CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Semester-IV	**Branch: Cyber Security**
Subject: Computer Organization & Architecture	**Code: 3022D01BT022**
Maximum/Minimum-Passing Marks: 100/35 **Teacher Assessment Marks: 20** **Class Test Marks**: **20**	**Periods/week:**

L	T	P	Ass. Hours	Teaching Hrs/Sem
03	01	-	15	60

Class Tests: 2 (Mandatory)	**Assignments: 2 (Minimum)**
Duration (ESE): 3 hours	**Total Credits: 4**

Course Objectives:

1. Understand Computer System Components
2. Explore Instruction Set Architecture (ISA)
3. Study Memory Hierarchy & Storage Systems
4. Learn Processor Design & Performance Optimization
5. Understand I/O Systems & Interfacing

UNIT I: Basic Structure Of Computers **(14 Hrs)**

Functional units, Basic operational concepts, Addressing modes, subroutines: parameter passing, Instruction formats, BASIC PROCESSING UNIT: bus architecture, Instruction Cycle, sequencing of control signals, Hardwired control, Micro programmed Control, microinstruction format.

UNIT II: Arithmetic **(11 Hrs)**

Design of Fast Adders, Signed multiplication, Booth's Algorithm, bit-pair recoding, Integer Division, Floating point numbers and operations, guard bits and rounding.

UNIT III: The Memory System **(13 Hrs)**

Various technologies used in memory design, Memory Hierarchy: Main Memory, Auxiliary Memory, Associative Memory, Cache memory, Virtual Memory. Memory Management Hardware, Multi-module memories and Interleaving.

UNIT IV: Input/ Output Organization **(12 Hrs)**

Peripheral Devices, I/O interfaces I/O-mapped I/O and memory-mapped I/O, interrupts and interrupt handling mechanisms, vectored interrupts, synchronous vs. asynchronous data transfer, Direct Memory Access.

UNIT V: Pipeline and Vector Processing **(10 Hrs)**

Parallel Processing, Pipelining, Arithmetic pipeline, Instruction Pipeline, RISC Pipeline, Pipeline hazards, Vector Processing, Array Processors.

Course Outcomes:

1. Understand the Internal Working of a Computer
2. Analyze Instruction Set Architecture (ISA)
3. Evaluate Memory & Storage Hierarchies

4. Design & Optimize Processor Architectures
5. Implement I/O and Interfacing Mechanisms

Text Books:

1. **Computer System Architecture** – *M. Morris Mano*
2. **Computer Organization and Architecture** – *William Stallings*

Reference Books:

1. **Computer Organization and Design: The Hardware/Software Interface** – *David A. Patterson & John L. Hennessy*
2. **Computer Organization** – *Carl Hamacher, Zvonko Vranesic, Safwat Zaky*
3. **Computer Architecture: A Quantitative Approach** – *John L. Hennessy & David A. Patterson*

हिंदी पुस्तक:

1. कंप्यूटर आर्किटेक्चर (हिंदी) लेखक डॉ ऐ. के. तिवारी, प्रकाशक; यूनिवर्सिटी बुक हाउस प्राइवेट लि.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Semester-IV	**Branch: Cyber Security**
Subject: Data Structures	**Code:3022D02BT022**
Maximum/Minimum-Passing Marks: 100/35 **Teacher Assessment Marks: 20** **Class Test Marks**: **20**	**Periods/week:**

L	T	P	Ass. Hours	Teaching Hrs/Sem
03	01	-	15	60

Class Tests: 2 (Mandatory)	**Assignments: 2 (Minimum)**
Duration (ESE): 3 hours	**Total Credits: 4**

Course Objectives:

1. Understand Fundamental Data Structures
2. Analyze and Apply Efficient Algorithms
3. Implement Dynamic Data Management
4. Optimize Memory and Computational Efficiency
5. Apply Data Structures in Real-world Applications

UNIT I: Arrays and Lists **(12 Hrs)**

Arrays: Types, row major and column major representation, applications of arrays, Sparse matrices and their representation. Linked lists: Array implementation and dynamic implementation of Singly Linked List, Doubly List and circular linked list. Operations on a Linked List, Insertion, Deletion, Traversal, Polynomial Representation and Addition

UNIT II: Stack and Ques **(13 Hrs)**

Stacks: Abstract Data Type, Primitive Stack Operations: push and pop, Array and Linked implementation of stack, Applications of Stack, Prefix and Postfix expressions, evaluation of postfix expression, Operations on Queues: create , add , delete, full and empty. Circular Queues, Arrays and Linked representation of Queue, Dequeue and Priority Queues.

UNIT III: Trees **(13 Hrs)**

Basic Terminology, Binary Trees, Binary Tree representation: Array and dynamic representation, Complete Binary Tree, Algebraic expression, Threaded Binary trees, Heap sort Traversal algorithms: Pre-order, In-order, post-order, Search Trees: Binary Search Tree, insertion and deletion in binary search tree, AVL trees. Introduction to m-way search trees, B-trees.

UNIT IV: Graphs **(13 Hrs)**

Graph Terminology, Linked Representation of Graphs, Adjacency matrices, Adjacency lists, Adjacency Multi List. Graph Traversal: Depth First Search and Breadth First Search, Connected Components, Spanning Trees, Minimum Cost Spanning Trees: Prims and Kruskal's algorithm, shortest path algorithm: Floyd Warshall algorithm and Dijkstra algorithm.

UNIT V: Recursion and Hashing **(09 Hrs)**

Recursion, principles of Recursion, Towers of Hanoi problem, Quick Sort and Merge Sort using recursion, Hashing: Hash function, Collision Resolution Strategies.

Course Outcomes:

1. Understand and Differentiate Data Structures
2. Analyze and Implement Algorithms Efficiently
3. Develop Problem-solving Skills
4. Efficient Memory Utilization
5. Apply Data Structures in Software Development

Text Books:

1. **Data Structures and Algorithms in C –** *Reema Thareja*
2. **Data Structures and Algorithms Made Easy –** *Narasimha Karumanchi*

Reference Books:

1. **Algorithms, Part I & II –** *Robert Sedgewick, Kevin Wayne*
2. **Data Structures Using C –** *Aaron M. Tenenbaum, Yedidyah Langsam, Moshe J. Augenstein*
3. **Fundamentals of Data Structures in C –** *Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed*

हिंदी पुस्तक:

1. **Data Structure (Hindi Edition)** लेखक: डॉ. एस.एस. श्रीवास्तव, प्रकाशक: लक्ष्मी पब्लिकेशन्स

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Semester-IV	**Branch: Cyber Security**
Subject: Database Management System	**Code:3022D03BT022**
Maximum/Minimum-Passing Marks: 100/35 **Teacher Assessment Marks: 20** **Class Test Marks**: **20**	**Periods/week:**

L	T	P	Ass. Hours	Teaching Hrs/Sem
03	01	-	15	60

Class Tests: 2 (Mandatory)	**Assignments: 2 (Minimum)**
Duration (ESE): 3 hours	**Total Credits: 4**

Course Objectives:

1. Understand Database Concepts
2. Design and Develop Databases
3. Learn SQL and Query Optimization
4. Explore Transaction Management & Concurrency Control

UNIT I: **(13 Hrs)**

Data base System Applications, data base System VS file System, View of Data, Data Abstraction, Instances and Schemas, Data base Users and Administrator, Data base System Structure: Storage Manager, the Query Processor. Data base design and ER diagrams: Beyond ER Design Entities, Attributes and Entity sets, Relationships and Relationship sets, Additional features of ER Model, Concept Design with the ER Model, Conceptual Design for Large enterprises.

UNIT II: **(12 Hrs)**

Introduction to the Relational Model, Integrity Constraint Over relations, Enforcing Integrity constraints, querying relational data, Logical data base Design, Introduction to Views, Destroying altering Tables and Views. Relational Algebra: Selection and projection set operations, renaming, Joins, Division, Examples of Algebra overviews, Relational calculus: Tuple relational Calculus, Domain relational calculus, Expressive Power of Algebra and Calculus**.**

UNIT III: **(12 Hrs)**

Form of Basic SQL Query, Examples of Basic SQL Queries, Introduction to Nested Queries, Correlated Nested Queries, Set Comparison Operators, Aggregative Operators, NULL values, Comparison using Null values, Logical connectivity's: AND, OR and NOT, Impact on SQL Constructs, Outer Joins, Disallowing NULL values, Complex Integrity Constraints in SQL Triggers and Active Data bases.

UNIT IV: **(10 Hrs)**

Schema refinement: Problems Caused by redundancy, Decompositions, Problem related to decomposition, reasoning about FDs, FIRST, SECOND, THIRD Normal forms, BCNF, Lossless join Decomposition, Dependency preserving Decomposition, Schema refinement in Data Base Design, Multi valued Dependencies, FORTH Normal Form.

.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

(13 Hrs)

UNIT V:

Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent , Executions, Serializability, Recoverability, Implementation of Isolation, Testing for serializability, Lock Based Protocols, Timestamp Based Protocols, Validation Based Protocols, Recovery and Atomicity, Log Based Recovery, Recovery with Concurrent Transactions, Indexing, Cluster Indexes, Primary and Secondary Indexes, Index data Structures, Tree base Indexing, B and B+ Trees: A Dynamic Index Structure.

Course Outcomes:

1. Demonstrate Knowledge of Database Systems
2. Design Efficient Database Models
3. Implement SQL Queries Effectively
4. Manage Transactions and Concurrency
5. Develop Real-world Database Applications
6. Apply DBMS in Real-world Applications

Text Books:

1. **Database System Concepts –** *Abraham Silberschatz, Henry Korth, and S. Sudarshan*
2. **Fundamentals of Database Systems –** *Ramez Elmasri and Shamkant B. Navathe*

Reference Books:

1. **Database Management Systems** – *Raghu Ramakrishnan and Johannes Gehrke*
2. **Database Management Systems** – *Peter Rob and Carlos Coronel*
3. **Database Management Systems: A Practical Approach** – *V. Raghavan and C. K. Gupta*

हिंदी पुस्तक:

1. डाटाबेस मैनेजमेंट सिस्टम लेखक: एस.एस. श्रीवास्तव, प्रकाशक: मध्य प्रदेश हिंदी ग्रंथ अकादमी, भोपाल
2. **KITABVALA** रिलेशनल डाटाबेस मैनेजमेंट सिस्टम लेखक: खेमानी, प्रकाशक: KITABVALA

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Semester-IV	**Branch: Cyber Security**
Subject: Full Stack Web Development	**Code:3022D04CT022**
Maximum/Minimum-Passing Marks: 100/35 **Teacher Assessment Marks: 20** **Class Test Marks**: **20**	**Periods/week:**

L	T	P	Ass. Hours	Teaching Hrs/Sem
02	01	-	15	45

Class Tests: 2 (Mandatory)	**Assignments: 2 (Minimum)**
Duration (ESE): 3 hours	**Total Credits: 3**

Course Objectives:

1. Develop a solid understanding of front-end and back-end web development principles, including HTML, CSS, JavaScript, and server-side programming.
2. Gain proficiency in designing, developing, deploying, and maintaining full-stack web applications using modern frameworks and technologies.
3. Learn to design and integrate relational and non-relational databases with web applications to handle and manage data effectively.
4. Understand how to create responsive, user-friendly web interfaces and scalable architectures for optimal user experience and performance.
5. Acquire skills in version control, CI/CD pipelines, and cloud deployment to ensure robust and reliable web application delivery.

(10 Hrs)

UNIT I: BASICS OF FULL STACK : Understanding the Basic Web Development Framework – User – Browser – Webserver – Backend Services – MVC Architecture – Understanding the different stacks –The role of Express – Angular – Node – Mongo DB – React

(09 Hrs)

UNIT II: NODE JS : Basics of Node JS – Installation – Working with Node packages – Using Node package manager – Creating a simple Node.js application – Using Events – Listeners –Timers – Callbacks – Handling Data I/O – Implementing HTTP services in Node.js

UNIT III: MONGO DB : Understanding NoSQL and MongoDB – Building MongoDB Environment – User accounts – Access control – Administering databases – Managing collections – Connecting to MongoDB from Node.js – simple applications **(09 Hrs)**

UNIT IV: EXPRESS AND ANGULAR: Implementing Express in Node.js – Configuring routes – Using Request and Response objects – Angular – Typescript – Angular Components – Expressions – Data binding – Built-in directives **(09 Hrs)**

UNIT V: MERN STACK : – Basic React applications – React Components – React State – Express REST APIs – Modularization and Web pack – Routing with React Router – Server-side rendering **(08 Hrs)**

Course Outcomes:

1. Proficiency in Web Development
2. Build and manage robust back-end systems, including server-side logic,
3. **End-to-End Application Deployment -** Develop, test, and deploy full-stack web applications on cloud platforms
4. Apply full-stack development tools and techniques to solve real-world problems,
5. Work effectively in teams using collaborative tools, version control, and agile development methodologies

Text Books:

1. Brad Dayley, Brendan Dayley, Caleb Dayley, 'Node.js, MongoDB and Angular Web Development', Addison-Wesley, Second Edition, 2018
2. Vasan Subramanian, 'Pro MERN Stack, Full Stack Web App Development with Mongo, Express, React, and Node', Second Edition, Apress, 2019.

Reference Books:

1. Chris Northwood, 'The Full Stack Developer: Your Essential Guide to the Everyday Skills Expected of a Modern Full Stack Web Developer', Apress; 1st edition, 2018
2. Kirupa Chinnathambi, 'Learning React: A Hands-On Guide to Building Web Applications Using React and Redux', Addison-Wesley Professional, 2nd edition, 2018

Online Resources:

1. https://www.coursera.org/specializations/full-stack-react
2. https://www.udemy.com/course/the-full-stack-web-development/

हिंदी पुस्तक:

1. फुल स्टैक वेब डेवलपमेंट लेखक: अनुराग तिवारी, विवरण: यह पुस्तक HTML, CSS, JavaScript, PHP, और MySQL जैसी तकनीकों का उपयोग करके फुल स्टैक वेब डेवलपमेंट की मूल बातें सिखाती है।
2. वेब डेवलपमेंट **(HTML, CSS, JavaScript, PHP),** लेखक: सुरेश चंद्रा, विवरण: इस पुस्तक में वेब डेवलपमेंट के सभी पहलुओं को समझाया गया है, जिससे पाठक फुल स्टैक डेवलपमेंट में दक्ष हो सकते हैं।

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Semester-IV	**Branch: Cyber Security**
Subject: Cyber Ethics and Principles	**Code: 3131D05BT022**
Maximum/Minimum-Passing Marks: 100/35 **Teacher Assessment Marks: 20** **Class Test Marks: 20**	**Periods/week:**

L	T	P	Ass. Hours	Teaching Hrs/Sem
01	01	-	15	30

Class Tests: 2 (Mandatory)	**Assignments: 2 (Minimum)**
Duration (ESE): 3 hours	**Total Credits: 2**

Course Objectives:

1. To explain basic cyber ethical principles.
2. To analyze privacy and security issues in the digital world.
3. To understand intellectual property rights and usage of digital contents.
4. To evaluate ethical challenges in social media and online behavior.
5. To assess ethical concerns in emerging technologies like AI.

UNIT-I: INTRODUCTION TO CYBER ETHICS

Ethical concepts and principles, Introduction to Cyber Ethics and Moral Theories, Ethical theories: Utilitarianism, Deontology, Virtue Ethics, Ethical decision-making frameworks, Steps in ethical decision-making, Ethical frameworks, Professional Ethics in Computing, Codes of ethics (ACM, IEEE, etc.), Responsibilities of IT professionals

[6 hrs]

UNIT-II: PRIVACY, SECURITY, AND SURVEILLANCE

Privacy in the digital age: Data Collection, Profiling, and Behavioral Tracking, Surveillance Technologies: Recording, Tracking, and Monitoring Techniques, Cybersecurity Threats: Viruses, Phishing, Ransomware, Ethical Dilemmas in Cybersecurity: Surveillance vs Rights, Whistle blowing. **[6 hrs]**

UNIT-III: INTELLECTUAL PROPERTY

Intellectual Property Rights, Protecting Intellectual Property, Trade Secrets, Trademarks and Service Marks, Patents, Copyrights, Open access and open-source software. **[6 hrs]**

UNIT-IV: SOCIAL MEDIA AND EMERGING TECHNOLOGIES

Ethics of Social Media, Identity, Cyberbullying, Misinformation, Deepfakes, Ethics in Emerging Technologies, AI Ethics and Algorithmic Bias, Ethics in IoT and Cloud Computing, Ethics in Virtual and Augmented Reality (VR/AR), Psychological Impact, Consent, and Manipulation of Reality. **[6 hrs]**

UNIT-V: Teacher Specific Module

Teachers are expected to select relevant topics within the chosen subject area, giving special emphasis to advanced concepts and recent developments in the field. The content should be enriched with well-chosen case studies that highlight practical applications, contemporary issues, and emerging trends, thereby enabling students to gain both theoretical knowledge and contextual understanding. **[6 hrs]**

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Course Outcomes:

1. Explain basic ethical principles and professional codes in cyber ethics.
2. Analyze privacy and security issues in the digital world.
3. Understand intellectual property rights and digital content usage.
4. Evaluate ethical challenges in social media and online behavior.
5. Assess ethical concerns in emerging technologies like AI.

Text Books:

S.No.	Title	Authors	Edition	Publisher
1	**Ethics and Technology:** Controversies, Questions, and Strategies for Ethical Computing	Tavani, H. T. (2018)	5th edition	John Wiley & Sons.
2	Ethics for the Information Age	Quinn, M. J. (2014)	6th edition	Pearson.
3	**A Gift of Fire:** Social, Legal, and Ethical Issues for Computing Technology	Baase, S., & Henry, T.		
4	The Handbook of Information and Computer Ethics.	Himma, K. E., & Tavani, H. T. (2019)		John Wiley & Sons

Reference Books:

S.No.	Title	Authors	Edition	Publisher
1	Computer Ethics	Johnson, D. G,	4th edition	Prentice Hall.
2	Computer network security and cyber ethics	Joseph Migga Kizza		

हिंदी पुस्तक:

1. Code Academy Cyber Law and Ethics in Hindi. ISBN : 9789349779655
2. Indian Cyber Law in Hindi by J. Thomas ISBN : 9789349779105, 9349779102

E-resources/Web Sources:

1. https://www.scu.edu/media/ethics-center/technology-ethics/IntroToCybersecurityEthics.pdf
2. https://www.geeksforgeeks.org/computer-networks/what-is-cyberethics/
3. https://cybercrime.gov.in/UploadMedia/CyberSafetyHindi.pdf

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Semester-IV	**Branch: Cyber Security**
Subject: Indian Traditional Knowledge: Science and Practices.	**Code: 3000D06ET046**
Maximum/Minimum-Passing Marks: 50 **Teacher Assessment Marks: 10** **Class Test Marks**: **10**	**Periods/week:**

L	T	P	Ass. Hours	Teaching Hrs/Sem
02	-	-	10	30

Class Tests: 2 (Mandatory)	**Assignments: 2 (Minimum)**
Duration (ESE): 3 hours	**Total Credits: 2**

Course Objectives:

1. Creating awareness amongst the youths about the true history and rich culture of the country;
2. Understanding the scientific value of the traditional knowledge of Bhārata;
3. To familiarize learners with major sequential development in Indian science, engineering and technology.
4. To review & strengthen the ancient discovery and research in physics, chemistry, maths, metallurgy, astronomy, architecture, textile, transport, agriculture and Ayurveda etc.

Course Outcomes:

1. Student understands the various traditional practices of ancient India.
2. They have been introduced to some concepts of Ancient Indian Physics and Chemistry.
3. They have been introduced to some concepts of Ancient Indian Science (Metallurgy, Astronomy & Astrology.
4. They have been introduced to some fields of IKS like Ancient Architecture and Engineering.

UNIT I: Bhāratīya Civilization and Development of Knowledge System (08 Hours)

Genesis of the land, Antiquity of civilization, On the Trail of the Lost River, Discovery of the Saraswatī River, the Saraswatī-Sindhu Civilization, Traditional Knowledge System, Introduction to Vedas, A synopsis of the four Vedas, Sub-classification of Vedas, Vedic Life: A Distinctive Features, Ancient Education System, the Takṣaśilā University, the Nālandā University, Knowledge Export from Bhārata.'

UNIT II: ANCIENT INDIAN SCIENCE (08 Hours)

Physics in India: Vaisheshika darshan Atomic theory & law of motion, theory of panchmahabhoota, Brihath Shathaka (divisions of the time, unit of distance), bhaskarachaya (Theory of gravity, surya siddhanta & sidhanta shriomani), Lilavati (gurutvakashan Shakti).

Chemistry in India: Vatsyayana, Nagarjuna,Khanda, Al-Biruni, Vagbhaṭa –building of the ras-shala (laboratory), working arrangements of ras-shala, material and equipment, Yaśodhara Bhaṭṭa-process of distillation, apparatus, saranasamskara, saranataila

UNIT III: ANCIENT INDIAN TECHNOLOGY (8 Hours)

Metallurgy in India: Engineering Science and Technology in the Vedic Age and Post-Vedic Records, Mining and ore extraction, Survarṇa (gold), Rajata (silver), Tamra (copper), Loha (iron), Vanga (tin),

Naga / sisa (lead), Pittala (brass), and steel in ancient India, Apparatuses used for extraction of metallic components, Iron Pillar of Delhi.

Astronomy and Astrology: The Beginnings of Indian Astronomy - The Early Historical Period-The Siddhāntic Era., Ancient Indian Observational astronomy. Foundation concepts - nakṣatra, graha, time units, phenomena like meteors, eclipses., Brief notes on Astronomical instruments like sundials, water clock, time measurement. Aryabhatta - Varahamihira- Bhaskara I – Brahamagupta- Bhaskara II

UNIT IV: ARCHITECTURE AND CIVIL ENGINEERING (6 Hours)

Perspective of Arthaśāstra on town planning, Vāstu-śāstra – The science of architecture, Eight limbs of Vāstu, Town planning, Temple architecture in India, Iconography, Architecture in India: Nagara (northern style), Vesara (mixed style), and Dravida (southern style), Indian vernacular architecture, Temple sytle, cave architecture, rock cut architecture, kalinga architecture, chandels architecture, rajput architecture, jain architecture, sikh architecture, Maratha architecture.

Text Books: (Hindi and English language as per availability)

1. Textbook on "The Knowledge System of Bhārata by Bhag Chand Chauhan.
2. वास्तविक आईना सनातन विज्ञानं का, परम कुमार, वैभव प्रकाशन रायपुर
3. SCIENTIFIC BASIS OF INDIAN KNOWLEDGE SYSTEM Saroj Sharma, Bal Krishna Rai, Sunita Joshi Kathuria, SHIPRA PUBLICATIONS
4. R P Kulkarni, Glimpese of Indian Engineering and Technology (Ancient & Medieval period, Munshiram Manoharlal Publishers Pvt. Ltd. 2018.
5. Sen, S. N., and Shukla, K. S. (Ed.) (2000). History of Astronomy in India, 2nd Revised Edition. New Delhi: Indian National Science Academy.
6. D N Shukla Civil Architecture in Ancient India (Part-I) Meharchand lakshmidas publication, 2016.

Reference Books: (Hindi and English language both)

1.Iyengar, R. N. (2016) Astronomy in Vedic texts, History of Indian Astronomy, A Handbook - Volume brought out on the occasion of IX International Conference on Oriental Astronomy November 14–18.
2. Pride of India- A Glimpse of India's Scientific Heritage edited by Pradeep Kohle et al. Samskrit Bharati (2006).
3. Vedic Physics by Keshav Dev Verma, Motilal Banarsidass Publishers (2012). 3. India's Glorious Scientific Tradition by Suresh Soni, Ocean Books Pvt. Ltd. (2010).
4. AK Pathak, Science and Technology in India, Anshika prakashan pratapgarh, 2016.
5. AR vasudev Murty, Science and Technology in Ancient India as Reflected in the Mahabharata, Sanskrit bharati, 2019.
6. B Dagens, Mayamata: An Indian Treatise on Housing Architecture and Iconography (An Updated Edition with revised Glossary), Motilal banrsidas, 2017.
7. Dr. V. Ganapati Sthapati, Building Architecture of Sthapatya Veda.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Semester-IV	**Branch: Cyber Security**
Subject: Computer Organization and Architecture Lab	**Code: 3131D01BL022**
Maximum Marks: 40 **Teacher Assessment Marks: 20** **Duration (ESE): 3 hours** **Total Credits: 1**	**Periods/week:**

L	T	P	Ass. Hours	Teaching Hrs/Sem
-	-	2	10	30

Course Objectives:

1. To understand the representation of data and arithmetic operations in computer systems.
2. To develop programs implementing arithmetic algorithms such as multiplication and division techniques used in processors.
3. To study memory organization concepts including allocation policies, cache mapping, and memory interleaving.
4. To understand processor organization concepts such as ALU design, interrupt handling, and instruction pipelining.
5. To analyze system performance using cache metrics and pipeline speedup, efficiency, and execution time calculations.

Experiment can be performed in C++ / Python / VHD ((Each student is required to perform a minimum of 10 experiments)

1. Write a program for IEEE-754 floating point representation and perform Addition/Subtraction.
2. Write a program for binary multiplication.
3. Write a program to perform signed bit multiplication using Booth's algorithm.
4. Write a program for Integer number division using restoring and non-restoring techniques
5. Write programs to simulate memory allocation policies
   a) First – fit algorithm b) Best- fit algorithm
6. Write a program to design basic ALU.
7. Write a program to simulate cache memory mapping techniques:
   - Direct Mapping
   - Fully Associative Mapping
   - Set-Associative Mapping
8. Write a program to evaluate cache performance by calculating:
   - Hit Ratio
   - Miss Ratio
   - Average Memory Access Time (AMAT)
9. Write a program to simulate a priority-based interrupt handling system, where higher-priority interrupts are serviced before lower-priority ones.
10. Write a program to simulate a **5-stage instruction pipeline** consisting of:
    - IF (Instruction Fetch)
    - ID (Instruction Decode)
    - EX (Execute)
    - MEM (Memory Access)
    - WB (Write Back)

11. Write a program to simulate a pipeline using user-defined number of instructions.
12. Write a program to calculate the speedup, efficiency, and total execution time of a pipeline system given the number of stages, number of instructions, and clock cycle time.
13. Write a program to simulate memory interleaving across multiple memory modules and determine the memory module number for a given memory address.

Course Outcomes:

After successful completion of the course, students will be able to:

1. Implement binary arithmetic operations including floating-point addition/subtraction, multiplication, and division algorithms.
2. Design and simulate processor components such as ALU, interrupt systems, and pipelined instruction execution.
3. Apply memory management techniques including first-fit, best-fit, cache mapping, and interleaving methods.
4. Evaluate computer system performance using cache hit/miss ratio, AMAT, pipeline speedup, and efficiency metrics.

Text Books -

1. **Computer Organization and Architecture –** *William Stallings*
2. **Computer System Architecture –** *M. Morris Mano*

Reference Books

1. **Computer Organization –** *Carl Hamacher et al.*
2. **Structured Computer Organization –** *Andrew S. Tanenbaum*
3. **Computer Organization and Design –** *David Patterson & John Hennessy*

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Semester-IV	Branch: Cyber Security
Subject: Data Structures Lab	Code:3131D02BL022
Maximum Marks: 40 Teacher Assessment Marks: 20 Duration (ESE): 3 hours Total Credits: 1	Periods/week:

L	T	P	Ass. Hours	Teaching Hrs/Sem
-	-	2	10	30

Course Objectives:

1. To implement linear and non-linear data structures
2. To understand the different operations of search tree
3. To implement graph traversal algorithms
4. To get familiarized to sorting and searching algorithms
5. To apply data structures in solving real-world computational problems effectively.

List of Experiments: (Each student is required to perform a minimum of 10 experiments in C)

1. **Implementation of Linear Data Structures**
   - Implement and demonstrate operations on arrays, linked lists, stacks, and queues.
2. **Stack Operations**
   - Perform push, pop, and peek operations on a stack using arrays and linked lists.
3. **Queue Operations**
   - Implement circular queue operations using arrays and linked lists, including enqueue and dequeue functions.
4. **Sorting Algorithms**
   - Implement and compare different sorting algorithms, such as Bubble Sort, Selection Sort, Insertion Sort, Merge Sort, and Quick Sort.
5. **Searching Algorithms**
   - Implement linear search and binary search algorithms on sorted and unsorted arrays.
6. **Implementation of Trees**
   - Create binary trees, perform tree traversals (in-order, pre-order, post-order), and implement binary search trees with insertion and deletion operations.
7. **Graph Representations**
   - Implement graph representations using adjacency matrix and adjacency list. Perform graph traversals using Depth-First Search (DFS) and Breadth-First Search (BFS).
8. **Hashing Techniques**
   - Implement hash tables using different hashing techniques (e.g., chaining and open addressing) and perform insertion, deletion, and search operations.
9. **Expression Evaluation**
   - Use stacks to evaluate postfix and infix expressions and convert infix expressions to postfix notation.
10. **Dynamic Programming Problems**
    - Solve problems such as the Knapsack problem and Longest Common Subsequence using dynamic programming techniques

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Course Outcomes:

1. Write functions to implement linear and non-linear data structure operations.
2. Suggest appropriate linear / non-linear data structure operations for solving a given problem.
3. Appropriately use the linear / non-linear data structure operations for a given problem
4. Apply appropriate hash functions that result in a collision free scenario for data storage and retrieve
5. Write well-structured, optimized, and memory-efficient code for handling large datasets.

Text Book

1. Data Structures Through C - 5th Edition, Yashavant Kanetkar, Bpb Publication

Reference book

1. Data Structure through C, GS Baluja, **Dhanpat Rai & Co.**
2. Data Structures and Algorithms Using C, Nitin Upadhyay, S.K. Kataria & Sons

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Semester-IV	Branch: Cyber Security				
Subject: Database Management System Lab	Code:3131D03BL022				
Maximum Marks: 40 Teacher Assessment Marks: 20 Duration (ESE): 3 hours Total Credits: 1	Periods/week:				
	L	T	P	Ass. Hours	Teaching Hrs/Sem
	-	-	2	10	30

Course Objectives:

1. To explain basic database concepts, applications, data models, schemas and instances.
2. To demonstrate the use of constraints and relational algebra operations.
3. Describe the basics of SQL and construct queries using SQL.
4. To emphasize the importance of normalization in databases.
5. To familiarize issues of concurrency control and transaction management.

List of Experiments: (Each student is required to perform a minimum of 10 experiments.)

1. Experiment 1 Student should decide on a case study and formulate the problem statement.
2. Experiment 2 Conceptual Designing using ER Diagrams (Identifying entities, attributes, keys and relationships between entities, cardinalities, generalization, specialization etc.) Note: Student is required to submit a document by drawing ER Diagram to the Lab teacher.
3. Experiment 3 Converting ER Model to Relational Model (Represent entities and relationships in Tabular form, Represent attributes as columns, identifying keys) Note: Student is required to submit a document showing the database tables created from ER Model.
4. Experiment 4 Normalization -To remove the redundancies and anomalies in the above relational tables, Normalize up to Third Normal Form
5. Experiment 5 Creation of Tables using SQL- Overview of using SQL tool, Data types in SQL, Creating Tables (along with Primary and Foreign keys), Altering Tables and Dropping Tables
6. Experiment 6 Practicing DML commands- Insert, Select, Update, Delete
7. Experiment 7 Practicing Queries using ANY, ALL, IN, EXISTS, NOT EXISTS, UNION, INTERSECT, CONSTRAINTS etc.
8. Experiment 8 Practicing Sub queries (Nested, Correlated) and Joins (Inner, Outer and Equi).
9. Experiment 9 Practice Queries using COUNT, SUM, AVG, MAX, MIN, GROUP BY, HAVING, VIEWS Creation and Dropping.
10. Experiment 10 Practicing on Triggers - creation of trigger, Insertion using trigger, Deletion using trigger, Updating using trigger
11. Experiment 11 Procedures- Creation of Stored Procedures, Execution of Procedure, and Modification of Procedure. Experiment 12 Cursors- Declaring Cursor, Opening Cursor, Fetching the data, closing the cursor.

Course Outcomes:

1. Apply the basic concepts of Database Systems and Applications.
2. Use the basics of SQL and construct queries using SQL in database creation and interaction.
3. Design a commercial relational database system (Oracle, MySQL) by writing SQL using the system.
4. Students will understand and implement data integrity constraints and security measures.
5. Analyze and Select storage and recovery techniques of database systems.

Text Books:

1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, “Database System Concepts”, McGrawHill.
2. R. Elmasri and S. Navathe, “Fundamentals of Database Systems”, Pearson Education.
3. Raghu Ramakrishnan, Johannes Gehrke, “Database Management Systems”, McGraw-Hill Education

Reference Books:

1. C. J. Date, A. Kannan, S. Swami Nandan, “An introduction to Database System”, Pearson Education.
2. Ivan Bayross, “SQL, PL/SQL: The Programming Language of Oracle”, BPB Publications.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Semester- IV	**Branch:Cyber Security**
Subject:Full Stack Web Development Lab	**Code:3131D04CL022**
Maximum marks:40 **Teachers Assessment : 20**	**Periods/week:**
Duration (ESE): 3 hours	**TotalCredits:1**

L	T	P	Ass. Hours	Teaching Hours
-	-	02	10	30

Course Objectives:

1. Effectively utilize various front-end and back-end development tools.
2. Acquire the ability to comprehend and independently create functional applications.
3. Demonstrate proficiency in designing and developing engaging websites.
4. Build web-based applications using appropriate client-side and server-side programming techniques.
5. Implement robust web-based applications with efficient and optimized database integration.

List of Experiments: (Each student is required to perform a minimum of 15 experiments.)

1. Study of Web Architecture - User–Browser–Web Server–Backend–Database interaction model.
2. Installation & Setup - Install Node.js, VS Code, MongoDB, and configure development environment.
3. Creating First Node.js Application - Simple “Hello Server” using Node runtime.
4. Working with Node Package Manager (NPM) - Initialize project, install packages, manage dependencies.
5. Understanding Events & EventEmitter - Implement custom events and listeners.
6. File System Handling - Read/write files using fs module.
7. Creating HTTP Server in Node.js - Implement basic HTTP services.
8. Introduction to Express Framework - Create Express server and basic routing.
9. Routing in Express - GET, POST, PUT, DELETE request handling.
10. Working with Request & Response Objects - Send JSON, HTML, status codes.
11. Middleware Implementation - Create and use custom middleware.
12. Building RESTful API - Create CRUD API using Express.
13. Connecting Express with MongoDB - Using Mongoose ODM.
14. Installation & Configuration of MongoDB - Create database and collections.
15. CRUD Operations in MongoDB - Insert, update, delete, find documents.
16. Schema & Model Creation - Define schema using Mongoose.
17. Authentication System - User registration & login using MongoDB.
18. Access Control & Validation - Role-based access and validation.
19. Creating React Application - Using create-react-app or Vite.
20. React Components - Functional components and props.
21. React State & Hooks - useState, useEffect implementation.
22. Event Handling in React - Form submission and validation.
23. React Routing - Navigation using React Router.
24. Full CRUD MERN Application - Frontend (React) + Backend (Express) + MongoDB.
25. Authentication using JWT - Secure login system.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Course Outcomes:

1. Utilize a variety of front-end and back-end development tools effectively.
2. Develop the capability to understand, design, and build applications independently.
3. Demonstrate the ability to design and develop professional-quality websites.
4. Create web-based applications by implementing suitable client-side and server-side programming.
5. Develop and deploy web-based applications with efficient database integration.

Text Books:

S.No	Title	Author(s)	Publisher
1	MERN Stack Development for Beginners	Shama Hoque	BPB Publications
2	Web Development with Node and Express	Ethan Brown	O'Reilly
3	Learning React	Alex Banks, Eve Porcello	O'Reilly
4	MongoDB: The Definitive Guide	Kristina Chodorow, Shannon Bradshaw	O'Reilly

Reference Books:

S.No	Title	Author(s)	Publisher
1	Node.js Web Development	David Herron	Packt Publishing
2	Pro MERN Stack	Vasan Subramanian	Apress
3	Full Stack React Projects	Shama Hoque	Packt Publishing
4	REST API Design Rulebook	Mark Masse	O'Reilly

Online Resources:

1. Node.js Official Documentation – https://nodejs.org/en/docs
2. Express.js Documentation – https://expressjs.com
3. MongoDB Documentation – https://www.mongodb.com/docs
4. React Official Documentation – https://react.dev

हिंदीपुस्तक:

1. फुल स्टैक वेब डेवलपमेंट **(Node.js, React, MongoDB)**लेखक: अजय कुमार विवरण: इस पुस्तक में MERN स्टैक (MongoDB, Express, React, Node.js) को सरल हिंदी भाषा में समझाया गया है, जिसमें CRUD, API और authentication शामिल हैं।

2. **Node.js** और **MongoDB** वेब डेवलपमेंट लेखक: राहुल शर्मा, विवरण: इस पुस्तक में सर्वर-साइड डेवलपमेंट, डेटाबेस कनेक्शन, और REST API को हिंदी में विस्तार से समझाया गया है।

3. **React.js** हिंदी गाइड लेखक: सुरेश चंद्रा विवरण: इस पुस्तक में React components, hooks, routing और state management को आसान भाषा में समझाया गया है।

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Semester-IV	Branch:Cyber Security
Subject: Entrepreneurship Development and Startups	Code: 3000D07DT076
Maximum Marks: 50 Total Credits: Non Credit Course	Periods/week:

L	T	P	Ass. Hours	Teaching Hrs/Sem
2	-	-	10	30

Course Objectives: This course develops entrepreneurial thinking by covering core concepts of entrepreneurship, innovation, startup ecosystems, venture creation, and growth management.

Course Contents:

Unit I: Introduction to Entrepreneurship – Concept and importance of entrepreneurship. Characteristics of successful entrepreneurs. Types: Innovative, Social, Women and Rural. Entrepreneur vs Manager.

Unit II: Creativity, Innovation, and Business Ideas – Creativity and innovation: concepts and process. Idea generation techniques. Opportunity recognition and evaluation. Problem-solution fit and product-market fit.

Unit III: Startup Ecosystem and Business Models – Startup ecosystem: concept and components. Government initiatives – Startup India, Make in India. Business model canvas and value proposition. Lean startup methodology. IPR basics.

Unit IV: Venture Creation and Financing – Steps in starting a new venture. Business Plan preparation. Sources of finance: Bootstrapping, Angel investors, Venture capital, Crowdfunding. Legal registration of startups in India.

Unit V: Growth, Scaling, and Entrepreneurial Management – Growth and scaling strategies. Digital marketing and branding for startups. Leadership and team building. Key challenges faced by startups. Case studies of Indian startups.

Course Outcomes:

CO No.	Course Outcome	Bloom's Level
CO1	Understand the concept, importance, and characteristics of entrepreneurship.	Understand (L2)
CO2	Apply creativity and innovation techniques to generate and evaluate business ideas.	Apply (L3)
CO3	Analyze the startup ecosystem, government initiatives, and business model frameworks.	Analyze (L4)
CO4	Develop business plan covering venture creation steps, funding sources, and legal formalities.	Create (L6)
CO5	Evaluate growth strategies, marketing approaches, and leadership practices for startup success.	Evaluate (L5)

Text Books:

S.No.	Title	Authors	Edition	Publisher
1	Entrepreneurial Development	S.S. Khanka	4th, 2018	S. Chand Publishing
2	Dynamics of Entrepreneurial Development and Management	Vasant Desai	Revised, 2020	Himalaya Publishing House

Reference Books:

S.No.	Title	Authors	Edition	Publisher
1	Small Scale Industries and Entrepreneurship	Vasant Desai	2019	Himalaya Publishing House
2	Innovation and Entrepreneurship	Peter F. Drucker	Revised, 2006	Harper Business
3	The Lean Startup	Eric Ries	1st, 2011	Crown Business

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Semester-IV	Branch:Cyber Security				
Subject: Emotional Intelligence and Social Learning	Code: 3000D08FT046				
Maximum Marks: 40 Total Credits: Non Credit Course	Periods/week:				
	L	T	P	Ass. Hours	Teaching Hrs/Sem
	1	-	-	-	15

Course Objectives: This course aims to develop social and emotional awareness in students and initiate them towards better personal and social well-being.

Course Contents:

Unit I: Fundamentals of Emotional Intelligence – Nature and Significance, Building blocks of emotional intelligence.

Unit II: Models of Emotional Intelligence – Ability, Trait and Mixed models of emotional intelligence.

Unit III: Personal Competence –Self-Awareness: Observing and recognizing one's own feelings, Knowing one's strengths and areas of development.

Self-Management: Managing emotions, anxiety, fear, and anger.

Unit IV: Social Competence – Social Awareness: Others' Perspectives, Empathy and Compassion.

Relationship Management: Effective communication, Collaboration, Teamwork, and Conflict management.

Unit V: Social Relationships and Mindfulness – Sharing vs Power: Peers, Family and Society, The Value of Silence and Reflection, Practice of Mindfulness.

Course Outcomes:

CO No.	Course Outcome	Bloom's Level
CO1	Recognize and understand their own emotions, strengths, weaknesses, and potential triggers.	Remember (L1) / Understand (L2)
CO2	Acquire skills for effective communication, collaboration, teamwork, and conflict management.	Apply (L3)
CO3	Apply techniques to regulate emotions, anxiety, fear, and anger to manage stress and improve performance.	Apply (L3)
CO4	Develop empathy and compassion by understanding perspectives, emotions, and needs of others.	Analyze (L4)
CO5	Implement techniques to enhance personal and professional relationships.	Evaluate (L5)

Text Books:

S.No.	Title	Authors	Edition	Publisher
1	Emotional Intelligence – Managing emotions to win life	S K Mangal & Shubhra Mangal	2015	PHI/EEE
2	Essentials of Social and Emotional Learning (SEL)	Black, Donna Lord	2022	Wiley

Reference Books:

S.No.	Title	Authors	Edition	Publisher
1	Mastering Emotional Intelligence	Dr Pratik Surana	1st	TMH / Notion Press

Hindi Books: डैनियल गोलेमान की "इमोशनल इंटेलिजेंस", थिएबॉल्ट मूरिस की "मास्टर योर इमोशंस"

E-resources / Web Sources:

https://books.google.co.in/books?id=WcSzCwAAQBAJ&printsec=copyright&redir_esc=y#v=onepage&q&f=false