



**MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR**

**(Deemed to be University)**

**(Declared Under Distinct Category by Ministry of Education, Government of India)**

**NAAC Accredited with A++ Grade**



*Syllabi of*  
*Departmental Courses (DC) Courses*  
***B. Tech I Semester***  
***For batch admitted 2024-25***  
***(Computer Science and Design)***  
*Under Flexible Curriculum*



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## INTRODUCTION TO COMPUTER SCIENCE AND DESIGN DC-29241101

### COURSE OBJECTIVES:

- To understand the fundamentals of modern computing systems.
  - To familiarize students with contemporary design techniques and tools.
  - To implement design solutions using digital logic, algorithms, computer networks, and software development methodologies.
  - To introduce students to emerging technologies and their impact on computer science and design.
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### Unit I – Introduction to Design:

Introduction to design thinking, Design thinking and human-centered design processes, Principles of design, Elements of visual design, Basic principles of user interface design and user experience (UX) design, Introduction to design tools and software, Responsive and adaptive design principles, Accessibility and inclusive design practices.

### Unit II - Introduction to Computer:

Evolution of computing: from traditional computers to cloud and edge computing, Classification of Computers. Components of modern computing systems: CPUs, GPUs, TPUs, and specialized hardware, System bus, Computer memory and its types, Memory hierarchy. Overview of operating systems and their roles in modern computing environments, its types, and services. Emerging paradigms: quantum computing and neuromorphic computing.

### Unit III – Algorithm Design:

Introduction to algorithms, Algorithm design techniques, Flowcharts and pseudocode, Basic data structures and their applications, Fundamental algorithm design techniques: divide-and-conquer, dynamic programming, greedy algorithms, Advanced data structures: balanced trees, hash tables, graphs. Parallel and distributed algorithm design, Ethics and bias in algorithmic decision-making.

### Unit IV - Computer Network Design:

Introduction: Computer Network, Types- LAN, MAN & WAN, Data transmission modes, Networking Devices, Evolution of network architectures: from client-server to microservices, Cloud computing and serverless architectures, Internet of Things (IoT) and edge computing networks, 5G and beyond: implications for network design, Network security and privacy in the modern era, Blockchain and decentralized networks

### Unit V - Software Design:



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The evolving role of software, Software engineering, Software Development cycle, Levels of Software design, Modern software development methodologies: Agile, DevOps, CI/CD, Microservices and containerization, API-first design and RESTful architectures, Cloud-native application development, Low-code and no-code development platforms, Artificial Intelligence and Machine Learning in software design, Ethical considerations in software development

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## RECOMMENDED BOOKS:

- "Design of Everyday Things" by Don Norman
  - "Clean Architecture: A Craftsman's Guide to Software Structure and Design" by Robert C. Martin
  - "Designing Data-Intensive Applications" by Martin Kleppmann
  - "Introduction to Algorithms" by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein
  - "Computer Networks" by Andrew S. Tanenbaum and David J. Wetherall
  - Online resources: Coursera, edX, and MIT OpenCourseWare for up-to-date computer science and design courses
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## COURSE OUTCOMES:

After completion of the course students would be able to:

**CO1:** Understand and apply modern design principles in user experience and interface design

**CO2:** Design and analyze efficient algorithms for complex problem-solving

**CO3:** Describe current trends in computer networks and distributed systems

**CO4:** Apply modern software design principles and development methodologies

**CO5:** Evaluate the ethical implications of emerging technologies in computer science and design

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## CO-PO Mapping

CO	PO													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1			2		3	2			2	2	2		1	
CO2		3	3			1			1		1	1		2
CO3		2		3	2				1	1			2	
CO4			2		3						2	1		2
CO5		3	1	2		2		2				1	2	



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## COMPUTER PROGRAMMING

ESC-29241102

### COURSE OBJECTIVES

- To develop the understanding of algorithms, programming approaches and program documentation techniques.
- To design and implement programming solutions for problem solving.

### Unit I

Introduction to Programming, Machine Level Languages, Assembly Level Languages, High Level Languages, Program Execution and Translation Process, Problem solving using Algorithms and Flowcharts. Introduction to C Programming: Data Types, Constants, Keywords, Operators & Expressions, Precedence of operators and input/output functions.

### Unit II

Control Statements and Decision Making: The goto statement, The if statement, The if- else statement, Nesting of if statements, The conditional expression, The switch statement, The while loop, The do...while loop, The for loop, The nesting of for loops, The break and continue statement.

### Unit III

Arrays, Strings & Pointers: One dimensional Arrays, Passing Arrays to Functions, Multidimensional Arrays, Strings, Basics of Pointers & Addresses, Pointer to Pointer, Pointer to Array, Array of Pointers, Types of pointers, Pointer to Strings.

### Unit IV

Functions & Structures: Function Basics, Function Prototypes, Passing Parameter by value and by reference, Passing string to function, Passing array to function, Function returning address, Recursion, Structures & Union, Pointer to Structure, Self-Referential Structures, Dynamic memory allocation by malloc/calloc function, Storage Classes.

### Unit V

File Handling: Defining and Opening a file, Closing Files, Input/output Operations on Files, Predefined Streams, Error Handling during I/O Operations, Command Line Arguments.



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## RECOMMENDED BOOKS

- Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.
  - Paul Deitel and Harvey M. Deitel , How to Program, Pearson Publication.
  - Yashavant Kanetkar , Let Us C, BPB publication.
  - E. Balagurusamy, Programming in ANSI C, Tata McGraw-Hill.
  - Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.
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## COURSE OUTCOMES

After completion of the course students will be able to:

CO1: **Identify** situations where computational methods and computers would be useful.

CO2: **Describe** the basic principles of procedural programming.

CO3: **Develop** algorithms and flowchart for a given problem.

CO4: **Analyze** the problems and choose suitable programming techniques to develop solutions.

CO5: **Design** computer programs to solve real world problems.

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CO1		3	3			1	2					2	2	
CO2	3	1	2									1	1	
CO3		3	3	2					2		1	1		2
CO4		3	3						2	1	1			3
CO5		2	3	2		3	2		1		1		2	



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## **Digital Circuit Design**

**DC-29241103**

### **Course Objectives:**

- To perform the analysis and design of various digital electronic circuits.
- To learn various number systems, boolean algebra, and logic gates.
- To understand the concept of counters, latches, and flip-flops.
- To grasp various memories and basic analog and digital systems.

### **Unit I:**

Introduction to Digital Circuit Design, Various Number Systems: Binary, Decimal, Octal and Hexadecimal Numbers, Conversions, Complement's, Binary Arithmetic, Binary Codes: BCD, ASCII Codes. Basic Theorems and Properties of Boolean Algebra, Boolean Functions & Relations, Digital Logic Gates, NAND and NOR implementation, De Morgan's Theorem, Karnaugh Maps and simplification/minimization, Prime Implicants and its types.

### **Unit II:**

Combinational Circuits, Half Adder, Half Subtractor, Full Adder and Full Subtractor, Binary Adder-Subtractor, Binary Multiplier, Comparator, Decoders, Encoders, Multiplexers, Demultiplexer.

### **Unit III:**

Sequential Circuits, Level Clocking, Latches, Flip-Flops: RS Latches, RS Flip-flop, D Latches, Edge-triggered D Flip-flop, Edge-triggered JK Flip-flop, JK Master-slave Flip-flop, T Flip-flop; Registers, Shift Registers, Counters, Ripple Counters, Synchronous Counters.

### **Unit IV:**

Introduction to Memory, Memories: ROM, RAM, SRAM, DRAM, Memory Decoding, Error Detection and Correction methods, Programmable Logic Array, Programmable Array Logic, Sequential Programmable Devices, RTL and DTL Circuits, TTL, ECL, MOS, CMOS, Application Specific Integrated Circuits.

### **Unit V:**

Clocks and timing circuits, Introduction of Analog to Digital & Digital to Analog converters, Display devices, Field Effect Transistors, Bipolar Junction Transistors: NPN transistor and PNP transistor.



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## Reference Books:

- Digital Design, Morris Mano M. and Michael D. Ciletti, Pearson Education.
- Digital Principles and Design, Donald D. Givone, Tata McGraw Hill, India.
- Digital Logic and Computer Design by M. Morris Mano.
- Digital Systems: Principles and Applications by Ronald J. Tocci, Neal S. Widmer, and Gregory L. Moss.

## Course Outcomes:

**CO1: Recall** different number system and solve the basic arithmetic operations.

**CO2: Solve** boolean functions using logic gates, and K-map.

**CO3: Develop** the understanding of combinational circuits.

**CO4: Analyze** the basic concept of sequential circuits.

**CO5: Compare** various memory and Programmable Logic Devices, converters, and

## CO-PO Mapping

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CO1	3	2	2				1							1
CO2		2	3	2					1				1	
CO3	2	3	2				1			1			2	
CO4	3	3	2				1			1			2	
CO5		3		1		1			1		2			1



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**Cyber World and Security Concern  
DC-29241104**

**COURSE OBJECTIVES**

- To understand the cyber security threat landscape.
  - To analyse and evaluate existing legal framework and laws on cyber security.
  - To analyse and evaluate the digital payment system security and remedial measures against digital payment frauds.
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**Unit-I**

**Introduction to Cyber security:** Defining Cyberspace and Overview of Computer and Web-technology, Architecture of cyberspace, Communication and web technology, Internet, World wide web, Advent of internet, Internet infrastructure for data transfer and governance, Internet society, Regulation of cyberspace, Concept of cyber security, Issues and challenges of cyber security

**Unit-II**

**Cyber crime and Cyber law:** Classification of cyber crimes, Common cyber crimes- cyber crime targeting computers and mobiles, cyber crime against women and children, financial frauds, social engineering attacks, malware and ransomware attacks, zero day and zero click attacks, Cybercriminals modus-operandi , Reporting of cyber crimes, Remedial and mitigation measures, Legal perspective of cyber crime, IT Act 2000 and its amendments, Cyber crime and offences, Organisations dealing with Cyber crime and Cyber security in India, Case studies.





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**Department of Computer Science and Engineering**

**Unit-III**

**Social Media Overview and Security:** Introduction to Social networks. Types of Social media, Social media platforms, Social media monitoring, Hashtag, Viral content, Social media marketing, Social media privacy, Challenges, opportunities and pitfalls in online social network, Security issues related to social media, Flagging and reporting of inappropriate content, Laws regarding posting of inappropriate content, Best practices for the use of Social media, Case studies.

**Unit-IV**

**E-Commerce and Digital Payments:** Definition of E- Commerce, Main components of E-Commerce, Elements of E-Commerce security, E-Commerce threats, E-Commerce security best practices, Introduction to digital payments, Components of digital payment and stake holders, Modes of digital payments- Banking Cards, Unified Payment Interface (UPI), e-Wallets, Unstructured Supplementary Service Data (USSD), Aadhar enabled payments, Digital payments related common frauds and preventive measures. RBI guidelines on digital payments and customer protection in unauthorised banking transactions. Relevant provisions of Payment Settlement Act,2007

**Unit-V**

**Digital Devices Security, Tools and Technologies for Cyber Security:** End Point device and Mobile phone security, Password policy, Security patch management, Data backup, Downloading and management of third party software, Device security policy, Cyber Security best practices, Significance of host firewall and Ant-virus, Management of host firewall and Anti-virus, Wi-Fi security, Configuration of basic security policy and permissions.



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**Department of Computer Science and Engineering**

**Reference Books:**

- Cyber Crime Impact in the New Millennium, by R. C Mishra , Auther Press. Edition 2010.
- Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Sumit Belapure and Nina Godbole, Wiley India Pvt. Ltd. (First Edition, 2011)
- Security in the Digital Age: Social Media Security Threats and Vulnerabilities by Henry A. Oliver, Create Space Independent Publishing Platform. (Pearson , 13th November, 2001)
- Electronic Commerce by Elias M. Awad, Prentice Hall of India Pvt Ltd.
- Cyber Laws: Intellectual Property & E-Commerce Security by Kumar K, Dominant Publishers
- Network Security Bible, Eric Cole, Ronald Krutz, James W. Conley, 2nd Edition, Wiley India Pvt. Ltd.
- Fundamentals of Network Security by E. Maiwald, McGraw Hill.

**COURSE OUTCOMES**

After completion of this course, the students would be able to:

- CO1. **Understand the** concept of Cyber security and issues and challenges associated with it.
- CO2. **Understand** the cyber crimes, their nature, legal remedies and as to how report the crimes through available platforms and procedures.
- CO3. **Identify** various privacy and security concerns on online Social media.
- CO4. **Analyze** the basic concepts related to E-Commerce and digital payments..
- CO5. **Evaluate** security aspects related to Computer and Mobiles.



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CO2	2	3		3					1			2	3	
CO3		3			2	2			1			1	2	
CO4	3		2								1	1	2	
CO5		3		2			1		1			2		1