hardware interlocks, operand forwarding, Delayed load, Pre fetch target instruction, Branch target buffer, Loop buffer, Branch prediction, and Delayed branch. Super scalar design; Super pipelining, and VLIW processors.

UNIT V

Parallel Processing, Flynn's classification: SISD, SIMD, MISD, MIMD. Vector processor, Array Processor, Symmetric multi processing, NUMA, Cache coherence in parallel computing.

Reference Books:

1. William Stallings, Computer Organization and Architecture: Design for performance 8th Ed., Pearson Education.
2. Rajkamal, Computer Architecture, ISP 2006, Tata McGraw HILL.
3. Andrew Tanenbaum, Structured computer organization, 4th Ed., Prentice – Hall, Upper Saddle River, NJ, 2000. (Alternate reference)
4. M. Morris Mano, Computer System Architecture, 3rd Ed., Pearson Education.
5. Kai Hwang, Computer Architecture

INTERNATIONAL INSTITUTE OF PROFESSIONAL STUDIES, DAVV, INDORE
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IC-703B: Advanced Java

Aim of Course: To introduce the enhanced and advanced concepts of Java.

Objectives:

The course is designed to formulate students for:

- Design and developing an understanding of the web applications of Java.
- Learn Java programming language with new and enhanced versions.
- Students will be capable of making their own GUI, network, security, thread, Servlet and JSP based systems.
- These learning will be helpful for their campus based recruitment as well as in the organization.

Course Contents:

UNIT I

Collections: Collection Interfaces, Concrete Collections, the Collections Framework

Multithreading: Creating thread and running it, Multiple Thread acting on single object, Synchronization, Thread communication, Thread group, Thread priorities, Daemon Thread, Life Cycle of thread.

UNIT II

Networking: Internet Addressing, InetAddress, Factory Methods, Instance Method, TCP/IP Client Sockets, URL, URL Connection, TCP/IP Server Sockets, Datagrams

Java Database Connectivity (JDBC): Merging Data from Multiple Tables: Joining, Manipulating Databases with JDBC, Prepared Statements, Transaction Processing, Stored Procedures C

UNIT III

Servlets: Servlet Overview and Architecture, Interface Servlet and the Servlet Life Cycle, Handling HTTP get Requests, Handling HTTP post Requests, Redirecting Requests to Other Resources, Session Tracking, Cookies, Session Tracking with HttpSession.

UNIT IV

Java Server Pages (JSP): Introduction, Java Server Pages Overview, A First JavaServer Page Example, Implicit Objects, Scripting, Standard Actions, Directives, Custom Tag Libraries.

UNIT V

Remote Method Invocation: Defining the Remote Interface, Implementing the Remote Interface, Compiling and Executing the Server and the Client

Common Object Request Broker Architecture (CORBA): Technical/Architectural Overview, CORBA Basics, CORBA services

Introduction SmartPhone Application Development: Introduction to android platform, Creating application template, adding activity, intent, services to application, using Google map API.

Text Books:

- Core JAVA Volume-II- Advanced Features, 9th edition , Horstmann Cornell- Pearson.
- “Advanced Java 2 Platform HOW TO PROGRAM” by H. M.Deitel, P. J. Deitel, S. E. Santry – Prentice
- “Beginning Java™ EE 6 Platform with GlassFish 3 From Novice to Professional” by Antonio Goncalves
- Head First Servlets and JSP, Bryan Basham, O'Reilly

Reference Book/Web:

- Deitel & Deitel, JAVA How to Program, Pearson Education, Sixth Edition
- Herbert Schildt , Java : The Complete Reference, Tata McGraw- Hill, 7th Edition
- <http://www.w3schools.in/java/>
- <http://www.tutorialspoint.com/>

INTERNATIONAL INSTITUTE OF PROFESSIONAL STUDIES, DAVV, INDORE
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IC-705: Operating Systems

Aim of Course: To make the students familiar with design of operating systems as resource manager of a computer system.

Objectives:

The course is designed to make students:

- To present basic concepts of operating system architecture
- Understand the concepts of processor management and memory management techniques
- Study deadlock handling and inter-process communication
- Study file systems and device management.

Course Contents:

UNIT I

Introduction to Operating System:- Objectives and functions and the services provided by OS.

Evolution of operating system:- Concepts of batch processing, multiprogrammed batched system, time-sharing systems, Parallel Systems, Distributed systems. Operating system structure:- System calls and system programs.

UNIT II

Process Management: -Process concept, Process states, Process scheduling , Operations on processes , Co-operating processes and IPC.

CPU scheduling: - Basic concept and scheduling criteria, Long term, short term medium term schedulers, Scheduling algorithms, Multi-Processors Scheduling, Measurement of performance of processor.

UNIT III

Process synchronization: - Critical section problem, Mutual exclusion and synchronization, Concept of semaphores, Classical IPC problems. Deadlocks: - Characterization of deadlock, Methods of handling prevention, detection and avoidance, Recovery from deadlock.

UNIT IV

Memory management:-Logical and physical address spaces, Swapping and paging, Contiguous, allocation and its drawbacks, Non-contiguous allocation. Virtual memory: - Demand paging and its need, Performance of demand paging, Page replacement and its need, Thrashing and allocation of frames.

File system interface: - File concept, access methods, Directory structure, protection and consistency. File system structure, Allocation methods, Free space management, Efficiency and performance, Coincidence, protection and sharing.

UNIT V

I/O system: - Various i/o devices, Device drivers, structure of I/O software, Transforming

I/O request of h/w operation. Secondary storage structure:- Disk structure, Disk Scheduling, Disk management, Swap space management and Disk reliability.

Note:- Case study of windows and Unix operating system is to be done as assignment.

Text Book:

1. Silberschatz , Gagne, Galvin, Operating System concept, 8th edition, WILEY.

Reference Books:

1. D. M. Dhamdhare, System Programming and operating system, Tata McGraw Hill, 3rd edition.

2. Gary Nutt, Operating Systems, 3rd edition Pearson Education.
 3. Andrew S. Tanenbaum, 3rd edition Modern Operating Systems
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INTERNATIONAL INSTITUTE OF PROFESSIONAL STUDIES, DAVV, INDORE
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IC-704B: Analog Electronics

Aim of Course: To enable students understand operational amplifiers.

Objectives:

The course is designed to make students:

- Understand working of amplifiers.
- Understand amplifier circuits, feedback circuits, and oscillator circuits To teach basic numerical methods required for typical engineering and business applications..

Course Contents:

UNIT I

Amplifier Circuits: Overview of BJT DC biasing techniques: Fixed bias, emitter stabilized bias, voltage divider bias. BJT Small signal analysis: Common emitter fixed bias, voltage divider bias, emitter follower.

UNIT II

Frequency Effects: Frequency response of an amplifier: Input & Output coupling capacitor, emitter and collector bypass capacitor, Miller's theorem, decibel voltage gain, cascading of stages.

UNIT III

Operational Amplifier: Differential and common mode operation, Non-inverting and inverting amplifiers: summing amplifier, integrator, and differentiator. Op-Amp specifications: DC offset parameters, frequency parameters.

UNIT IV

Feedback circuits: Concept of feedback, Feedback connection types, effect of feedback on gain and bandwidth.

UNIT V

Oscillators circuits: Operation, Phase Shift, Wein Bridge, Tuned and Crystal oscillators

Text Book:

1. Adel S. Sedra, Kenneth C. Smith, Microelectronics Circuits Theory and Applications

Reference Books:

4. Electronic Devices and Circuit theory by Robert Boylestad & Louis Nashelsky.
5. Electronic Principles by A. P Malvino.