Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Shri Vaishnav Institute of Information Technology

Choice Based Credit System (CBCS) in the light of NEP-2020

Diploma CSE/Cyber Security

SEMESTER-II(2025-2028)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME					L	T	P	CREDITS
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
DTCS201	**DC**	**Introduction to Data Structure**	**60**	**20**	**20**			**3**	**0**	**2**	**4**

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES:

The student will have ability to:

1. Understand basic data organization concepts.
2. Learn various data structures and their applications.
3. Implement data structures using C/C++/Python.
4. Develop programs using stacks, queues, linked lists, trees, and graphs.

COURSE OUTCOMES:

Upon completion of the subject, students will be able to:

1. Explain the concept of data organization and abstract data types.
2. Use arrays, linked lists, stacks, and queues in problem-solving.
3. Choose appropriate data structures for given problems.
4. Apply searching and sorting techniques.

SYLLABUS

UNIT I **10 HOURS**

Introduction to Data Structures: Definition and importance of data structures, Classification: Primitive and Non-primitive data types, Abstract Data Types (ADT), Concept of Algorithm, Pseudocode, and Flowcharts, Complexity analysis: Time and Space complexity, Big O notation.

Arrays and Strings: One-dimensional and Multi-dimensional Arrays, Operations: Traversing, Insertion, Deletion, Searching, and Sorting, Applications of arrays (Matrix representation, Polynomial representation), Introduction to Strings and basic string operations

UNIT II **8 HOURS**

Linked Lists: Concept and types of linked lists:Singly Linked List, Doubly Linked List, Circular Linked List, Operations: Insertion, Deletion, Traversal, Comparison between arrays and linked lists

UNIT III **9 HOURS**

Stacks and Queues: Stack: Definition, operations (push, pop, peek), implementation using array and linked list, Applications: Expression evaluation, Conversion (Infix ↔ Postfix), Queue: Definition, operations (enqueue, dequeue), types (circular, priority, double-ended), Implementation using array and linked list.

UNIT IV **10 HOURS**

Trees: Definition and terminology (root, leaf, degree, height, etc.), Binary Tree and its types (Full, Complete, Binary Search Tree), Tree traversal: In-order, Preorder, Post-order, Operations on Binary Search Tree (BST): Insertion, Deletion, Searching, Introduction to Heap and Applications

Graphs: Definition and representation (Adjacency Matrix, Adjacency List), Types of graphs, Graph traversal: BFS and DFS, Applications of Graphs.

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DTCS201	DC	Introduction to Data Structure	60	20	20			3	0	2	4

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UNIT V **8 HOURS**

Searching: Linear Search, Binary Search

Sorting: Concept and types of Sorting, Stable & Unstable sorting. Concept of Insertion Sort, Selection sort, Bubble sort, Quick Sort, Merge Sort, Heap & Heap Sort, ShellSort & Radix sort.

TEXTBOOKS:

1. Ashok N. Kamthane, "Introduction to Data structures", 2nd Edition, Pearson Education India,2011.
2. Tremblay & Sorenson, "Introduction to Data- Structure with applications", 8th Edition, Tata McGrawHill,2011.

REFERENCE:

1. Rajesh K. Shukla, Data Structures Using C & C++, Wiley-India 2016
2. ISRD Group, Data Structures Using C, TataMcGraw-Hill 2015.
3. E. Balagurusamy, "Data Structure Using C", Tata McGraw-Hill 2017.
4. Prof. P.S. Deshpande, Prof. O.G. Kakde, C & Data Structures, Charles River Media 2015.
5. Gav Pai, Data Structures, Tata McGraw-Hill, 2015.

LIST OF PRACTICALS

1. To develop a program to find an average of an array using AVG function.
2. To implement a program that can insert, delete and edit an element in array.
3. Write a menu driven program to implement the push, pop and display option of the stack with the help of static memory allocation.
4. Write a menu driven program to implement the various operations on a linear queue.
5. To implement an algorithm for insert and delete operations of circular queue and implementing the same using array.
6. Write a menu driven program to implement various operations on a linear linked list.
7. Write a menu driven program to implement various operations on a circular linked list
8. Write a program to develop an algorithm for binary search and perform the same.
9. Write a program for implementation of Bubble sort
10. Write a program for Insertion sort
11. Write a program for Merge Sort
12. Write a program to implement Quick sort

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DTCS202	**DC**	**Data Communication and Computer Networks**	**60**	**20**	**20**	**30**	**20**	3	0	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES:
The student will have ability to:
1. Understand the concepts, fundamentals, and processes of data communication and networking.
2. Study various transmission media, encoding, and switching techniques.
3. Learn about the layered architecture of OSI and TCP/IP models and their associated protocols.
4. Understand network addressing, routing, and transport mechanisms.
5. Explore real-world networking devices, tools, and configuration techniques.

COURSE OUTCOMES:
Upon completion of the subject, students will be able to:
1. Explain the working of data communication systems and network architecture.
2. Classify different network topologies, transmission media, and encoding techniques.
3. Analyze error detection, correction, and flow control techniques.
4. Evaluate switching, routing, and congestion control mechanisms.
5. Configure and troubleshoot simple local and wide area networks using simulation tools.

SYLLABUS

UNIT I **10 HOURS**

Fundamentals of Data Communication:

Components of Data Communication System, Types of Connections: Point-to-Point, MultiPoint, Transmission Modes: Simplex, Half Duplex, Full Duplex, Network Topologies and Devices (Hubs, Switches, Routers, Gateways), Transmission Media: Guided and Unguided, Analog and Digital Transmission, Bandwidth, Bit Rate, Noise, Delay, Jitter, Protocols and Standards, OSI and TCP/IP Models (Overview and Comparison).

UNIT II **8 HOURS**

Data and Signal Transmission:

Data Encoding and Modulation Techniques: Unipolar, Polar, Bipolar Encoding; AM, FM, PM Concepts; Line Coding and Block Coding, Multiplexing Techniques: FDM, TDM, WDM, Synchronous & Statistical TDM, Circuit, Message, and Packet Switching, Synchronous vs. Asynchronous Transmission, Flow and Error Control: Stop-and-Wait, Go-Back-N, Selective Repeat.

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DTCS202	**DC**	**Data Communication and Computer Networks**	**60**	**20**	**20**	**30**	**20**	3	0	2	4

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UNIT III **9 HOURS**

Data Link and Network Layer:

Data Link Layer Functions, Framing and Protocols, MAC Sublayer: ALOHA, Slotted ALOHA, CSMA/CD, CSMA/CA, Network Layer Design Issues and Services, IPv4, IPv6 Addressing: Classful and Classless, Subnetting and Supernetting, Routing Algorithms: Distance Vector, Link State, Dijkstra, Bellman-Ford, ARP, RARP, ICMP, DHCP, and NAT Concepts.

UNIT IV **7 HOURS**

Transport and Application Layer:

Transport Layer Functions and Services, TCP and UDP Protocols, TCP Header and Connection Management, Flow Control and Congestion Control, SCTP and its Features, Application Layer Protocols: DNS, HTTP, FTP, SMTP, POP3, SNMP, Telnet, Socket Programming and Network Configuration Basics.

UNIT V **8 HOURS**

Network Design, Security, and Tools:

Network Security Fundamentals: Authentication, Encryption, Firewalls, VPNs, Wireless and Mobile Networks Overview, Network Performance Metrics: Throughput, Latency, Bandwidth Utilization, Network Simulation Tools: Packet Tracer, NS2, Wireshark, Network Troubleshooting and Basic Configuration Commands (ping, ipconfig, traceroute), Introduction to Emerging Topics: IoT Networking, SDN, and Cloud-based Networking

TEXTBOOKS:

1. B. A. Forouzan, Data Communication and Networking, 5th Edition, McGraw Hill, 2017.
2. Andrew S. Tanenbaum, Computer Networks, 6th Edition, Pearson, 2021.

REFERENCE:

1. William Stallings, Data and Computer Communication, 10th Edition, Pearson, 2014.
2. James F. Kurose & Keith W. Ross, Computer Networking: A Top–Down Approach, 7th Edition, Pearson, 2021.
3. W. Richard Stevens, TCP/IP Illustrated, Addison Wesley, 2nd Edition, 2012.

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DTCS202	**DC**	**Data Communication and Computer Networks**	**60**	**20**	**20**	**30**	**20**	3	0	2	4

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LIST OF PRACTICALS

1. Demonstrate different types of network equipment (hub, switch, router).
2. Crimp and test CAT5/CAT6 cables (straight-through and crossover).
3. Establish peer-to-peer LAN connection and verify connectivity.
4. Simulate packet transmission and routing in Cisco Packet Tracer.
5. Implement error detection using CRC and Hamming code.
6. Write a socket program for simple client-server communication.
7. Simulate subnetting and IP addressing using Packet Tracer.
8. Observe HTTP, FTP, and DNS packet exchange using Wireshark.
9. Implement Stop-and-Wait and Sliding Window flow control using a program.
10. Demonstrate router configuration and basic troubleshooting commands.

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DTMT302	DCC	Basic Digital Electronics	60	20	20	30	20	3	0	2	4

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COURSE OBJECTIVES:

The student will have ability to:

1. To present the Digital fundamentals, Boolean algebra, and its applications in digital systems
2. To present a problem oriented introductory knowledge of combinational digital circuits and its applications.
3. To understand the various semiconductor memories and related technology.
4. To introduce the sequential circuits involved in the making various digital circuits

COURSE OUTCOMES:

Upon completion of the subject, students will be able to:

1. Describe the number systems, conversions, and their applications.
2. Apply minimization techniques such as K maps, Tabular method etc. for the design of digital circuits
3. Understand combinational and sequential circuits
4. Differentiate various type of memories and there use in different applications.

SYLLABUS

UNIT I **10 HOURS**

Binary Number System: Binary arithmetic: addition, subtraction, multiplication and division, Complements: 1's,2's,9'sand 10's. Subtraction using complements, Octal number system, Hexadecimal number system, Conversion among binary, octal, decimal, and hexadecimal number systems, Codes: BCD, Gray, Excess-3, the parity bit

UNIT II **8 HOURS**

Logic Gates and Boolean Algebra: Primary Gates: symbol, operation and truth-table, NAND, NOR, EX-OR, EX-NOR gates: symbol, operation, truth- table, Positive and Negative logic, De Morgan's theorems, Universal Gate, Laws and theorems of Boolean algebra, simplification of Boolean expression, Sum of products (SOP) and product of sums (POS) expression, Karnaugh maps: Four variable K-maps and their simplification techniques, Don't care condition

UNIT III **9 HOURS**

Combinational Logic Circuits: Arithmetic Circuits: Half adder, full adder, parallel binary adder, l's complement subtractor circuit, 2's complement subtractor/adder circuits, 8421 adder, half and full subtractor, parallel binary subtractor, Binary to Gray and Gray to binary code converters, Decoder and Encoder, 8Hrs. Multiplexer and Demultiplexers.

UNIT IV **10 HOURS**

Memory and Programmable Logic:

Memory classifications, RAM: Static and Dynamic, ROM: ROM, PROM, EPROM. Programmable Logic Array (PLA), Programmable Array Logic (PAL) and Structure. A/D and D/A Converter

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DTMT302	DCC	Basic Digital Electronics	60	20	20	30	20	3	0	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

UNIT V **8 HOURS**

Flip-Flops:

S-R latch, S-R flip-flops asynchronous and synchronous, timing diagram, truth table, excitation table, D flip flop-timing diagram, truth table, excitation table T flip flop timing diagram, truth table, excitation table, J K flip flop timing diagram, truth table

TEXTBOOKS:

1. Mano M. M. and Ciletti M., "Digital Design", Pearson Education (2008) 4th ed
2. LeachD.P., Malvino A.P., Saha G.," Digital Principles and Applications", TMH, (2014)' 8th ed.

REFERENCE:

1. Floyd T. L. and Jain R. P.," Digital Fundamentals", Pearson Education (2008) 1fth ed
2. Tocci R. and widmer N., "Digital Systems: Principles and Applications", Pearson Education (2007) 10th ed

LIST OF PRACTICALS

1. To realize the basic logic gates.
2. To realize the NAND gate as a universal building block.
3. To realize the NOR gate as a universal building block.
4. To realize the HALF ADDER circuit
5. To realize the FULL ADDER circuit.
6. To realize the HALF SUBTRACTOR circuit.
7. To realize the AND-OR-INVERT circuit.
8. To realize the parity checker circuit.
9. To realize the exclusive-OR gate.
10. To realize the SR & JK flip-flop.

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DTCS203	DC	Computer Architecture	60	20	20	30	20	2	0	2	3

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COURSE OBJECTIVES:

The student will have the ability to:

1. To impart basic concepts of computer architecture and organization.
2. To explain the key skills of constructing cost-effective computer systems.
3. To familiarize with the basic CPU organization.
4. To help students understand various memory devices.
5. To facilitate students in learning of IO communication.

COURSE OUTCOMES:

Upon completion of the subject, students will be able to:

1. Identify various components of a computer and their interconnection.
2. Identify basic components and design of the CPU: the ALU and control unit.
3. Compare and select various Memory devices as per the requirement.
4. Compare various types of IO mapping techniques.
5. Critique the performance issues of cache memory and virtual memory.

SYLLABUS

UNIT I **8 HOURS**

STRUCTURE OF COMPUTERS:

Computer types, Functional units, Basic operational concepts, VonNeumann Architecture, Bus Structures, Software, Performance, Multiprocessors and Multicomputer, Data representation, Fixed and Floating point, Error detection and correction codes. COMPUTER ARITHMETIC: Addition and Subtraction, Multiplication and Division algorithms, Floating-point Arithmetic Operations, Decimal arithmetic operations**.**

UNIT II **7 HOURS**

BASIC COMPUTER ORGANIZATION AND DESIGN:

Instruction codes, Computer Registers, Computer Instructions, and Instruction Cycle. Timing and Control, Memory-Reference Instructions, Input-Output, and Interrupt. Central processing unit: Stack organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Complex Instruction Set Computer (CISC) Reduced Instruction Set Computer (RISC), CISC vs RISC

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DTCS203	DC	Computer Architecture	60	20	20	30	20	2	0	2	3

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UNIT III **7 HOURS**

REGISTER TRANSFER AND MICRO-OPERATIONS:

Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Micro-Operations, Logic Micro-Operations, Shift Micro-Operations, Arithmetic logic shift unit. MICRO-PROGRAMMED CONTROL: Control Memory, Address Sequencing, Micro-Program example, Design of Control Unit.

UNIT IV **7 HOURS**

MEMORY SYSTEM:

Memory Hierarchy, Semiconductor Memories, RAM (Random Access Memory), Read Only Memory (ROM), Types of ROM, Cache Memory, Performance considerations, Virtual memory, Paging, Secondary Storage, RAID.

UNIT V **7 HOURS**

INPUT OUTPUT:

I/O interface, Programmed IO, Memory Mapped IO, Interrupt Driven IO, DMA. MULTIPROCESSORS: Characteristics of multiprocessors, Interconnection structures, Inter-Processor Arbitration, Inter-Processor Communication and Synchronization, Cache Coherence**.**

TEXTBOOKS:

1. M. Moris Mano (2006), Computer System Architecture, 3rd edition, Pearson/PHI, India

REFERENCE:

1. Carl Hamacher, ZvonksVranesic, SafeaZaky (2002), Computer Organization, 5th edition, McGraw Hill, New Delhi, India.
2. William Stallings (2010), Computer Organization and Architecture- designing for performance, 8th edition, Prentice Hall, New Jersy..
3. Anrew S. Tanenbaum (2006), Structured Computer Organization, 5th edition, Pearson Education Inc,

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DTCS203	**DC**	**Computer Architecture**	**60**	**20**	**20**	**30**	**20**	**2**	**0**	2	**3**

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LIST OF PRACTICALS

1. Study of Computer Functional Units and Von Neumann Architecture
2. Implementation of Fixed-Point and Floating-Point Number Representation
3. Design and Simulation of Error Detection and Correction Codes (Hamming Code)
4. Implementation of Arithmetic Algorithms (Addition, Subtraction, Multiplication, Division)
5. Simulation of the Instruction Cycle of a Basic Computer
6. Demonstration of Addressing Modes and Instruction Formats
7. Register Transfer and Micro-Operations using RTL Simulation
8. Design of a Microprogrammed Control Unit
9. Study of Memory Hierarchy and Cache Mapping Techniques
10. Simulation of Input-Output Techniques (Programmed I/O, Interrupt, DMA)

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DTCS205	SEC	Introduction to Scripting	0	0	0	30	20	0	0	2	1

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COURSE OBJECTIVES:

The student will have ability to:

1. To understand different types of scripting languages.
2. To gain knowledge about client side scripts and server side scripting.
3. To learn about PHP, PERL and Python languages and their usage in implementation.
4. To build web application project using scripting languages.

COURSE OUTCOMES:

Upon completion of the subject, students will be able to:

1. Student will be Able to understand difference between scripting languages.
2. Student will be able to create programs using functions, control structures.
3. Student will learn implementation of scripting languages on different tools
4. Student can apply knowledge of scripting languages for creating a web application project using scripting languages implementation.

SYLLABUS

UNIT I **10 HOURS**

Introduction of scripting languages, need of scripting, characteristics of scripting languages, uses of scripting languages, Introduction of client side scripting languages like JavaScript, VBScript, HTML5 (Structure), CSS3 (Designing), AJAX, jQuery, Server side scripting languages like PHP, ASP.NET (C# OR Visual Basic), C++ , Java and JSP, Python, Ruby on Rails.

UNIT II **8 HOURS**

PHP basic features, Embeddingphp code in your web pages, outputting the data to the browser, data types, variables, constants, expressions, string interpolation, control structure, function, creating a function, function library, Arrays, String & regular expression, Web forms, Files, Authentication, Uploading file with PHP, sending email using PHP.

UNIT III **9 HOURS**

Python: Introduction to python languages, python syntax, statements, functions, build-in functions, methods, module in python, exception handling, integrated web application in python- Building small, efficient python web system, web application framework.

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DTCS205	SEC	Introduction to Scripting	0	0	0	30	20	0	0	2	1

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UNIT IV **7 HOURS**

Introduction to Perl and scripting, scripts, programs, Web scripting and PERL names , values, variable, scalar expression, control structures, arrays, list, hashes, strings, patterns, and regular expression, subroutine.

UNIT V **8 HOURS**

Introduction of Angular JS, Industrial usage of angular JS.benefits of Angular JS, Creation of Web application project using database, scripting, HTML, & CSS.

TEXTBOOKS:

1. The World of Scripting Languages, David Barron, Wiley Publications.
2. Python Web Programming, Steve Holden and David Beazley, New Riders Publications.
3. Beginning PHP and MySQL, 3” Edition, Jason Gilmore, Apress Publications (Dream tech.).

REFERENCE:

1. Open Source Web Development with LAMP using Linux, Apache, MySQL, Pen and PHP, J.Lee and B.Ware(Addison Wesley) Pearson Education.
2. Programming Python,M.Lutz,SPD.
3. PHP 6 Fast and Easy Web Development, Julie Meloni and Matt Telles, Cengage Learning Publications.
4. PHP 5.1,l.Bayross and S.Shah, The X Team, SPD.
5. Core Python Programming, Chun, Pearson Education.
6. Guide to Programming with Python, M.Dawson, Cengage Learning.
7. Pen by Example, E.Quigley, Pearson Education.
8. Programming Perl,Larry Wall, T.Christiansen and J.Orwant,O’Reilly, SPD.
9. Tcl and the Tk Tool kit, Ousterhout, Pearson Education.
10. PHP and MySQL by Example, E.Quigley, Prentice HalI(Pearson).
11. Perl Power, J.RFlynt, Cengage Learning.
12. PHP Programming solutions, V.Vaswani, TMH.

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			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
DTCS205	**SEC**	**Introduction to Scripting**	**0**	**0**	**0**	**30**	**20**	**0**	**0**	2	**1**

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

LIST OF PRACTICALS

1. Javascript program to generate Fibonacci series and to look for motifs and patterns in sequences.
2. Javascript program to find out frequency of characters existing in nucleotide and protein sequences 6Javascript's implementation to generate dynamic HTML pages.
3. Write PHP programs to do basic operations to deal with strings, and arrays, and to implement various mathematical functions.
4. Development of an PHP program to take set of sequences and find out conserved sequences.
5. Create a MySQL databasetables and execute all SQL queries.
6. Write a PHP program to connect MySQL database and execute all SQL commands.
7. Construct a PHP interface for a given Web page and to produce its overall connectivity.
8. Implement database and server site connectivity all together to generate complete dynamic web based applications through PHP, HTML and MySQL.
9. Write programs in Perl to implement string handling and other functions to be implemented to deal with biological data management.
10. Write PHP programs to do basic server side programming.