NAAC Criterion-I

Curricular Aspects

Key Indicator -1.1 Curriculum Design and Development

Sub-Criteria -1.1.3

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

Gola ka Mandir, Gwalior - 474005, Madhya Pradesh, India

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY
INTRODUCTION TO COMPUTER PROGRAMMING
230102

L	T	P	Total Credits
2	1	2	4

COURSE OBJECTIVES

- To familiar with program readability/understanding including program style/formatting and self-documenting code.
- To familiar with debugging process.
- To design and implement basic programming solutions including statements, control structures, and methods.

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

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY

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.

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.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. identify situations where computational methods and computers would be useful. *Skill Development*

CO2. describe the basic principles of imperative and structural programming. *Skill Development.*

CO3. develop a pseudo-code and flowchart for a given problem. *Employability, Skill Development.*

CO4. analyze the problems and choose suitable programming techniques to develop solutions. *Entrepreneurship development*

CO5. design, implement, debug and test programs. *Employability, Skill Development.*

CO6. design computer programs to solve real world problems. *Entrepreneurship development*

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY
INTRODUCTION TO INTERNET OF THINGS (IoT)
230101 (DC)

L	T	P	Total Credits
4	-	-	4

COURSE OBJECTIVES

- To understand basic terminology of Internet of Things.
- To understand technology behind interaction between things.
- To understand basic terminology of Internet of Things.

Unit I

Internet of things (IoT) : Introduction, Evaluation of IoT concept, Definition, Key features and components, IoT Building block, IoT Characteristics, Advantages and Disadvantages.

Unit II

IoT Applications, IoT application structures and driver technologies : collection, transmission, processing, managing, utilization phase, Telematics and Telemetry, Telematics vs IoT, Machine-to-Machine communication, M2M vs IoT, IoE, IIoT, V2V, V2X.

Unit III

IoT hardware and software, Study of IoT Sensors, Actuators, Wearable electronics, Standard devices, Concept of Cloud, Edge, Fog and Roof computing in IoT, Introduction to communication, Components of communication system, Modes of communication, Types of data transmission, IoT communication models : Device-to-Device, Device-to-Cloud, Device-to-Gateway, and Back-End Data-Sharing, IoT Connectivity and Management.

Unit IV

Introduction to Internet and Networking Protocol, IoT protocols, Types of IoT Networks, Introduction of WSN, RF wireless sensors, RFID, WiFi, Bluetooth, IP Based Cellular Networks & 3G, 4G.

Unit V

IoT Challenges: Interoperability, Precision, Data volume and scalability, Internet connectivity, IoT Security: Security vulnerabilities in overall IoT system, Security vulnerabilities at different layers of IoT architecture, IoT Privacy and Trust, Standardization gap.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY

RECOMMENDED BOOKS

- Internet of Things from Hype to Reality, The Road to Digitization, Ammar Rayes and Samer Salam, Second Edition, Springer
- Internet of Things (IoT) Technology, Economic View And Technical Standardization, Etienne Schneider, Version 1.0, ILNAS
- Internet-of-Things (IoT) Systems Architectures, Algorithms, Methodologies, Dimitrios Serpanos and Marilyn Wolf, Springer
- Data Communications and Networking, Behrouz A Forouzan, Fourth Edition, McGraw Hill Education

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. explain basic terminology of Internet of Things. *Skill Development*

CO2. illustrate the role of communication in IoT. **Skill** *Development*

CO3. identify and use various protocols devices that are used in IoT. **Skill** *Development*

CO4. classify networking, cloud and fog computing concept for data management. **Skill Development**

CO5. investigate challenges, security and privacy. **Skill** *Development*, **Employability**

CO6. discuss different IoT enabled techniques behind interaction between things. **Entrepreneurship,** *Skill Development*

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY
INTRODUCTION TO ARTIFICIAL INTELLIGENCE
240101 (DC)

L	T	P	Total Credits
4	-	-	4

COURSE OBJECTIVES

- To provide the most fundamental knowledge to the students so that they can understand what the AI is.
- To present the basic representation and reasoning paradigms used in AI.
- To investigate applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.

Unit I

Artificial Intelligence: Introduction, History of AI, AI Problem, Approaches, Goals, Purpose, Scope, Terminology, and Application Areas, Industrialization and its Impact, Cyber-Physical System, Evolution of Industry, Data Availability, Relation between Artificial Intelligence, Machine Learning, Deep Learning and other Related Fields.

Unit II

Conventional Vs Machine Learning Programming , Data/Information/Knowledge, Type of Data: Structure, Non Structure, Semi Structure, Images, Video, Temporal, Real Time, etc, Data Types: Categorical/Nominal/Ordinal, Etc..., Data Types Conversion, Model, Algorithm, Model Development Life Cycle, Learning, Training, Testing, Validation, Importance of Data, AI Tools for Implementation.

Unit III

Introduction to Machine Learning: Basic Concepts of Machine Learning, Types of Learning: Supervised, Unsupervised and Reinforcement Learning, Categorical and Continuous Data, Skewness and Correlation, Regression Analysis Vs Classification. Introduction to Optimization: Evolutionary Algorithms, Genetic Algorithms: Basic Concepts, Optimization, Need for Optimization, Membership Functions.

Unit IV

Introduction to Intelligent Agent, Characteristics and functionalities, Introduction to Expert System, Roles of Expert Systems, Logic and Reasoning in AI: Introduction to

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY

Logic, Basic of Boolean Algebra, Logic Gates, Propositional and Predicate Logic: Interpretation of Formulas, Syntax and Semantics of an Expression, Inference Rules.

Unit V

Artificial Intelligence in Real World: Speech Processing, Natural Language Processing, Planning, Engineering and Expert Systems, Fuzzy Systems, Models of Brain and Evolution, AI in Healthcare, Defence and Agriculture, Cyber Security, Agriculture, E-Commerce, Gaming, Finance, Smart Devices.

RECOMMENDED BOOKS

- Artificial Intelligence A Modern Approach by Stuart J. Russell and Peter Norvig, Prentice Hall.

- Fundamentals of Artificial Intelligence by K. R. Chowdhary, Springer.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. define basic concepts of Artificial Intelligence. **Skill Development**

CO2. relate various computer components used in Artificial Intelligence. *Skill Development*

CO3. identify different logical and reasoning techniques used in AI. *Skill Development, Employability*

CO4. analyze the general approach of optimization, intelligent agent and expert system. **Skill Development, entrepreneurship, Employability**

CO5. analyze the general approach of machine learning. **Skill Development, entrepreneurship, Employability**

CO6. build AI enabled intelligent procedures for solving real world problems. **entrepreneurship Employability**

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY
IT WORKSHOP
(160111)

L	T	P	Total Credits
-	-	4	2

COURSE OBJECTIVES:

- To make use of computers for various purposes like surfing the net, sending/ receiving emails, preparation of various documents and presentations, preparing small databases, maintenance of accounts.
- To acquire the knowledge of computer system, mother board and its processing unit.
- To be aware of different memories, windows installation, hardware and software troubleshooting.

Unit-I

Computer Hardware: Introduction to Hardware Peripherals like RAM, ROM, Keyboard, Hard disk drive, Mouse , Processors, Generation of processor , Working of SMPS , Study of various ports, Assembly and Disassembly of Computer, Study of Networking Cable and it's types, Installation and Partition of Hard Disk, Troubleshooting & Fault finding.

Unit-II

Operating System and software installations: Introduction to Operating System, Types of Operating System (Windows and Linux), Evolution of Operating System, Introduction of Software, Types of Software, Installation steps for Operating System (Windows, Linux etc), Creating Virtual Machine using VMware/ VirtualBox.

Unit-III

Word & Excel Orientation: Overview of Microsoft office word / Excel, New Features of Microsoft Office, Working with Documents in Microsoft Word /Excel, Saving the File, Formatting the Text, Alignment of Text, Applying Fonts, Spell Checking, Inserting Header and Footer , Charts and Graphics in Microsoft Word/Excel, Working with Tables, functions and Macros in Microsoft Word/Excel, Validating Data in Microsoft Excel, Using formulae in Excel, Creating project/certificates/Newsletter using Word.

PowerPoint Presentation: Introduction to Microsoft PowerPoint, Use of Standard Formatting toolbar, Working with Charts and Tables, Editing slides, Changing templates,

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY

Slide Layouts, Inserting clipart & Pictures into slide, Slide Transitions, Animation, Inserting sound and movies into slides, Create & Deliver dynamic presentation.

Unit-IV

Computer Application: Microsoft Disk Operating System (MS-DOS): Internal Commands, External Commands, Batch File etc. Overview of Linux, Common Linux Features, **Essential Linux commands,** Advantage of Linux, Creating E-mail Account, E-mail Writing , Blog Writing, Net Surfing and Chatting ,Customize Web Browser with the LAN proxy setting, Bookmarks, Search Toolbars and Pup up Blockers, Install Antivirus Software, Configure personal firewall and Window update, Customize browser to block pop ups, Cyber Hygiene.

Unit-V

Internet: Introducing the Networking concept using LAN & WAN, Introduction, Evolution and Uses of Internet, Concepts of Web Browser, Web Page and Web Site, Study of various Internet based services like Email, Social Network, Chat, Introduction to Cyber Security and Cyber Laws.

Server: Introduction to Server, Difference between server and normal desktop, Evolution of servers, Study of various servers. Web designing using HTML/CSS.

RECOMMENDED BOOKS

- Comdex Information Technology course tool kit Vikas Gupta, WILEY Dreamtech
- The Complete Computer upgrade and repair book, 3rd edition Cheryl A Schmidt, WILEY Dreamtech.
- Introduction to Information Technology, ITL Education Solutions Limited, Pearson Education.
- PC Hardware and A+ Handbook - Kate J. Chase PHI (Microsoft)

COURSE OUTCOMES

After completion of the course student would be able to:

CO1. understand the basic concept and structure of computer hardware and networking. **Skill Development**

CO2. demonstrate installation of windows and connections through ports at basic level. **Skill Development**

CO3. identify the existing configuration of the computers and peripherals. **Skill Development**

CO4. apply the knowledge about computer peripherals to identify/rectify problems onboard. **Entrepreneurship, Employability**

CO5. explain the concept of Memory, Motherboard, Bus and SMPS. Skill Development

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY

CO6. manage data backup and restore operations on computer and update application software.

Entrepreneurship. Employability

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY
INTRODUCTION TO ARTIFICIAL INTELLIGENCE AND DATA SCIENCE
(270101)

L	T	P	Total Credits
4	-	-	4

COURSE OBJECTIVES

- To provide the most fundamental knowledge to the students so that they can understand what the AI is.
- To present the basics of Data Science (DS) and machine learning (ML) and how DS is different from ML.
- To investigate applications of AI and DS techniques in social media analysis, mobile and IoT analysis, time series analysis, security and privacy for data analytics.

Unit I
Artificial Intelligence: Introduction, History of AI, AI Problem, Approaches, Goals, Purpose, Scope, Terminology, and Application Areas, Industrialization and its Impact, Cyber-Physical System, Evolution of Industry, Data Availability, Relation between Artificial Intelligence, Machine Learning, Deep Learning and other Related Fields.

Unit II
Conventional Vs Machine Learning Programming, Data/Information/Knowledge, Type of Data: Structure, Non-Structure, Semi Structure, Images, Video, Temporal, Real Time. Data Types: Categorical/Nominal/Ordinal, Data Types Conversion, Model, Algorithm, Model Development Life Cycle, Learning, Training, Testing, Validation, Importance of Data, AI Tools for Implementation.

Unit III
Introduction to Machine Learning: Basic Concepts of Machine Learning, Types of Learning: Supervised, Unsupervised and Reinforcement Learning, Categorical and Continuous Data, Skewness and Correlation, Regression Analysis Vs Classification.

Unit IV
Introduction and importance of Data Science, modelling process in Data Science, various tools for data analytics, data handling and visualization, data scientist roles and responsibilities, privacy and security in Data Science.

Unit V

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY

Artificial Intelligence and Data Science in Real World: Speech Processing, Natural Language Processing, Satellite Data Analysis, manufacturing industry, logistic industry, retail industry. AI and DS in Healthcare, Defence and Agriculture, Cyber Security, Agriculture, E-Commerce, Finance, Smart Devices.

RECOMMENDED BOOKS

- Artificial Intelligence A Modern Approach by Stuart J. Russell and Peter Norvig, Prentice Hall.

- Fundamentals of Artificial Intelligence by K. R. Chowdhary, Springer.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. define basic concepts of Artificial Intelligence. **Skill Development**

CO2. relate various computer components used in Artificial Intelligence. **Skill Development**

CO3. identify different logical and reasoning techniques used in AI. **Skill Development, Employability**

CO4. understand pattern discovery, data handling and data visualization. Skill Development

CO5. analyze the general modelling process in Data Science. **Skill Development, entrepreneurship**

Employability

CO6. understand the real-world problems and applications of AI and DS for solving the problems.

Entrepreneurship, Employability

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY
INTRODUCTION TO ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING
(280101)

L	T	P	Total Credits
4	-	-	4

COURSE OBJECTIVES

- To provide the most fundamental knowledge to the students so that they can understand what the AI is.
- To present the basics of Artificial Intelligence (AI) and machine learning (ML).
- To investigate applications of AI and ML techniques in social media analysis, mobile and IoT analysis, time series analysis, artificial neural networks and other machine learning models.

Unit I

Artificial Intelligence: Introduction, History of AI, AI Problem, Approaches, Goals, Purpose, Scope, Terminology, and Application Areas, Industrialization and its Impact, Cyber-Physical System, Evolution of Industry, Data Availability, Relation between Artificial Intelligence, Machine Learning, Deep Learning and other Related Fields.

Unit II

Conventional Vs Machine Learning Programming, Data/Information/Knowledge, Type of Data: Structure, Non Structure, Semi Structure, Images, Video, Temporal, Real Time. Data Types: Categorical/Nominal/Ordinal, Data Types Conversion, Model, Algorithm, Model Development Life Cycle, Learning, Training, Testing, Validation, Importance of Data, AI Tools for Implementation.

Unit III

Introduction to Machine Learning: Basic Concepts of Machine Learning, Types of Learning: Supervised, Unsupervised and Reinforcement Learning, Categorical and Continuous Data, Skewness and Correlation, Regression Analysis Vs Classification. Supervised Learning: Linear and Logistic Regression: Linear models for classification, Sigmoid, Logistic regressions with single and multiple variables, Polynomial regression.

Unit IV

Unsupervised Learning: Clustering, Common distance measures, Hierarchical algorithms – agglomerative and divisive, partitioning algorithms – k-means and derivatives; Design

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY

and Analysis of Machine Learning Experiments: Guidelines for machine learning experiments, Factors, Response, and Strategy of experimentation, Cross-Validation and Resampling methods, measuring classifier performance.

Unit V

Artificial Intelligence and Machine Learning in Real World: Speech Processing, Natural Language Processing, Planning, manufacturing industry, logistic industry, retail industry. AI and DS in Healthcare, Defense and Agriculture, Cyber Security, Agriculture, E-Commerce, Finance, Smart Devices.

RECOMMENDED BOOKS

- Artificial Intelligence A Modern Approach by Stuart J. Russell and Peter Norvig, Prentice Hall.
- Fundamentals of Artificial Intelligence by K. R. Chowdhary, Springer.
- E. Alpaydin, Introduction to Machine Learning (3rd ed.), PHI, 2015. ISBN 978-8120350786.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. define basic concepts of Artificial Intelligence. **Skill Development**

CO2. relate various computer components used in Artificial Intelligence. **Skill Development**

CO3. learn about and practice a variety of Supervised and Unsupervised Learning approaches. **Skill Development**

CO4. familiarize and learn about the latest trends and research in the field. **Entrepreneurship**

CO5. understand the real-world problems and applications of AI and ML for solving the problems. Skill Development

---

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY
DATA STRUCTURES
160211/230202/240202/270202/280202 (DC-1)

L	T	P	Total Credits
2	1	2	4

COURSE OBJECTIVES

- To be familiar with the use of data structures as the foundational base for computer solutions to problems.
- To understand various techniques of searching and sorting.
- To understand basic concepts about stacks, queues, lists, trees and graphs.

Unit-I

Introduction to Data Structures: Algorithms & their characteristics, asymptotic notations. arrays and its representations, index to address translation. Link list: Introduction, implementation of linked list, operations, circular link list, doubly linked list, polynomial manipulation using linked list.

Unit-II

Stacks: Concepts and implementation of stacks, operations on stack, conversion of infix to postfix notation, evaluation of postfix expression, recursion.

Queues: Concepts and implementation, operations on queues, dequeue, priority queues, circular queues and application.

Unit-III

Trees: Types, terminology, binary tree -representations, traversal, conversion of general tree to binary tree, binary search tree, threaded binary tree and height balanced tree.

Unit-IV

Graphs: Background, graph theory terminologies, representation of graphs- sequential & linked representation, path matrix, graph traversals- BFS, DFS, spanning trees, applications of graph.

Unit-V

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY

Searching & Sorting: Linear search, binary search, bubble sort, selection sort, insertion sort, quick sort, merge sort, radix sort and heap sort, comparison between sorting techniques, hashing and collision resolution techniques.

RECOMMENDED BOOKS

- Data Structures, Algorithms and Applications in C++, Sartaj Sahni, 2nd Edition.
- An Introduction to Data Structures with Applications, Jean-Paul Tremblay, Mcgraw hill.
- Data Structures & Algorithms, Aho, Hopcroft & Ullman, original edition, Pearson Publication.

COURSE OUTCOMES

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

CO1. outline the basics of Algorithms and their performance criteria's. **Skill Development**
CO2. explain the working of linear/Non-Linear data structures. **Skill Development**
CO3. identify the appropriate data structure to solve specific problems. **Skill Development Employability**
CO4. analyze the performance of various Data Structures & their applications. **Entrepreneurship, Employability**
CO5. evaluate the time/space complexities of various data structures & their applications. **Entrepreneurship, Employability**
CO6. design the optimal algorithmic solutions for various problems. **Employability**

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY
DATA STRUCTURES
160211/230202/240202/270202/280202 (DC-1)

L	T	P	Total Credits
2	1	2	4

COURSE OBJECTIVES

- To be familiar with the use of data structures as the foundational base for computer solutions to problems.
- To understand various techniques of searching and sorting.
- To understand basic concepts about stacks, queues, lists, trees and graphs.

Unit-I

Introduction to **Data Structures:** Algorithms & their characteristics, asymptotic notations, arrays and its representations, index to address translation. **Link list:** Introduction, implementation of linked list, operations, circular link list, doubly linked list, polynomial manipulation using linked list.

Unit-II

Stacks: Concepts and implementation of stacks, operations on stack, conversion of infix to postfix notation, evaluation of postfix expression, recursion.

Queues: Concepts and implementation, operations on queues, dequeue, priority queues, circular queues and application.

Unit-III

Trees: Types, terminology, binary tree -representations, traversal, conversion of general tree to binary tree, binary search tree, threaded binary tree and height balanced tree.

Unit-IV

Graphs: Background, graph theory terminologies, representation of graphs- sequential & linked representation, path matrix, graph traversals- BFS, DFS, spanning trees, applications of graph.

Unit-V

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY
DIGITAL LOGIC DESIGN
230201/240201/270201/280201 (DC)

L	T	P	Total Credits
2	1	-	3

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.

Unit-I

Introduction to Digital Electronics, Needs and Significance, Different Number System: Binary Numbers, Octal and Hexadecimal Numbers, Conversions, Complement's, Signed Binary Numbers, Binary Arithmetic's, Binary Codes: BCD, ASCII Codes.

Unit-II

Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Boolean Relations, Digital Logic Gates, De Morgan's Theorem, Karnaugh Maps and simplifications.

Unit-III

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

Unit-IV

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

Unit-V

Introduction to Memory, Memory Decoding, Error Detection and Correction, Programmable Logic Array, Programmable Array Logic, Sequential Programmable

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY

Devices, RTL and DTL Circuits, TTL, ECL, MOS, CMOS, Application Specific Integrated Circuits.

RECOMMENDED BOOKS

- Digital Design, Morris Mano M. and Michael D. Ciletti, IV Edition, Pearson Education.
- Digital Electronics: Principles, Devices and Applications, Anil K. Maini, Wiley.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. explain the computer architecture for defining basic component and functional unit. **Skill Development**

CO2. recall different number system and solve the basic arithmetic operations. **Skill Development**

CO3. develop the understanding of combinational circuits. **Skill Development, Employability**

CO4. analyze the basic concept of sequential circuits. **Entrepreneurship, Employability**

CO5. compare various memories. **Skill Development**

CO6. solve the boolean functions using logic gates. **Skill Development**

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY
OBJECT ORIENTED PROGRAMMING AND METHODOLOGY
160212 /230203/240203/270203/ 280203 (DC-2)

L	T	P	Total Credits
3	-	2	4

COURSE OBJECTIVES

- To study about the concept of object oriented programming.
- To create C++ programs that leverage the object oriented features of the C++ Language.
- To apply object oriented or non-object oriented techniques to solve bigger computing problems.

Unit-I

Introduction to C++ and Object Oriented Concepts: Basics of C++, Tokens, I/O Statements, Structure of Program, Operators and Expressions, Flow of Control, Arrays, Structures, Functions and its type, Function Prototyping, Pointers, Pointer Variables, Pointers and Arrays, Array of Pointers, Pointers and Structures, Dynamic Memory Allocation.

Programming Techniques: Unstructured & Structured Programming, Object Oriented Paradigm, Features of Oops, Comparison with Procedural Oriented Programming & Object Oriented Programming, Abstract Data Types, Reference Variable, Scope Resolution Operator.

Unit-II

Classes & Objects: Specification of Class, Visibility Modes: Private, Public, Protected, Defining Member Functions, Creating of Objects, Characteristics of Object, Static Data Member, Static Member Function, Array of Objects, Object as Arguments, Inline Function, Default Arguments, Friend Function, Recursion.

Constructors and Destructors: Introduction, Types of Constructors- Default Constructor, User Defined Constructor, Parameterized Constructor, Copy Constructor, Constructor with Default Arguments, Rules of Constructor Definition and Usage, Destructors.

Unit-III

Polymorphism: Introduction, Type of Polymorphism: Compile Time Polymorphism & Run Time Polymorphism, Function Overloading, Operator Overloading: Binary

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY

Operators, Arithmetic Assignment Operators, Unary Operators, Rules for Operator Overloading, Pitfalls of Operator Overloading, Data Conversion, Type Casting.

Unit-IV

Inheritance: Introduction to Code Reuse, Visibility Modes, Types of Inheritance: Single Level, Multilevel, Multiple, Hybrid, Multipath. Virtual Base Classes, Abstract Classes, Constructors in Derived Classes, Nesting of Classes, Overriding Member Function. Containership: Classes with in Classes, Function Overriding.

Unit-V

Pointer & File Concept: Pointers Overview, Pointers to Objects, This Pointer, Pointers to Derived Classes, Virtual Functions & Pure Virtual Function, Association, Type of Association, Aggregation, File Concepts, Study of Various Files and Streams, Opening and Closing of Files- Functions Get(), Getline(), Put(), Opening The Files Using Function Open(), File Manipulator Function.

RECOMMENDED BOOKS

- C++ How to Program, H M Deitel and P J Deitel, Prentice Hall.
- Programming with C++, D Ravichandran, T.M.H.
- Computing Concepts with C++ Essentials, Horstmann, John Wiley.
- The Complete Reference in C++, Herbert Schildt, TMH.
- Object-Oriented Programming in C++, E Balagurusam.
- Fundamentals of Programming C++, Richard L. Halterman.

COURSE OUTCOMES

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

CO1. tell the concepts of classes & objects and their significance in real world. **Skill Development**

CO2. explain the benefits of object oriented design. **Skill Development, Employability**

CO3. build C++ classes using appropriate encapsulation and design principles. **Skill Development, Employability**

CO4. analyze the utilization of inheritance and polymorphism in the solution of problems. **Skill Development, Employability**

CO5. choose appropriate object orient programming concepts for solving real world problems. **Skill Development, Employability, Entrepreneurship**

CO6. develop solutions to problems demonstrating usage of control structures, modularity, I/O and other standard language constructs. **Skill Development, Employability, Entrepreneurship.**

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY
DIGITAL ELECTRONICS
160213 (DC-3)

L	T	P	Total Credits
2	1	-	3

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.

Unit-I

Introduction to Digital Electronics, Needs and Significance, Different Number System: Binary Numbers, Octal and Hexadecimal Numbers, Conversions, Complement's, Signed Binary Numbers, Binary Arithmetic's, Binary Codes: BCD, ASCII Codes.

Unit-II

Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Boolean Relations, Digital Logic Gates, De Morgan's Theorem, Karnaugh Maps and simplifications.

Unit-III

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

Unit-IV

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

Unit-V

Introduction to Memory, Memory Decoding, Error Detection and Correction, Programmable Logic Array, Programmable Array Logic, Sequential Programmable Devices, RTL and DTL Circuits, TTL, ECL, MOS, CMOS, Application Specific Integrated Circuits.

RECOMMENDED BOOKS

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY

- Digital Design, Morris Mano M. and Michael D. Ciletti, IV Edition, Pearson Education.

- Digital Electronics: Principles, Devices and Applications, Anil K. Maini, Wiley.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1 explain the computer architecture for defining basic component and functional unit. **Skill Development**

CO2 recall different number system and solve the basic arithmetic operations. **Skill Development**

CO3. develop the understanding of combinational circuits. **Skill Development, Employability, Entrepreneurship.**

CO4. analyze the basic concept of sequential circuits. **Employability, Entrepreneurship.**

CO5. compare various memories. **Skill Development**

CO6. solve the boolean functions using logic gates. **Skill Development, Employability, Entrepreneurship.**

COMPUTER SYSTEM ORGANIZATION
160311

L	T	P	Total Credits
2	1	-	3

COURSE OBJECTIVE

- To provide the fundamental knowledge of a computer system and its processing units.
- To provide the details of input & output operations, memory management and performance measurement of the computer system.
- To understand how computer represents and manipulate data.

Unit -I

Introduction: Von Newman Model, Various Subsystems, CPU, Memory, I/O, System Bus, CPU and Memory Registers, Program Counter, Accumulator, Register Transfer and Micro Operations: Register Transfer Language, Register Transfer, Tree-State Bus Buffers, Bus and Memory Transfers, Arithmetic Micro-Operation, Logic Micro-Operation, Shift Micro-Operation Register Transfer Micro Operations, Arithmetic Micro-Operations, Logic Micro-Operations and Shift Micro-Operations.

Unit- II

Computer Arithmetic: Addition and Subtraction with Signed-Magnitude, Multiplication Algorithm, Division Algorithm, Division Algorithms, Floating-Point Arithmetic Operations.

Central Processing Unit (CPU): General Purpose Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer (RISC), Hardwired and Microprogrammed Control.

Unit -III

Microprocessors: Introduction of 8085 Microprocessor: Architecture, Instruction Set, Addressing Modes, Interrupts and Basic Assembly Language Programming.

Unit -IV

Input-Output Organization: Peripheral Devices, I/O Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, DMA (DMA Controller, DMA Transfer),

Input-Output Processor (IOP), Data Transfer- Serial/Parallel, Simplex/ Half Duplex/ Full Duplex.

Unit-V

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory- Organization and Mappings, Memory Management Hardware, Introduction to Pipelining & Multiprocessors.

RECOMMENDED BOOKS

- Computer System Architecture, Morris Mano, PHI.
- Microprocessor Architecture, Programming and Applications with the 8085, Gaonkar, Penram International Publishing (India) Pvt.Ltd.
- Computer Organization, Carl Hamacher, THM.
- Computer Architecture and Organization, J P Hayes, Mc-Graw Hills, New Delhi.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. recall the basic building blocks of computer Architecture. *Skill development*
CO2. compare different memories. *Skill development*
CO3. apply the concept of memory mapping, multiprocessor and pipelining in solving real world problems. *Entrepreneurship, Skill development*
CO4. analyze various modes of Input-Output data transfer. *Skill development*
CO5. evaluate the arithmetic related to the number system. *Skill development*
CO6. develop the skill of writing low level programming. *Skill development*

MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR – 474005
(A Govt. Aided UGC Autonomous Institute Affiliated to R.G.P.V. Bhopal, M.P.)
Department of Information Technology

DESIGN & ANALYSIS OF ALGORITHMS
160312

L	T	P	Total Credits
3	-	2	4

COURSE OBJECTIVES
- To introduce the topic of algorithms as a precise mathematical concept.
- To study the techniques like recursion, divide and conquer, dynamic programming, greedy approach, backtracking and branch and bound.
- To practice their skills on many well-known algorithms and data structures designed to solve real-life problems.

Unit-I

Introduction to Computational Model: Algorithms and its Importance, Recurrences and Asymptotic Notations, Mathematical Analysis of Non-Recursive and Recursive Algorithm, Review of Sorting & Searching Algorithms, **Basic Tree and Graph Concepts:** B-Trees and Traversal Techniques, Topological sort.

Unit-II

Divide and Conquer Method: Introduction and its Examples such as Finding the Maximum and Minimum, Binary Search, Merge Sort, Quick Sort and Strassen's Matrix Multiplication and additional real world problems on divide and conquer.

Unit-III

Greedy Method: Introduction, Characteristics, Examples of Greedy Methods such as Single-Source Shortest Paths, **Minimum Cost Spanning Trees :** Prims's and Kruskal's Algorithm, Knapsack Problem, Dijkstra's single source shortest path algorithm, Optimal Storage on Tapes.

Unit-IV

Dynamic Programming: Introduction, The Principle of Optimality, Examples of Dynamic Programming Methods such as – 0/1 Knapsack, Traveling salesman problem, Floyd's All Pairs Shortest Path, Longest Common Subsequence and Reliability Design, Matrix chain multiplication

Unit-V

Backtracking: Concept and its Examples like 4-Queen's Problem, Knapsack problem Hamiltonian Circuit Problem, Graph Coloring Problem etc. **Branch & Bound:** Introduction and its Examples like - Traveling Salesperson Problem etc. **NP-Completeness:** Introduction, Class P and NP, Polynomial Reduction, NP-Hard and NP- Complete Problems.

RECOMMENDED BOOKS

- Fundamentals of Computer Algorithms, Horowitz & Sahani, Universities press.
- Introduction to Algorithms, Coremen Thomas, Leiserson CE, Rivest RL, PHI.
- Design & Analysis of Computer Algorithms, Ullmann, Pearson.
- Algorithm Design, Michael T Goodrich, Robarto Tamassia, Wiley India.

COURSE OUTCOMES

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

CO1.   demonstrate a familiarity with major algorithms and data structures. *Skill development Employability*

CO2.   apply important algorithmic design paradigms and methods of analysis. *Skill development*

CO3.   analyze the asymptotic performance of algorithms. *Skill development*

CO4.   compare different design techniques to develop algorithms for computational problems. *Skill development Employability*

CO5.   design algorithms using greedy strategy, divide and conquer approach, dynamic programming, backtracking and branch n bound approach. *Skill development*

CO6.   understand the hardness and different classes of hardness. Further, design approximate solutions for computationally hard problems. *Skill development Employability Entrepreneurship*

MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR – 474005
(A Govt. Aided UGC Autonomous Institute Affiliated to R.G.P.V. Bhopal, M.P.)
Department of Information Technology

DATABASE MANAGEMENT SYSTEM
160313

L	T	P	Total Credits
2	1	2	4

COURSE OBJECTIVES

- To understand the different issues involved in the design and implementation of a database system.
- To study the physical and logical database designs, database modelling, relational, hierarchical and network models.
- To understand and use data manipulation language to query, update and manage a database.

Unit-I

DBMS: Database Approach v/s Traditional File Approach, Advantages of Database System, Database Users and Administrator, Database System Environment, Application Architectures, Schemas, Instances, Data Independence, Data Models: Hierarchical Data Model, Network Data Model & Relational Data Model, Comparison between Models.

Entities and Relationship Model: Entity types, Entity sets, Attributes and Keys, Relationship Types and Sets, Constraints, Design issue, E-R Diagram, Weak Entity Sets.

Unit-II

Relational Model: Structure of Relational Databases: Relation, Attribute, Domain, Tuples, Degree, Cardinality, Views, Database Relations, Properties of Relations, Attributes, Keys, Attributes of Relation, Domain Constraints, Integrity Constraints.

Relational Algebra: Concepts and Operations: Select, Project, Division, Intersection, Union, Division, Rename, Join etc.

Relational Calculus: Tuple Relational Calculus, Domain Relational Calculus.

Unit-III

SQL: Purpose of SQL, Data Definition Language (DDL) Statements, Data Manipulation Language (DML) Statements Update Statements & Views in SQL, Data Control Language (DCL)

Unit-IV

Relational Database Design: Purpose of Normalization, Data Redundancy and Update Anomalies, Functional Dependency, The Process of Normalization, Various Normal Forms: 1NF, 2NF, 3NF, BCNF, Decomposition, Desirable Properties of Decomposition: Dependency Preservation, Lossless Join, Problems with Null Valued & Dangling Tuple, Multivalued Dependencies.

Unit-V

Transaction Management: Transaction Concept, Transaction State, Concurrent Executions, Serializability: Conflict and View Serializability, Concurrency Control: Lock-Based Protocol, Recovery: Log-Based Recovery.

RECOMMENDED BOOKS

- Database System Concepts, Abraham Silberschatz Henry F. Korth S. Sudarshan, McGraw-Hill 6th Edition.
- Database Management System, Raghu Ramakrishnan Johannes Gehrke, McGraw Hill 3rd Edition.
- Fundamentals of Database System, Elmasri & Navathe, Addison-Wesley Publishing, 5th Edition.
- An Introduction to Database Systems, Date C. J, Addison-Wesley Publishing, 8th Edition.

COURSE OUTCOMES

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

CO1.   demonstrate the concepts of different type of database system. *Skill Development*
CO2.   apply relational algebra concepts to design database system. *Skill Development*
CO3.   make use of queries to design and access database system.   *Skill Development*
CO4.   analyze the evaluation of transaction processing and concurrency control. *Skill Development*
CO5.   determine the optimize database for real world applications.
CO6.   design a database system for a real world application. *Entrepreneurship*

OPERATING SYSTEM
160314

L	T	P	Total Credits
3	-	-	3

COURSE OBJECTIVES

- To provide basic knowledge of computer operating system structures and functioning.
- To compare several different approaches to memory management, file management and process management.
- To understand various problems related to concurrent operations and their solutions.

Unit I

Basics of Operating System: Generations, Types, Structure, Services, System Calls, System Boot, System Programs, Protection and Security.

Unit II

Process Management: Process Concepts, Process States, Process Control Block, Scheduling-Criteria, Scheduling Algorithms and their Evaluation, Threads, Threading Issues.

Unit III

Process Synchronization: Background, Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors.
Deadlock: System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery from Deadlock.

Unit IV

Memory Management: Main Memory, Swapping, Contiguous Memory Allocation, Paging, Structure of Page Table, Segmentation, Virtual Memory, Demand Paging, Page Replacement Algorithms, Allocation of Frames, Thrashing.

Unit V

Storage Management: Mass-Storage Structure, Overview, Disk Structure, Disk Attachment, Disk Scheduling.
File System Interface: The Concept of a File, Access Methods, Directory Structure, File System Structure, Allocation Methods, Free-Space Management.

RECOMMENDED BOOKS

- Operating System Concepts, Silberschatz, Ninth Edition, Willey Publication.
- Operating Systems, internals and Design Principles, Stallings, Seventh Edition, Pearson Publication.
- Modern Operating Systems, Tanenbaum, Fourth Edition. Pearson Publication.

COURSE OUTCOMES

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

CO1. tell the basic concept of operating systems. *Skill Development*
CO2. explain the working procedure of the operating system. *Skill Development*
CO3. analyze the various operating system problems and issues. *Skill Development*
CO4. develop the solutions for various operating system problems and issues. *Skill Development, Employability*
CO5. measure the performance of various scheduling and allocation techniques. *Skill Development*
CO6. test the working of various scheduling and allocation techniques. *Skill Development*

MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR – 474005
(A Govt. Aided UGC Autonomous Institute Affiliated to R.G.P.V. Bhopal, M.P.)
Department of Information Technology

JAVA PROGRAMMING LAB
160315

L	T	P	Total Credits
-	1	2	2

COURSE OBJECTIVES

- To understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
- To acquire the ability to write a computer program to solve specified problems.
- To be able to use Java SDK environment to create, debug and run simple Java programs.

Unit-I

Introduction to Java programming: Overview and Characteristics of Java, The Java Virtual Machine, Installing Java, Java Program Development, Java Source File Structure, Compilation, Executions. Packages, Package access, Variables and data types, Conditional and looping constructs, Arrays.

Unit-II

Object-oriented programming with Java Classes and Objects: Fields and Methods, Constructors, Overloading methods, Nested classes, Overriding methods, Polymorphism, Making methods and classes final, Wrapper classes.

Unit-III

Extending Classes and Inheritance: Types of Inheritance in Java, Abstract classes and methods, Interfaces, use of 'super', Polymorphism in inheritance. Garbage collection in JAVA.

Exception handling: Try- Catch, Throw, Throws, Finally constructs, The Exception class.

Unit-IV

String Package and Multithreading: Operation on String, Mutable & Immutable String, Tokenizing a String, Creating Strings using String Buffer class.

Understanding Threads: Needs of Multi-Threaded Programming, Thread Life-Cycle, Thread Priorities and Synchronizing Threads.

Unit-V

The I/O Package: Input Stream and Output Stream classes, Reader and Writer classes, Basics of AWT, Swing and Applets: Layout Managers, Event Handling, Classes for various controls, such as label, choice, list, checkbox, etc., Dialogs and frames using menus.

Basic concepts of networking: Working with URLs, Concepts of URLs and Sockets. Basics of database connectivity with JDBC.

RECOMMENDED BOOKS

- Programming with JAVA: A Primer, E. Balagurusamy, Tata McGraw Hill.
- JAVA: The Complete Reference, Herbert Schildt, McGraw Hill Education.
- JAVA-2: The Complete Reference, Patrick Naughton, Herbert Schidt.

COURSE OUTCOMES

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

CO1. tell the available features in Java programming language. *Employability, Skill development*

CO2. illustrate Java programming concepts for solving problems. *Employability, Skill development*

CO3. make use of the Java programming methods for connecting the various databases. *Employability, Skill development*

CO4. test for bugs in a software application written in the Java programming language. *Employability, Skill development*

CO5. determine different ways for handling exceptions, memory management, file handling, i/o management and internet based application development. *Skill development*

CO6. build a project for application development using Java programming language. *Employability, Skill development, Entrepreneurship*

MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR – 474005
(A Govt. Aided UGC Autonomous Institute Affiliated to R.G.P.V. Bhopal, M.P.)
Department of Information Technology

COMPUTER NETWORKS AND PROTOCOLS
240303

L	T	P	Total Credits
3	-	-	3

COURSE OBJECTIVES

- Familiarize the student with the basic taxonomy and terminology of the computer networking & Protocols.
- Provide detail knowledge about various layers, protocols and devices that facilitate networking.
- Enable students to deal with various networking problems such as flow control, error control and congestion control.

Unit-I

Introduction: Computer Network Types, OSI Reference Model & TCP/IP Reference Mode, Circuit Switching, Message Switching & Packet Switching, Frequency Division Multiplexing, Wavelength Division Multiplexing & Time Division Multiplexing, ISDN, SONET.

Physical Layer : Data Transmission Modes, Network topologies, Line Coding, Synchronous & Asynchronous Transmission, Transmission Medium- Guided & Unguided, Networking Devices, Performance Criteria.

Unit-II

Data Link Layer: Introduction, Design Issues, Services, Framing, Error Control, Flow Control, ARQ Strategies, Error Detection and Correction, Parity Bits, Cyclic Redundant Code (CRC), Hamming Codes, MAC Sub Layer- Channel Allocation Problem, Pure ALOHA ,Slotted ALOHA, CSMA ,CSMA/CD, IEEE 802.3, IEEE 802.4 and IEEE 802.5, HDLC.

Unit-III

Network Layer Protocols: Introduction, Design Issues, Services, Routing- Distance Vector Routing, Hierarchical Routing & Link State Routing, Shortest Path Algorithm- Dijkstra's Algorithm & Floyd–Warshall's Algorithm, Routing Protocols, Flooding, Connection Oriented & Connectionless Service, IP Addressing, IPV4, IPV6, Internet Protocol Datagram, Fragmentation, ICMP, IGMP.

Unit-IV

Transport Layer Protocols: Datagram Protocol (UDP) - Process To Process Communication, Port Number, Socket Address, User Datagram, UDP Operation. TCP Services, Process To Process Communication, Stream Delivery Service, Full Duplex Communication, Connection Oriented Service, Reliable Service, TCP Features-Numbering System, Flow Control, Error Control, Congestion Control , TCP Segment, Flow Control-Sliding Window Protocol, Silly Window Syndrome Error Control-Checksum, Acknowledgement, Retransmission, Congestion Control.

Unit-V

Application Layer Protocols: Introduction, Design Issues, Presentation Layer-Translation, Encryption- Substitutions and Transposition Ciphers, Compression- Lossy and Lossless. Session Layer – Dialog Control, Synchronization. Application Layer-Remote Login, File Transfer & Electronic Mail. Domain Name System (DNS), Telnet, FTP, TFTP, Email Protocol: SMTP, POP, IMAP.

RECOMMENDED BOOKS

- Data Communication and Networking, Behrouz A. Forouzan, McGraw Hill.
- Computer Networks, Andrew S. Tanenbaum, Pearson Education India.
- Computer Networks and Internets, Douglas E. Comer, Pearson India.
- TCP/IP Protocol Suite, B. A. Fourozan, Tata McGraw Hill
- Internetworking with TCP/IP, Douglas E. Comer, Publisher- PHI, New Delhi
- TCP/IP Illustrated by Richard Stevens, Publisher- Addison – Wesley.

COURSE OUTCOMES

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

CO1. explain the fundamental concepts of computer network. *Skill development*
CO2. illustrate the basic taxonomy & terminologies of computer network protocols. *Skill development*
CO3. develop a concept for understanding advance computer network. *Skill development*
CO4. build the skill of IP addressing and routing mechanism. *Skill development, Employability*
CO5. predict the performance of computer network in congestion and internet. *Skill development*
CO6. construct the network environment for implementation of computer networking concept. *Skill development*

PYTHON PROGRAMMING LAB
240305

L	T	P	Total Credits
-	-	2	1

COURSE OBJECTIVES

- Implement an algorithm in Python by using standard programming constructs such as, functions, modules, aggregated data (arrays, lists, etc.)
- Explain the output of a given Python program and identify and correct errors in a given Python program
- Write programs using the features of object-oriented programming language such as, encapsulation, polymorphism, inheritance, etc.

Unit-I

Introduction to Python programming language Data and Expressions: Literals; Variables and Identifiers; Operators; Expressions and Data Types, Logical operator; Boolean operator; Boolean Expressions; Control Structures; Selection Control, Iterative Control. Lists & tuples: List Structures; Lists in Python, Iterating over Lists in Python.

Unit-II

Functions: Arguments in functions; Program routes; Calling Value Returning Functions; Calling Non- value Returning Functions Parameter Passing; Variable Scope; Modular design Modules; Top-Down Design Python Modules; File Handling Operation in file: Reading, Writing and appending in Text Files.

Unit-III

String Processing; Dictionaries and sets operations; Exception Handling: Exceptions Data Collections applying lists etc.

Unit-IV

Introduction to Object Oriented Programming, Class, Objects, Encapsulation, Data abstraction, Inheritance, Polymorphism.

Unit-V

Graphics Programming: Graphics Programming, Using Graphical Objects, Interactive Graphics, Displaying Images, Generating Colors, Graphics Objects, Entry Objects, Test Case: Numpy, scipy; Test Case: panda, Matplotlib.

MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR – 474005
(A Govt. Aided UGC Autonomous Institute Affiliated to R.G.P.V. Bhopal, M.P.)
Department of Information Technology

RECOMMENDED BOOKS

- C. Dierbach, Introduction to Computer Science Using PYTHON: A Computational Problem-Solving Focus (1st ed.), Wiley, 2015. ISBN 978-8126556014.
- Yashavant Kanetkar, Let Us Python (1st ed.), BPB Publishers, 2019. ISBN 978-9388511568

COURSE OUTCOMES

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

CO1. solve computational problem using python language *Skill development, Employability*

CO2. familiar with basics syntax and features of python programming language *Skill Development, Employability*

CO3. hands on experience to online coding tools like colab. *Skill development, Employability*

CO4. design a program utilizing the features of object oriented concept. *Skill development*

CO5. utilize some of the libraries available for solving problems. *Skill development*

DESIGN AND THINKING LAB
230305

L	T	P	Total Credits
-	-	2	1

PREREQUISITES

We assume that you are already familiar with the basics of C and C++. Knowledge in other programming language especially the OOP is an added advantage. A basic understanding of microcontrollers and electronics is also expected.

COURSE OBJECTIVE:

The students will:

- Learn the basics of electronics, including reading schematics (electronics diagrams)
- Learn how to prototype circuits with a breadboard
- Learn the Arduino programming language and IDE
- Program basic Arduino examples
- Prototype circuits and connect them to the Arduino
- Program the Arduino microcontroller to make the circuits work
- Connect the Arduino microcontroller to a serial terminal to understand communication and stand-alone use
- Explore the provided example code and online resources for extending knowledge about the capabilities of the Arduino microcontroller

---

Unit-I

Introduction: embedded system, Understanding Embedded System, Overview of basic electronics and Digital electronics, Microprocessor vs Microcontroller, Common features of Microcontroller, Comparison between different types of microcontrollers.

Unit-II

Arduino: introduction, Pin Configuration and Architecture, Device and Platform Features, Concept of Digital and Analog ports, Arduino Interfacing Board, Introduction to Embedded C and Arduino Platform.

Unit-III

Basic Concepts and Functions: Arduino data types, Variables and constants, Operators, Control Statements, Arrays, Functions, Pins Configured as INPUT, Pull-up Resistors, Pins Configured as OUTPUT, pinMode() Function, digitalWrite() Function, analogRead() function, Arduino Interrupts.

Unit-IV

Arduino Time and Displays: Incorporating Arduino time, delay() function, delay Microseconds() function, millis() function, micros() function. Working with Serial

Monitor, Line graph via serial monitor, interfacing 8 bit LCD to Arduino, Fixed one line static message display, Running message display using the LCD Library of Arduino.

Unit-V

Arduino Sensors and Secondary Integrations: Humidity Sensor, Temperature Sensor, Water Detector/ Sensor, PIR Sensor, Ultrasonic Sensor, Connecting Switch (Relay switches). Types of Relay, Controlling Electrical appliances with electromagnetic relays.

RECOMMENDED BOOKS:

- Arduino for Dummies, by John Nussey (2013)

References:

1. Arduino Projects for Dummies, by Brock Craft (2013)
2. Programming Arduino – Getting Started with Sketches, Simon Monk (2016)
3. Programming Arduino - Next Steps, by Simon Monk (2016)

COURSE OUTCOMES

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

CO1: define the basic concept of Embedded System. *Skill development*

CO2: describe the basic principles of Arduino programming and IDE. *Skill development*

CO3: familiarize with different types of sensors and related systems. *Skill development*

CO4: design, implement, debug and test programs/ system. *Skill development, Employability*

CO5: design and develop Smart systems applications. *Skill development, Employability , Entrepreneurship*

CO6: build Arduino board using different sensors. *Skill development, Employability , Entrepreneurship*

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY

COMPUTER GRAPHICS & MULTIMEDIA
160411

L	T	P	Total Credits
3	-	2	4

COURSE OBJECTIVES

- To become familiar with computer graphics techniques and display devices.
- To enhance the proficiency in image representations, 2D and 3D graphics transformations.
- To develop awareness with various illumination, color models and multimedia system.

Unit-I

Introduction to Computer Graphics: Interactive Computer Graphics, Application of Computer Graphics, Random and Raster Scan Displays, Storage Tube Graphics Display, Calligraphic Refresh Graphics Display, Flat Panel Display, Refreshing, Flickering, Interlacing, Resolution, Bit Depth, Aspect Ratio etc.

Unit-II

Scan Conversion Technique: Image representation, Line drawing: DDA, Bresenham's Algorithm. Circle Drawing: General Method, Mid-Point, DDA, Bresenham's Circle Generation Algorithm, Ellipse Generation Algorithm, Curves: Parametric Function, Bezier Method, B-Spline Method.

Unit-III

2D & 3D Transformations: Translation, Rotation, Scaling, Reflection, Shearing, Inverse Transformation, Composite Transformation, World Coordinate System, Viewing Transformation, Representation of 3D object on Screen, Parallel and Perspective Projections.

Unit-IV

Clipping: Point clipping, Line Clipping, Simple Visibility Line Clipping Algorithm, Cohen Sutherland Line Clipping Algorithm etc. Polygon Clipping, Convex and concave Polygon, Sutherland Hodgeman Polygon Clipping Algorithm etc. Hidden Surface Elimination: Z- Buffer algorithm and Painter's Algorithm, Area Filling, **Basic Illumination Models:** Diffuse Reflection, Specular Reflection, Phong Shading, Gouraud Shading, Color Models: like RGB, YIQ, CMY, HSV etc.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY

Unit-V

Multimedia System: An Introduction, Multimedia hardware and software, Multimedia System Architecture, Multimedia Applications and evolving technologies, Multimedia Authoring. Data & File Format standards ~~RTF, TIF, MIDI, JPEG, DIB, MPEG~~ ~~Audio~~ ~~digital audio, MIDI processing sound,~~ Sampling, ~~Compression video, AVI, CTV, MOV~~ ~~MPEG~~ Compression standards, Compression through spatial and temporal redundancy.

RECOMMENDED BOOKS

- Donald Hearn and M.P. Becker : Computer Graphics, PHI Publication
- FoleyVandam, Feiner, Hughes : Computer Graphics principle and Practice
- Rogers : Principles of Computers Graphics, TMH
- Sinha and Udai : Computer Graphics, TMH
- Prabhat K. Andleigh, Kiran Thakrar : Multimedia Systems Design, Prentice Hall PTR

COURSE OUTCOMES

After completion of the course students will be able to:

CO1.   CO1. explore various display devices and applications of computer graphics. *Skill development*

CO2. illustrate various scan conversion techniques like line, circle, curve and shape drawing algorithms. *Skill development*

CO3. apply 2-dimensional, 3-dimensional transformations and projections on images. *Skill development*

CO4. classify methods of image clipping and various algorithms for line and polygon clipping. *Skill development*

CO5. apply appropriate filling algorithms, hidden surface elimination algorithm on images. *Skill development*

CO6. summarize various color models, shading methods and multimedia system. *Skill development*

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY

SOFTWARE ENGINEERING
160412

L	T	P	Total Credits
2	1	2	4

COURSE OBJECTIVES

- To understand the nature of software development and software life cycle process models, agile software development, SCRUM and other agile practices.
- To understand project management and risk management associated with various types of projects.
- To know basics of testing and understanding concept of software quality assurance and software configuration management process.

Unit - I

Introduction to Software Engineering: Definition, Software Engineering-Layered Technology, Software Characteristics and Components, **Software Model:** Software Development of Life Cycle Model (SDLC), The Waterfall Model, Iterative Waterfall Model, Prototyping Model, Spiral Model, RAD Model. **Selection Criteria of Model:** Characteristics of Requirements, Status of Development Team, Users Participation, Type of Project and Associated Risk.

Unit - II

Requirement Engineering: Definition, Requirement Engineering Activity , **Types of Requirement-** Functional and Non-functional Requirements, User and System Requirements, Requirement Elicitation Methods, Requirement Analysis Methods, Requirement Documentation (SRS), Requirement Validation, Requirement Management.

Unit - III

Design Concept, Principle and Methods: Design Fundamentals, Design Principles, Effective Modular Design, Design Representations, Architectural Design, Procedural Design, Data Directed design, Real Time Design, Object Oriented Design, Coupling and Cohesion.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY

Unit - IV

Software Metrics, Project Management and Estimation: Metrics in Process and Project Domains, Software Measurement, Software Quality Metrics, **Project Management-** Basics-People, Product, Process, Project, **Estimation-** Software Project Estimation, Decomposition Techniques- Function Point Estimation, Line of Code (LOC) Based estimation, Empirical Estimation, COCOMO Model, Project Scheduling Techniques.

Unit - V

Software Testing: Definitions, Software Testing Life Cycle (STLC), , Test Case Design, Strategic Approach to Software Testing- Verification & Validation , Strategic Issues, Criteria for Completion of Testing, Unit Testing, Integration Testing, Validation Testing, System Testing, Black Box Testing Techniques, White Box Testing Techniques, Acceptance Testing.

RECOMMENDED BOOKS
- Software Engineering, Sommerville, Pearson.
- Software Engineering: A Practitioner's Approach, Roger S. Pressman, McGraw Hill.
- Software Engineering, K.K. Agrawal & Yogesh Singh, New Age Publication.
- Software Engineering, Rajib Mall, PHI.

COURSE OUTCOMES
After completion of this course, the students would be able to:
CO1. explain the various fundamental concepts of software engineering. *Skill development*
CO2. develop the concepts related to software design & analysis. *Skill development*
CO3. compare the techniques for software project management & estimation. *Skill development*
CO4. choose the appropriate model for real life software project. *Skill development, Entrepreneurship*
CO5. design the software using modern tools and technologies. *Skill development, Entrepreneurship*
CO6. test the software through different approaches. *Skill development*

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY

COMPUTER NETWORKS
160413

L	T	P	Total Credits
2	1	-	3

COURSE OBJECTIVES

- Familiarize the student with the basic taxonomy and terminology of the computer networking.
- Provide detail knowledge about various layers, protocols and devices that facilitate networking.
- Enable Students to deal with various networking problems such as flow control, error control and congestion control.

Unit-I

Introduction: Computer Network, Types- LAN, MAN & WAN, Data Transmission Modes- Serial & Parallel, Simplex, Half Duplex & Full Duplex, Synchronous & Asynchronous Transmission, Transmission Medium- Guided & Unguided, Cables- Twisted Pair, Coaxial Cable & Optical Fiber, Networking Devices-Repeaters, Hub, Switch, Bridge, Router, Gateway and Modem, Performance Criteria- Bandwidth, Throughput, Propagation Time & Transmission Time, Network Standardization- OSI Reference Model & TCP/IP Reference Mode, X.25.

Unit-II

Physical Layer: Network Topologies- Bus, Ring, Star & Mesh, Line Coding- Unipolar, Polar and Bipolar, Switching- Circuit Switching, Message Switching & Packet Switching, **Multiplexing:** FDM – Frequency Division Multiplexing, WDM – Wavelength Division Multiplexing & TDM – Time Division Multiplexing.

Unit-III

Data Link Layer: Introduction, Design Issues, Services, Framing, Error Control, Flow Control, ARQ Strategies, Error Detection and Correction, Parity Bits, Cyclic Redundant Code (CRC), Hamming Codes, MAC Sub Layer- The Channel Allocation Problem, Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CD, IEEE 802.3, IEEE 802.4 and IEEE 802.5.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY

Unit-IV

Network Layer & Transport Layer: Introduction, Design Issues, Services, Routing- Distance Vector Routing, Hierarchical Routing & Link State Routing, Shortest Path Algorithm- Dijkstra's Algorithm & Floyd–Warshall's Algorithm, Flooding, Congestion Control- Open Loop & Closed Loop Congestion Control, Leaky Bucket & Token Bucket Algorithm. Connection Oriented & Connectionless Service, IP Addressing.

Unit-V

Presentation, Session& Application Layer: Introduction, Design Issues, Presentation Layer- Translation, Encryption- Substitutions and Transposition Ciphers, Compression- Lossy and Lossless. Session Layer – Dialog Control, Synchronization. Application Layer- Remote Login, File Transfer & Electronic Mail.

RECOMMENDED BOOKS

- Data Communication and Networking, Behrouz A. Forouzan, McGraw Hill.
- Computer Networks, Andrew S. Tanenbaum, Pearson Education India.
- Computer Networks and Internets, Douglas E. Comer, Pearson India.

COURSE OUTCOMES

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

CO1. explain the fundamental concepts of computer network. *Skill development*

CO2. illustrate the basic taxonomy & terminologies of computer network. *Skill development*

CO3. identify various parameter for affecting the performance of computer network. *Skill development*

CO4. analyze the concepts of communication using various layer of OSI model. *Skill development*

CO5. evaluate the performance of computer network in congestion and Internet. *Skill development, Employability*

CO6. design the network environment and applications for implementation of computer networking concept. *Skill development, Employability*

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY

CYBER SECURITY
100004

L	T	P	Total Credits
3	-	-	3

COURSE OBJECTIVES

To provide an understanding of cyber security fundamentals.

To analyse various cyber-attacks and their countermeasures.

To provide basics of Internet and networking.

To identify various cyber security threats and vulnerabilities.

To apply forensic science to investigate a cybercrime.

Unit-I

Introduction- Overview of Cyber Security, Cyber Crime, Cyber Warfare, Cyber Terrorism, Cyber Espionage, Cyber Vandalism (Hacking), Cyber Stalking, Internet Frauds and Software Piracy.

Unit-II

Basics of Internet & Networking- Wired and Wireless Networks, Internetworking Devices, Topologies, Web Browser, Web Server, OSI Model, IP Addressing, Firewall, E-Commerce, DNS, NAT, VPN, HTTP & HTTPS.

Unit-III

Cryptography and Network Security- Security Principles, Attacks, Cryptography, Steganography, Cryptanalysis, Symmetric Key and Public Key Cryptography, Digital Signature, Intrusion Detection System, Secure Socket Layer(SSL) & Secure Electronic Transaction(SET).

Unit-IV

Cyber Security Threats and Vulnerabilities- Hacker, Types of Hacker- White, Gray and Black, Malicious Software's: Virus, Worm, Trojan Horse, Backdoors and Spywares. Sniffers, Denial of Service Attack and Phishing.

Unit-V

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY

Cyber Crime Investigation and Legal Issues: Intellectual Property, Privacy Issues, IT Act 2000, Basics of Cyber Crime Investigation- Cyber Forensics, Electronic Evidences and its Types.

RECOMMENDED BOOKS:

Cryptography and Network Security, 4/E, William Stallings, 4th edition, Pearson publication

Computer Security: Principles and Practice, Stallings William, Pearson publication

Investigating Network Intrusions and Cybercrime, EC-Council Press

Network Forensics, Tracking Hackers through Cyberspace, Sherri Davidoff, Jonathan Ham, Prentice Hall.

Cryptography and Network Security, 3e, Atul Kahate, McGraw Hill publication.

COURSE OUTCOMES:

After completion of the course students would be able to:

CO1. tell the basic terminologies of cyber security. *Skill development*

CO2. explain the basic concept of networking and internet. *Skill development*

CO3. apply various methods used to protect data in the internet environment in real world situations. *Skill development, Employability*

CO4. discover the concept of IP security and architecture. *Skill development*

CO5. compare various types of cyber security threats/vulnerabilities. *Skill development, Employability*

CO6. develop the understanding of cybercrime investigation and IT ACT 2000. *Skill development, Employability, Entrepreneurship*

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY

COMPUTER ARCHITECTURE AND MICROPROCESSOR
230401/240401

L	T	P	Total Credits
2	1	2	4

COURSE OBJECTIVE

- To provide the fundamental knowledge of a computer system and its processing units.
- To provide the details of input & output operations, memory management and performance measurement of the computer system.
- To understand how computer represents and manipulate data.
- To understand different processors and basic architecture of 8/16 bit microprocessors.

Unit -I

Introduction: CPU structure and functions, processor organization, ALU, data paths, internal registers, status flags; System bus structure: Data, address and control buses. Processor control, micro-operations, instruction fetch, hardwired control, micro programmed control, microinstruction sequencing and execution.

Unit- II

Instruction set principles, machine instructions, types of operations and operands, encoding an instruction set, assembly language programming, addressing modes and formats.

Unit –III

Input-Output Organization: I/O organization; I/O techniques: interrupts, polling, DMA; Synchronous vs. asynchronous I/O.

Memory Organization: Memory system, internal and external memory, memory hierarchy, cache memory and its working, virtual memory concept.

Unit –IV

Microprocessors: 8085 microprocessor architecture; Instruction set, instruction types and formats; Instruction execution, instruction cycles, different types of machine cycles and timing diagram.

16-bit microprocessors, 8086 architecture, registers, memory segmentation and addressing,

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY

Unit-V

Basic peripherals and interfacing: 8255, interfacing with LED's, ADC, DAC, stepper motors and I/O & Memory Interfacing, 8254, 8259, 8251.

RECOMMENDED BOOKS

- Computer System Architecture, Morris Mano, PHI.
- Microprocessor Architecture, Programming and Applications with the 8085, Gaonkar, Penram International Publishing (India) Pvt.Ltd.
- Computer Organization, Carl Hamacher, THM.
- Computer Architecture and Organization, J P Hayes, Mc-Graw Hills, New Delhi.
- The Intel. Microprocessors, Architecture, Programming and Interfacing, B.B. Brey (PHI)
- Microprocessor 8086: Architecture, Programming, and Interfacing, Sunil Mathur(PHI)
- Advanced Microprocessor and Interfacing, D.V. Hall (Mc-Graw Hill)
- Advanced Microprocessor and Peripherals – Architecture, Programming and Interfacing, A.K. Ray & K.M. Bhurchandi, Tata McGraw Hill.
- Interfacing techniques in Digital Design with emphasis on Microprocessors, R.L. Krutz (John Wiley)

COURSE OUTCOMES

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

CO1. demonstrate the computer architecture and microprocessor for defining basic component and functional unit. *Skill development*

CO2. develop the fundamental concept to understand the working of computer architecture and microprocessor. *Skill development*

CO3. explain the basic concept of input output and memory organization. *Skill development*

CO4. develop the skill of writing assembly language programming. *Skill development*

CO5. build a system using peripheral devices and controllers for 8086 microprocessors *Skill development, Employability*.

CO6. apply the concept computer architecture and microprocessor in solving real world problems. *Skill development, Employability, Entrepreneurship*

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY

CLOUD COMPUTING
230402/240402

L	T	P	Total Credits
3	-	-	3

COURSE OBJECTIVES

- To understand Cloud Computing concepts, technologies, architecture and applications.
- To understand the underlying principle of cloud virtualization, cloud storage, data management and data visualization.
- To understand different cloud programming platforms and tools to develop and deploy applications on cloud.

Unit- I

Cloud Architecture and Model: Technologies for Network-Based System, System Models for Distributed and Cloud Computing, NIST Cloud Computing Reference Architecture. **Cloud Models:-** Characteristics, Cloud Services, Cloud models (IaaS, PaaS, SaaS), Public vs Private Cloud, Cloud Solutions Cloud ecosystem, Service management, Computing on demand.

Unit- II

Virtualization: Basics of Virtualization, Types of Virtualization, Implementation Levels of Virtualization, Virtualization Structures, Tools and Mechanisms, Virtualization of CPU, Memory, I/O Devices. Virtual Clusters and Resource management, Virtualization for Data-center Automation.

Unit- III

Cloud Infrastructure: Architectural Design of Compute and Storage Clouds, Layered Cloud Architecture Development, Design Challenges, Inter Cloud Resource Management, Resource Provisioning and Platform Deployment, Global Exchange of Cloud Resources.

Unit -IV

Programming Model: Parallel and Distributed Programming Paradigms- MapReduce, Twister and Iterative MapReduce, Hadoop Library from Apache, Google App Engine (GAE), Amazon Web Service (AWS), Smart Cloud, Public Clouds and Service Offerings, Microsoft Windows Azure. Mashups, Applications, Programming Support, Cloud Software Environments, Eucalyptus, Open Nebula, OpenStack, Aneka, Cloudsim.

Unit -V

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY

Security in the Cloud: Security Overview, Cloud Security Challenges and Risks, Software-as-a-Service Security, Security Governance, Risk Management, Security Monitoring, Security Architecture Design, Data Security, Application Security, Virtual Machine Security, Identity Management and Access Control, ███████████.

RECOMMENDED BOOKS
- Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
- John W. Rittinghouse and James F.Ransome, "Cloud Computing: Implementation, Management, and Security", CRC Press, 2010.
- Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", TMH, 2009.
- Kumar Saurabh, " Cloud Computing — insights into New-Era Infrastructure", Wiley India,2011
- George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud" O'Reilly
- James E. Smith, Ravi Nair, "Virtual Machines: Versatile Platforms for Systems and Processes", Elsevier/Morgan Kaufmann, 2005.

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

CO1. define various basic concepts related to cloud computing. *Skill development*

CO2. identify the architecture, infrastructure and delivery models of cloud computing. *Skill development*

CO3. apply suitable virtualization concepts. *Skill development*

CO4. choose the appropriate programming models and public cloud platforms. *Skill development,*

CO5. analyse various security issues in cloud computing. *Skill development*

CO6. compose virtualization, security and programming modules in cloud computing solutions. *Skill development, Employability*

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY

IOT ARCHITECTURE & PROTOCOLS
230404

L	T	P	Total Credits
3	-	-	3

COURSE OBJECTIVES

- Familiarize the student with the basic taxonomy and terminology of the IOT Architecture & Protocols.
- Provide detailed knowledge about various layers, protocols and devices that facilitate IoT service.

Unit-I

Introduction: IoT architecture outline, standards - IoT Technology Fundamentals- Devices and gateways, Local and wide area networking, IoT Communication models, Data management, Business processes in IoT, Everything as a Service(XaaS), M2M and IoT Analytics

Unit-II

IoT Reference Architecture: Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views. Real-World Design Constraints- Introduction, Technical Design constraints.

Unit-III

IoT Data Link Layer & Network Layer Protocols: PHY/MAC Layer(3GPP MTC, IEEE 802.11, IEEE 802.15), Wireless HART, ZWave, Bluetooth Low Energy, Zigbee Smart Energy, DASH7 - Network Layer-IPv4,IPv6, 6LoWPAN, 6TiSCH,ND, DHCP, ICMP, RPL, CORPL, CARP.

Unit-IV

IoT Transport & Session Layer Protocols: Transport Layer (TCP, MPTCP, UDP, DCCP, SCTP)-(TLS, DTLS), Session Layer-HTTP, CoAP, XMPP, AMQP, MQTT.

Unit-V

IoT Service Layer Protocols & Security Protocols: Service Layer -oneM2M, ETSI M2M, OMA, BBF – Security in IoT Protocols – MAC802.15.4 , 6LoWPAN, RPL, Application Layer: UPnP, SCADA, Authentication Protocols.

RECOMMENDED BOOKS

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

DEPARTMENT OF INFORMATION TECHNOLOGY

- Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications, Daniel Minoli, ISBN: 978-1-118-47347-4, Willy Publications ,2016
- From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence, Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, 1st Edition, Academic Press, 2015.
- Architecting the Internet of Things, Bernd Scholz-Reiter, Florian Michahelles, ISBN 978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer, 2016
- Sensors, Actuators and Their Interfaces, N. Ida, Scitech Publishers, 2014.
- IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things, David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, CISCO Press, 2017
- Internet of Things: Architectures, Protocols and Standards , Simone Cirani , Gianluigi Ferrari , Marco Picone , Luca Veltri, Willy Publications ,2018.

COURSE OUTCOMES

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

CO1. explain the fundamental concepts of IoT Architecture. *Skill development*

CO2. illustrate the basic taxonomy & terminologies of IoT communication protocols. *Skill development*

CO3. develop a concept for understanding IoT technologies. *Skill development*

CO4. build the skill for establishing communication among IoT devices. *Skill development*

CO5. analyze various IoT Application layer Protocols in IoT. *Skill development*

CO6. design IoT-based systems for real-world problems. *Skill development, Employability , Entrepreneurship*

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY

MACHINE LEARNING AND OPTIMIZATION
240404

L	T	P	Total Credits
3	-	2	4

COURSE OBJECTIVES

- Identify and develop operational research models from the verbal description of the real system.
- Analyse the results to resolve resource optimization
- To practice their skills on many well-known real-life problems.

Unit-I

Introduction to ML: Statistical Learning, Supervised vs Unsupervised Learning, Regression vs Classification Problems, Formulation of Design Problems as Mathematical Programming Problems, Linear Regression, Multiple Linear Regression, Logistic Regression, K-Nearest Neighbour Classification.

Unit-II

Tree Based Methods: Decision Tree Learning: Decision Tree Representation, Appropriate Problems for Decision Tree Learning, Random Forest, Issues in Decision Tree Learning. Naïve Bayes Classifier, Support Vector Machines.

Unit-III

Introduction to Optimization Algorithms: Optimization Algorithms, Engineering Applications of Optimization Algorithms, Objective Function, Optimization Algorithms for Differentiable and Non-Differentiable Objective Functions: Stationary and Critical Point, Functions of Single and Two Variables; Global Optimum, Single Variable Optimization, Two Variable Optimizations. First Order Algorithms, Local Descent Algorithms, Bracketing Algorithms. Stochastic Algorithms, Population Based Algorithms: Introduction, Genetic Algorithms.

Unit-IV

Artificial Neural Network: Neural Network Representation, Neural Networks as a Paradigm for Parallel Processing, Linear Discrimination, Pairwise Separation, Gradient

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY

Descent, Perceptron, Training A Perceptron, Multilayer Perceptron, Back Propagation Algorithm, Dynamically Modifying Network Structure.

Unit-V

Unsupervised Learning: Clustering, Common Distance Measures, Hierarchical Algorithms – Agglomerative and Divisive, Partitioning Algorithms – K-Means and Derivatives; Design and Analysis of Machine Learning Experiments: Guidelines for Machine Learning Experiments, Factors, Response, and Strategy of Experimentation, Ensemble Methods, Bagging and Boosting, Cross-Validation and Resampling Methods, Measuring Classifier Performance, Assessing a Classification Algorithm's Performance (ROC Curve), Comparing Two Classification Algorithms, Comparing Multiple Algorithms: Analysis of Variance, Comparison over Multiple Datasets.

--RE

COMMENDED BOOKS

- Algorithms for optimization, Mykel and Tim, The MIT Press
- Principles of Soft Computing, S.N. Deepa, Fundamentals of Computer Algorithms, Wiley.
- Optimization for Engineering Design: Algorithms and Examples (2nd ed.), Kalyanmoy Deb, Prentice Hall India Learning Private Limited, 2012.
- Introduction to Statistical Learning, Gareth James et al, Springer texts in statistics, 2015.
- Machine Learning (1st ed.), T. M. Mitchell, McGraw Hill, 2017. ISBN 978-1259096952.

COURSE OUTCOMES

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

CO1. demonstrate a familiarity with major optimization algorithms. *Skill development*

CO2. apply important optimization algorithmic and analyze the results. *Skill development, Employability*

CO3. finding out the local and global optimum. *Skill development*

CO4. formulation of design problems as mathematical programming problems. *Skill development, Employability*

CO5. design supervised and unsupervised learning approaches for real-life problems. *Skill development, Employability, Entrepreneurship*

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY

NETWORK & WEB SECURITY
230405/240405

L	T	P	Total Credits
3	-	-	3

COURSE OBJECTIVES

- To provide conceptual understanding of network security principles, issues, challenges and mechanisms.
- To understand how to apply encryption techniques to secure data in transit across data networks.
- To explore the requirements of real-time communication security and issues related to the security of web services.

Unit-I

Security: Principles and Attacks, Basic Number Theory: Prime Number, Congruence's, Modular Exponentiation, Fundamentals of Cryptography, Steganography, Cryptanalysis, Code Breaking, Block Ciphers and Steam Ciphers, Substitution Ciphers, Transposition Ciphers, Caesar Cipher, Play-Fair Cipher, Hill Cipher, Cipher Modes of Operation.

Unit-II

Cryptography: Symmetric Key Cryptography, Public Key Cryptography, Principles of Public Key Cryptosystem, Classical Cryptographic Algorithms: DES, RC4, Blowfish, RSA, Distribution of Public Keys and Key Management, Diffie-Hellman Key Exchange.

Unit-III

Hash Functions: Hash Functions, One Way Hash Function, SHA (Secure Hash Algorithm). Authentication: Requirements, Functions, Kerberos, Message Authentication Codes, Message Digest: MD5, SSH (Secure Shell), Digital Signatures, Digital Certificates.

Unit -IV

IP & Web Security Overview: SSL (Secure Socket Layer), TLS (Transport Layer Security), SET (Secure Electronic Transaction). IDS (Intrusion detection system):

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY

Statistical Anomaly Detection and Rule-Based Intrusion Detection, Penetration Testing, Risk Management. Firewalls: Types, Functionality and Polices.

Unit -V

Phishing: Attacks and its Types, Buffer Overflow Attack, Cross Site Scripting, SQL Injection Attacks, Session Hijacking. Denial of Service Attacks: Smurf Attack, SYN Flooding, Distributed Denial of Service. Hacker: Hacking and Types of Hackers, Foot Printing, Scanning: Types: Port, Network, Vulnerability), Sniffing in Shared and Switched Networks, Sniffing Detection & Prevention, Spoofing.

RECOMMENDED BOOKS

- Cryptography and Network Security, William Stallings, Pearson Education.
- Cryptography and Network Security, Atul Kahate, McGraw Hill Education.
- Incident Response and Computer Forensics, Kevin Mandia, Chris Prosise, Tata McGraw Hill.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. explain cryptographic algorithms, hash algorithms and authentication mechanisms. *Skill development*

CO2. illustrate fundamentals of number theory, attacks and security principles. *Skill development, Employability*

CO3. apply number theory and various algorithms to achieve principles of security. *Skill development, Employability*

CO4. analyze the cause for various existing network attacks and describe the working of available security controls. *Skill development, Employability*

CO5. examine the vulnerabilities in IT infrastructure. *Skill development, Employability*

CO6. predict the attacks and controls associated with IP, transport-level, web and e-mail security. *Skill development, Employability*

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY

THEORY OF COMPUTATION
160503 (DC-10)

COURSE OBJECTIVE

- To understand computability, decidability, and complexity through problem solving.
- To analyse and design abstract model of computation & formal languages
- To understand and conduct mathematical proofs for computation and algorithms.

Unit-I

Introduction of Automata Theory: Examples of automata machines, Finite Automata as a language acceptor and translator, Moore machines and mealy machines, composite machine, Conversion from Mealy to Moore and vice versa.

Unit-II

Types of Finite Automata: Non Deterministic Finite Automata (NDFA), Deterministic finite automata machines, conversion of NDFA to DFA, minimization of automata machines, regular expression, Arden's theorem. Meaning of union, intersection, concatenation and closure, 2 way DFA.
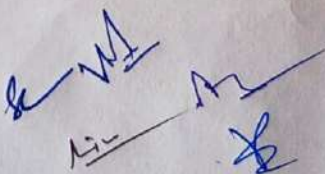
Unit-III

Grammars: Types of grammar, context sensitive grammar, and context free grammar, regular grammar. Derivation trees, ambiguity in grammar, simplification of context free grammar, conversion of grammar to automata machine and vice versa, Chomsky hierarchy of grammar, killing null and unit productions. Chomsky normal form and Greibach normal form.

Unit-IV

Push down Automata: example of PDA, deterministic and non-deterministic PDA, conversion of PDA into context free grammar and vice versa, CFG equivalent to PDA, Petrinet model.

Unit-V

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY

Turing Machine: Techniques for construction. Universal Turing machine Multitape, multihead and multidimensional Turing machine, N-P complete problems. Decidability and Recursively Enumerable Languages, decidability, decidable languages, undecidable languages, Halting problem of Turing machine & the post correspondence problem.

RECOMMENDED BOOKS

- Introduction to Automata Theory Language & Computation, Hopcroft & Ullman, Narosa Publication.
- Element of the Theory Computation, Lewis & Christors, Pearson.
- Theory of Computation, Chandrasekhar & Mishra, PHI.
- Theory of Computation, Wood, Harper & Row.
- Introduction to Computing Theory, Daniel I-A Cohen, Wiley.

COURSE OUTCOMES

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

CO1. explain the basic concepts of switching and finite automata theory & languages.
SKILL DEVELOPMENT

CO2. relate practical problems to languages, automata, computability and complexity.
SKILL DEVELOPMENT

CO3. construct abstract models of computing and check their power to recognize the languages. **EMPLOYABILITY**

CO4. analyse the grammar, its types, simplification and normal form. **SKILL DEVELOPMENT**

CO5. interpret rigorously formal mathematical methods to prove properties of languages, grammars and automata. **EMPLOYABILITY**

CO6. develop an overview of how automata theory, languages and computation are applicable in engineering application. **ENTERPRENEURSHIP**

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY

MICROPROCESSOR & INTERFACING
160504 (DC-11)

COURSE OBJECTIVES

- To understand different processors and basic architecture of 16 bit microprocessors.
- To understand interfacing of 16 bit microprocessor with memory and peripheral chips involving system design.
- To understand 8051 microcontroller.

Unit-I

Microprocessors: Introduction to x86 microprocessors, RISC and CISC processors, 8086 Architecture-Functional Diagram, Register Organization, Memory Segmentation, Programming Model, Memory Address, Physical Memory Organization, Minimum and maximum mode signals, Bus Cycle and Timing Diagrams, Instruction Formats, Addressing Modes, Instruction Set, Interrupts of 8086.

Unit-II

Basic Peripherals and Interfacing: 8212, 8155, 8255, 8755, interfacing with LED's, ADC, DAC, stepper motors and I/O & Memory Interfacing.

Unit-III

Special Purpose Programmable Peripheral Devices and Interfacing: 8253, 8254 programmable interval timer, 8259A programmable interrupt controller and 8257 DMA controllers, Keyboard and Display Interfacing.

Unit-IV

Serial and Parallel Data Transfer: Serial and Parallel data transmission, Types of communication system, Baud rate RS-232C, Modem and various bus standards, USART – 8251A.

Unit-V

Introduction to Microcontrollers: 8051 Microprocessor and its Architectures, Pin Description, Input-Output configurations, Interrupts, Addressing Modes, An overview of 8051 Instruction Set.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY

RECOMMENDED BOOKS

- The Intel Microprocessors, Architecture, Programming and Interfacing, B.B. Brey, PHI.
- Microprocessor 8086: Architecture, Programming and Interfacing, Sunil Mathur, PHI.
- Advanced Microprocessor and Interfacing, D.V. Hall, Mc-Graw Hill.
- Advanced Microprocessor and Peripherals – Architecture, Programming and Interfacing, A.K. Ray & K.M. Bhurchandi, Tata McGraw Hill.
- Interfacing Techniques in Digital Design with Emphasis on Microprocessors, R.L. Krutz, John Wiley.

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

CO1. compare the architecture and feature of different 16-bit microprocessor interfacing chips & microcontrollers. **SKILL DEVELOPMENT**

CO2. develop programming skills in assembly language of 8086 microprocessor and 8051 microcontroller. **SKILL DEVELOPMENT**

CO3. demonstrate the concept of interfacing with peripheral devices. **SKILL DEVELOPMENT**

CO4. make use of different interrupts and addressing modes. **SKILL DEVELOPMENT**

CO5. design an interfacing for I/O devices. **EMPLOYABILITY**

CO6. build a system based on 8086 microprocessor and 8051 microcontroller. **ENTERPRENEURSHIP**

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY
COMPILER DESIGN
160601 (DC-12)

L	T	P	Total Credits
2	1	2	4

COURSE OBJECTIVES

- To learn finite state machines and context free grammar.
- To learn, various phases of compiler
- To understand process of compiler implementation.

Unit-I

Overview of Translation Process: Introduction to Compiler, Translator, Interpreter and Assembler, Overview and use of Linker and Loader, Major Data Structures in Compiler, Other Issues in Compiler Structure, BOOT Strapping and Porting, Compiler Structure: Analysis-Synthesis Model of Compilation, Various Phases of a Compiler, Tool Based Approach to Compiler Construction.

Unit-II

Lexical Analysis: Input Buffering, Symbol Table, Token, Recognition of Tokens, Lexeme and Patterns, Difficulties in Lexical Analysis, Error Reporting and Implementation. Regular Grammar & Language Definition, Transition Diagrams, Design of a Typical Scanner usingLEX.

Unit-III

Syntax Analysis: Context Free Grammars (CFGs), Ambiguity, Basic Parsing Techniques: Top Down Parsing, Recursive Descent Parsing, Transformation on the Grammars, Predictive Parsing LL(1) Grammar, Bottom-UP Parsing, Operator Precedence Parsing, LR Parsers (SLR, CLR, LALR), Design of a Typical Parser Using YACC.

Unit-IV

Semantic Analysis: Compilation of Expression, Control, Structures, Conditional Statements, Various Intermediate Code Forms, Syntax Directed Translation, Memory Allocation and Symbol Table Organizations, Static and Dynamic Array Allocation, String Allocation, Structure Allocation etc., Error Detection Indication and Recovery, Routines or Printing Various Lexical, Syntax and Semantic Errors.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY

Unit-V

Code Generation and Code Optimization: Issues, Basic Blocks and Flow Graphs, Register Allocation, Code Generation, DAG Representation of Programs, Code Generation from DAGS, Peep-hole Optimization, Code Generator Generators, Specification of Machine. **Code Optimization: S**ource of Optimizations, Optimization of Basic Blocks, Loops, Global Data Flow Analysis, Solution to Iterative Data Flow Equations, Code Improving Transformations, Dealing with Aliases, Data Flow Analysis of Structured Flow Graphs.

RECOMMENDED BOOKS

- Compilers: Principles, Techniques and Tools, V. Aho, R. Sethi and J. D. Ullman, Pearson Education.
- Compiler Construction: Principles and Practice, K.C. Louden, Cengage Learning.

COURSE OUTCOMES
After completion of this course, the students would be able to:
CO1. define the concepts of finite automata and context free grammar.   **SKILL DEVELOPMENT**
CO2. build the concept of working of compiler.   **SKILL DEVELOPMENT**
CO3. examine various parsing techniques and their comparison.   **SKILL DEVELOPMENT**
CO4. compare various code generation and code optimization techniques. **EMPLOYABILITY**
CO5. analyze different tools and techniques for designing a compiler.   **EMPLOYABILITY**
CO6. design various phases of compiler.   **ENTERPRENEURSHIP**

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY
DATA MINING & WAREHOUSING
900116 (OC-1)

L	T	P	Total Credits
2	1	-	3

COURSE OBJECTIVES

- To understand the significance of data mining in real-world perspective.
- To gain understanding of data mining techniques, algorithms and commonly used tools.
- To develop ability for applying data mining techniques and tools for solving real-world problems.

Unit - I

Introduction: Motivation, important, Data type for Data Mining: Relational Databases, Data Ware-Houses. Transactional Databases, Advanced Database System and Its Applications, Data Mining Functionalities Concept/Class Description, Association Analysis Classification & Prediction, Cluster Analysis, Outliner Analysis Classification of Data Mining Systems, Major Issues in Data Mining.

Unit - II

Data Warehouse and OLTP Technology for Data Mining: Differences between Operational Database Systems & Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Data Cube Technology, Emerging Scenario of Pattern Warehousing System.

Unit - III

Data Pre-processing: Data Cleaning, Data Integration and Transformation, Data Reduction Discretization and Concept Hierarchy Generation. Data Mining Primitives Languages and System Architectures, Concept Description, Characterization and Comparison Analytical Characterization.

Unit - IV

Mining Association Rules in Large Databases: Association Rule Mining: Market Basket Analysis, Basic Concepts, Mining Single Dimensional Boolean Association Rules from Transactional Databases: The Apriori Algorithm, Generating Association Rules from Frequent Items, Improving the Efficiency of Apriori, other Algorithms &

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY

their Comparison, Mining Multilevel Association Rules, Multidimensional Association Rules, Constraint Based Association Rule Mining.

Unit - V

Classification & Predication and Cluster Analysis: Issues Regarding Classification & Predication, Different Classification Methods, Predication, Cluster Analysis, Major Clustering Methods, Currently Available Tools, Case Study.

RECOMMENDED BOOKS

- Data Mining: Concepts and Techniques, Han and Kamber, Morgan Kaufmann Publications.
- Data Mining Techniques, A. K. Pujari, Universities Press Pvt. Ltd.

COURSE OUTCOMES

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

CO1. explain various data mining tasks.   **SKILL DEVELOPMENT**

CO2. classify various databases systems and data models / schemas of data warehouse.
SKILL DEVELOPMENT

CO3. compare various methods for storing & retrieving data from different data sources/repository.   **SKILL DEVELOPMENT**

CO4. apply pre-processing techniques for construction of data warehouse.
EMPLOYABILITY

CO5. analyze data for knowledge discovery & prediction using appropriate algorithms.
ENTERPRENEURSHIP

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY

ROBOTICS & VISION CONTROL
(OC-1)

L	T	P	Total Credits
2	1	-	3

Prerequisites: Basics of Linear Algebra and Mechanics.

COURSE OBJECTIVES

- To learn the fundamentals of Computer Vision framework.
- To lean Digital Image Processing techniques.
- To understand Camera optical system.

Unit-I

Computer Vision: Introduction, Human Eye and Camera, Vision as an Information Processing Task, Homogeneous Transformations, Geometrical Framework for Vision, 2D and 3D Images Interpretation, Industrial Applications.

Unit-II

Digital Image: Basics of Image Processing, Image Acquisition, Segmentation, Binary and Grey Morphology Operations, Thresholding, Filtering, Edge and Corner Detection, Features Detection, Contours, Tracking Edges and Corners, Object Detection and Tracking, Image Data Compression, Real Time Image Processing.

Unit-III

Camera and Optical System: Camera Technology, Analog and Digital Camera, Camera Model, CCD and CMOS Technology, Sensor Size, Intrinsic and Extrinsic Camera Parameters, Camera Calibration, Systems of Lenses, Thin Lens, Beam Converging and Beam Diverging Lenses, General Imaging Equation, Aberrations, Practical Aspects.

Unit-IV

Fundamental of Robot. Robotics: Introduction, Robot, Definition, Robot Anatomy, Robot Parts and Their Functions, Classification of Robot and Robotic Systems, Laws of Robotic, Co-Ordinate Systems, Drives and Control Systems, Power Transmission Systems, Planning for Navigation, Different Applications.

Unit-V

Robot Actuator Effectors: Types of End Effectors, Types of Grippers, Interface, Sensors, Touch and Tactile Sensors.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY

RECOMMENDED BOOKS

- Computer Vision: Algorithms and Applications, Richard Szeliski, Ed. Springer, ISBN-10: 1848829345, ISBN-13: 978- 1848829343, Publishing, 2010.
- Handbook of Robotics, Bruno Siciliano, Ed. Springer-Verlag Berlin and Heidelberg GmbH & Co. K, ISBN-10: 354023957X, ISBN-13: 978-3540239574, Publishing, 2008.

COURSE OUTCOMES

After completing this course, the student will be able to:

CO1.   define kinematics and dynamics.   **SKILL DEVELOPMENT**

CO2.   explain basic of image processing.   **SKILL DEVELOPMENT**

CO3.   demonstrate the basics of camera technology. **EMPLOYABILITY**

CO4.   apply computer vision for motion control of robotic systems.   **EMPLOYABILITY**

CO5.   design controllers for tracking control of a robot.   **ENTERPRENEURSHIP**

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY
AGILE METHODOLOGY
160613 (DE-1)

L	T	P	Total Credits
4	-	-	4

COURSE OBJECTIVES

- To understand the background and driving forces for taking an agile approach to software development.
- To understand the business value of adopting agile approaches.
- To understand the agile development practices.

Unit -I

Fundamentals of Agile: The Genesis of Agile, Introduction and Background, Agile Manifesto and Principles, Overview of Scrum, Extreme Programming, Feature Driven Development, Lean Software, Development, Agile Project Management, Design and Development Practices in Agile Projects, Test Driven Development, Continuous Integration, Refactoring, Pair Programming, Simple Design, User Stories, Agile Testing, Agile Tools.

Unit- II

Agile Scrum Framework: Introduction to Scrum, Project Phases, Agile Estimation, Planning Game, Product Backlog, Sprint Backlog, Iteration Planning, User Story Definition, Characteristics and Content of User Stories, Acceptance Tests and Verifying Stories, Project Velocity, Burn Down Chart, Sprint Planning and Retrospective, Daily Scrum, Scrum Roles – Product Owner, Scrum Master, Scrum Team, Scrum Case Study, Tools for Agile Project Management.

Unit- III

Agile Testing: Agile Lifecycle and its Impact on Testing, Test-Driven Development (TDD), Xunit Framework and Tools for TDD, Testing User Stories - Acceptance Tests and Scenarios, Planning and Managing Testing Cycle, Exploratory Testing, Risk Based Testing, Regression Tests, Test Automation, Tools to Support Agile Tester.

Unit- IV

Agile Software Design and Development: Agile Design Practices, Role of Design Principles Including Single Responsibility Principle, Open Closed Principle, Liskov

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY

Substitution Principle, Interface Segregation Principles, Dependency Inversion Principle in Agile Design, Need and Significance of Refactoring, Refactoring Techniques, Continuous Integration, Automated Build Tools, Version Control.

Unit -V

Industry Trends: Market scenario and Adoption of Agile, Agile ALM, Roles in Agile Project, Agile applicability, Agile in Distributed Teams, Business Benefits, Challenges in Agile, Risks and Mitigation, Agile Projects on Cloud, Balancing Agility with Discipline, Agile Rapid Development Technologies.

RECOMMENDED BOOKS

- Agile Software Development with Scrum, Ken Schawber, Mike Beedle, Pearson.
- Agile Testing: A Practical Guide for Testers and Agile Teams, Lisa Crispin, Janet Gregory, Addison Wesley.
- Agile Software Development, Principles, Patterns and Practices, Robert C. Martin, Prentice Hall.
- Agile Software Development: The Cooperative Game, Alistair Cockburn, Addison Wesley.
- User Stories Applied: For Agile Software, Mike Cohn, Addison Wesley.

COURSE OUTCOMES

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

CO1. demonstrate scrum release planning, and scrum sprint planning. **EMPLOYABILITY**

CO2. apply user stories into tasks and ideal day estimates. **EMPLOYABILITY**

CO3. classify a sprint with sprint reviews and sprint retrospectives. **SKILL DEVELOPMENT**

CO4. examine the scrum with multiple team or distributed project teams. **EMPLOYABILITY**

CO5. design test driven and agile principal based software. **ENTERPRENEURSHIP**

CO6. develop any application using agile methodology. **ENTERPRENEURSHIP**

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY

SOFT COMPUTING
900208 (OC-2)

COURSE OBJECTIVES

- To provide the student with the basic understanding of neural networks and fuzzy logic fundamentals, Program the related algorithms and Design the required and related systems.
- To understand the fundamental theory and concepts of neural networks, neuro-modeling, several neural network paradigms and its applications.
- To understand the basics of an evolutionary computing paradigm known as genetic algorithms and its application to engineering optimization problems.

Unit-I

Introduction and Fundamental Concept of ANN: Basic models of Artificial Neural Networks, Terminologies of ANNs McCulloch-Pitts Neurons, Linear Separability, Hebb Network, **Supervised Learning Networks:** Introduction, Perceptron Networks, Back Propagation Networks, Radial Basis Function Networks, Hopefield networks.

Unit-II

Unsupervised Learning: Fixed weight Competitive Nets, Kohonen Self-Organizing Map, Learning vector quantization. Counterpropagation Networks, Adaptive Resonance Theory Network.

Unit-III

Fuzzy Set Theory: Fuzzy Sets, Fuzzy Membership Functions, Operations onFuzzy Sets, Fuzzy Relations, Fuzzy rules, Fuzzy Reasoning. **Defuzzification:** Lembda-Cuts for Fuzzy sets (Alpha-Cuts), Lembda-Cuts for Fuzzy Relations. **Fuzzy Inference System:** Introduction, Mamdani Fuzzy Model, Takagi-Sugeno Fuzzy Model.

Unit-IV

Introduction: Biological Background, Traditional optimization and Search Techniques, Basic Terminologies in GA, Operators in Genetic Algorithm, Stopping Condition for Genetic Algorithm Flow, Classification of Genetic Algorithm, Comparison with Evolutionary algorithm, Application of Genetic algorithm.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY

Unit-V

Hybrid Soft Computing Techniques: Introduction, Neuro-fuzzy Hybrid system, Adaptive Neuro fuzzy inference system(ANFIS), Genetic Neuro Hybrid system, Application of Soft Computing Techniques.

RECOMMENDED BOOKS

- Principles of Soft Computing, S. N. Sivanandam and S. N. Deepa , Wiley
- Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis and Applications-S. Rajasekaran& G.A. VijayalakshmiPai, PHI.
- Introduction to Soft Computing Neuro-Fuzzy and Genetic Algorithms, Samir Roy and Udit Chakraborty, Pearson.
- Neural Networks and Learning Machines-Simon Haykin PHI.
- Fuzzy Logic and Engineering Application, Tomthy Ross, TMH

COURSE OUTCOMES

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

CO1. CO1. define basic concepts of neural network and fuzzy systems.- **Skill Development**

CO2. CO2. compare solutions by applying various soft computing approaches on a given problem.- **Skill Development**

CO3. develop and train different supervised and unsupervised learning.- **Employability**

CO4. classify various nature inspired algorithms according to their application aspect.- **Employability**

CO3. CO5. compare the efficiency of various hybrid systems.- **Skill Development**

CO6. design a soft computing model for solving real world problems.- **Entrepreneurship**

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY
NETWORK SECURITY
900209 (OC-2)

COURSE OBJECTIVES

- To provide conceptual understanding of network security principles, issues, challenges and mechanisms.
- To understand how to apply encryption techniques to secure data in transit across data networks.
- To explore the requirements of real-time communication security and issues related to the security of web services.

Unit-I

Security: Principles and Attacks, Basic Number Theory: Prime Number, Congruence's, Modular Exponentiation, Fundamentals of Cryptography, Steganography, Cryptanalysis, Code Breaking, Block Ciphers and Steam Ciphers, Substitution Ciphers, Transposition Ciphers, Caesar Cipher, Play-Fair Cipher, Hill Cipher, Cipher Modes of Operation.

Unit-II

Cryptography: Symmetric Key Cryptography, Public Key Cryptography, Principlesof Public Key Cryptosystem, Classical Cryptographic Algorithms: DES, RC4, Blowfish, RSA, Distribution of Public Keys and Key Management, Diffie-Hellman Key Exchange.

Unit-III

Hash Functions: Hash Functions, One Way Hash Function, SHA (Secure Hash Algorithm).Authentication: Requirements, Functions, Kerberos, Message Authentication Codes, Message Digest: MD5, SSH (Secure Shell), Digital Signatures, Digital Certificates.

Unit -IV

IP & Web Security Overview: SSL (Secure Socket Layer), TLS (Transport Layer Security), SET (Secure Electronic Transaction). IDS (Intrusion Detection System): Statistical Anomaly Detection and Rule-Based Intrusion Detection, Penetration Testing, Risk Management. Firewalls: Types, Functionality and Polices.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY

Unit -V

Phishing: Attacks and Its Types, Buffer Overflow Attack, Cross Site Scripting, SQL Injection Attacks, Session Hijacking. **Denial of Service Attacks:** Smurf Attack, SYN Flooding, Distributed Denial of Service. **Hacker:** Hacking and Types of Hackers, Footprinting, Scanning: Types: Port, Network, Vulnerability), Sniffing in Shared and Switched Networks, Sniffing Detection & Prevention, Spoofing.

RECOMMENDED BOOKS
- Cryptography and Network Security, William Stallings, Pearson Education.
- Cryptography and Network Security, AtulKahate, McGraw Hill Education.
- Incident Response and Computer Forensics, Kevin Mandia, ChrisProsise, Tata McGraw Hill.

COURSE OUTCOMES
After completion of the course students would be able to:

CO1. define various aspects of network security.- **Skill Development**

CO2. illustrate fundamentals of number theory and cryptography.- **Skill Development**

CO3. apply security mechanisms to achieve principles of network security.- **Employability**

CO4. analyze the cause for various existing network attacks.- **Employability**

CO5. examine the vulnerabilities in applications over internet.- **Employability**

CO6. develop a secure protocol for achieving various network security services.-

Entrepreneurship

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY
R PROGRAMMING
900220 (OC-3)

COURSE OBJECTIVES

- To understand the critical programming language concepts.
- To perform data analysis using R commands.
- To make use of R loop functions and debugging tools.

Unit-I

Introduction to R: R Commands, Objects, Functions, Simple Manipulations, Matrices and Arrays, Factors, Lists, Data Frames.

Unit-II

Programming Using R: Introduction, Function Creation, Scripts, Logical Operators, Conditional Statements, Loops in R, Switch Statement, Creating List and Data Frames, List and Data Frame Operations, Recursive List.

Unit-III

Object- Oriented Programming in R: Introduction, S3 Classes, S4 Classes, References Classes, Debugging Principle in R, Import and Export Data from CSV, SAS and ODBC.

Unit-IV

Mathematical and Statistical Concepts, Hypothesis Testing, Different Statistical Distribution, Regression, Time Series Analysis.

Unit-V

Graphics in R: Basic Plots, Labelling and Documenting Plots, Adjusting the Axes, Specifying Colour, Fonts and Sizes, Plotting symbols, Customized Plotting, Packages in R for Windows, Linus and Mac.

RECOMMENDED BOOKS

- "R for Beginners", SandipRakshit, Tata Mc Graw Hill Education.
- "R programming for Data Science", Roger D. Peng, Learn publishing.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE OUTCOMES

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

CO1. define basic programming constructs used in R.- **Skill Development**

CO2. explain the various commands used in R.- **Skill Development**

CO3. apply various concept of programming for controlling the flow of data using R.-

Employability

CO4. analyze the concept of concept of object oriented programming in R.- **Employability**

CO5. choose appropriate packages of R programming for dealing various tasks.-

Employability

CO6. predict results from the datasets using R commands.- **Employability**

DEPARTMENT OF INFORMATION TECHNOLOGY

DATA MINING &PREDICTIVE MODELLING
160714 (DE-3)

COURSE OBJECTIVES

- To understand the value of data mining in solving real-world problems.
- To gain understanding of algorithms commonly used in data mining tools.
- To learn, how to develop models to predict categorical and continuous outcomes, using various models.

Unit - I

Introduction: Data Mining Process, KDD Process Model, Functions of Data Mining, Applications of Data Mining. Data Warehouse and its Architecture.

Data Preparation: Data Exploration, Data Quality, Missing Values, Data Types and Conversion, Transformation, Outliers, Feature Selection, Data Sampling.

Unit - II

Association Rules: Association Rule Mining: Market Basket Analysis, Basic Concepts, Mining Single Dimensional Boolean Association Rules from Transactional Databases: The Apriori Algorithm, Generating Association Rules from Frequent Items, Improving the Efficiency of Apriori, FP-Growth Algorithm, Partitioning Algorithms.

Unit - III

Regression& Classification: Overview of supervised learning, Linear regression models, Multiple Regression, Subset Selection, Linear Discriminant Analysis, Logistic Regression.

Introduction to Classification, Decision Trees, Rule Induction, K-Nearest Neighbors, Naïve Bayesian, Artificial Neural Networks, Support Vector Machines.

Unit – IV

Unsupervised Learning: Clustering, Major Clustering Methods: Partitioning Algorithms- K-Means, Hierarchical Algorithms, real life example of clustering.

Unit - V

DEPARTMENT OF INFORMATION TECHNOLOGY

Model Assessment and Selection: Ensemble Methods, Bagging and Boosting, Cross-Validation and Resampling, Measuring Classifier Performance, Assessing a Classification Algorithm's Performance (ROC Curve), Comparing Two Classification Algorithms.

RECOMMENDED BOOKS

- Data Mining: Concepts and Techniques, Han and Kamber, Morgan Kaufmann Publications.
- Data Mining Techniques, A. K. Pujari, Universities Press Pvt. Ltd.
- Applied Predictive Analytics Principles and Techniques for the Professional Data Analyst, Wiley Publications 2014.
- An Introduction to Statistical Learning with Applications in R, Gareth James, Daniela Witten et. al., Springer, 2015.

COURSE OUTCOMES

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

CO1. identify the key processes of data mining.-**Skill Development**

CO2. understand the basic principles and algorithms used in practical data mining.- **Skill Development**

CO3. compare the underlying predictive modeling techniques.- **Skill Development**

CO4. select appropriate predictive modelling approaches to identify cases to progress with.-**Employability**

CO5. develop different supervised and unsupervised learning.- **Entrepreneurship**

DEPARTMENT OF INFORMATION TECHNOLOGY

MOBILE COMPUTING
160716 (DE-3)

COURSE OBJECTIVES

- To introduce the basic concepts and principles in mobile computing.
- To provide a computer systems perspective on the converging areas of wireless networking, mobile devices, and network protocols.
- To introduce wireless communication and networking principles, that support connectivity to cellular networks, wireless internet and sensor devices.

Unit-I

Review of Personal Communication Services (PCS): Basic Concepts of Cellular Systems, Global System for Mobile Communication (GSM), Protocols, Handover, Data Services, and Multiple Division Techniques.

Unit-II

General Packet Radio Services (GPRS): GPRS Architecture, GPRS Network Nodes. Mobile Data Communication: WLANs (Wireless LANs) IEEE 802.11 Standard. Mobile IP.

Unit-III

Wireless Application Protocol (WAP): Mobile Internet Standard. WAP Gateway and Protocols, Wireless Markup Languages (WML).

Unit-IV

Third Generation (3G) Mobile Services: Introduction to International Mobile Telecommunications 2000 (IMT 2000) Vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000, Quality of Services in 3G.

Unit-V

Wireless Local Loop (WLL): Introduction to WLL Architecture, WLL Technologies. **Global Mobile Satellite Systems:** Case Studies of IRIDIUM and GLOBALSTAR Systems. Bluetooth Technology, Wi-Fi and Wi-Max.

RECOMMENDED BOOKS

- Mobile communications, J. Schiller, Pearson Education.

DEPARTMENT OF INFORMATION TECHNOLOGY

- Wireless and Mobile Networks Architecture, by Yi —Bing Lin, John Wiley & Sons.
- Mobile & Personnel Communication Systems and Services, Raj Pandya, Prentice Hall India.
- Wireless Communication- Principles and Practices, Theodore S. Rappaport, Pearson Education.
- The Wireless Application Protocol, Singhal& Bridgman, Pearson Education.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. explain the basic concepts of mobile telecommunications system.- **Skill Development**

CO2. demonstrate the infrastructure to develop mobile communications system.- **Skill Development**

CO3. classify the different generations and technology for mobile communications.- **Skill Development**

CO4. examine the working of different protocols of wireless mobile communication technology- **Employability**

CO5. determine the importance of each technology suitable for different situation of mobile and wireless communications.- **Entrepreneurship**

CO6. develop protocols for adhoc and infrastructure based wireless networks.- **Entrepreneurship**