Master of Engineering

(Two Year Full Time Degree Program)

SYLLABUS

(M. Tech. First Year)

School of Computer Science and Engineering

Shri Mata Vaishno Devi University Katra

(April 2018)

	ABBREVIATIONS / CODES / NOMENCLATURE
Course Code Convention	
SCT – LSAY Example ALL 9101 ALP 9102 ALS 9110	Course Code for various Courses / Subjects SC: School Code T: Course Type Code (Lecture/Studio/Practical/Project etc.) L: Course Level (1, 2, 3, 4 & 5 for First, Second years …) SA: Study Area / Sub Area Y: Semester Wise Course Number
CSE	School Code (SoCSE)
L	Lecture
P	Practical
E	Elective
C	Colloquium
D	Project Based
T	Training
S	Self Study
N	Non Credit
V	Special Lecture Topic
Teaching Scheme Convention	
L	Lecture
T	Tutorial
P	Practical
C	Course Credit
Evaluation Scheme Convention	
Minor	(Mid Term Exams / Tests) I & II
Major	Semester End Examination (ESE)
FFCS	Fully Flexible Credit System
CBCS	Choice Based Credit System

Teaching & Examination Scheme

M.Tech. , Semester-I , FIRST Year														
			Teaching & Credit Scheme						Evaluation & Examination Scheme					
S. No.	**Subject Code**	**Title of the Subject**	**L**	**T**	**P**	**S**	**Total Periods/week**	**C**	**Minor E Duration (Hours)**	**Major E Duration (Hours)**	**Internal Marks**	**Minor (I+II) Marks**	**Major ESE Marks**	**Total Marks**
1.	CSL6025	Advanced Programming	**3**	**0**	**2**		**8**	**4**	**1**	**3**	**10**	**40**	**50**	**100**
2.	CSL6103	Artificial Intelligence & fuz Logic	**3**	**1**	**0**		**8**	**4**	**1**	**3**	**10**	**40**	**50**	**100**
3.	CSL6142	Modeling & Simulation	**3**	**1**	**0**		**8**	**4**	**1**	**3**	**10**	**40**	**50**	**100**
4.	CSL6073	Network management	**3**	**1**	**0**		**8**	**4**	**1**	**3**	**10**	**40**	**50**	**100**
5.	CSL6046	Discrete Mathematical Structure	**3**	**1**	**0**		**8**	**4**	**1**	**3**	**10**	**40**	**50**	**100**
		SUB TOTAL	**15**	**4**	**2**		**40**	**20**			**50**	**200**	**250**	**500**

M.Tech. , Semester-II, FIRST Year														
			Teaching & Credit Scheme						Evaluation & Examination Scheme					
S. No.	**Subject Code**	**Title of the Subject**	**L**	**T**	**P**	**S**	**Total Periods/week**	**C**	**Minor E Duration (Hours)**	**Major E Duration (Hours)**	**Internal Marks**	**Minor (I+II) Marks**	**Major ESE Marks**	**Total Marks**
1.	CSL6062	Advanced Computer Architecture	**3**	**1**	**0**		**8**	**4**	**1**	**3**	**10**	**40**	**50**	**100**
2.	CSL6104	Neural Network & Probabilistic Reasoning	**3**	**1**	**0**		**8**	**4**	**1**	**3**	**10**	**40**	**50**	**100**
3.	CSL6083	Advanced DBMS	**3**	**0**	**2**		**8**	**4**	**1**	**3**	**10**	**40**	**50**	**100**
4.	CSL6084	Data Mining & Data Warehousing	**3**	**1**	**0**		**8**	**4**	**1**	**3**	**10**	**40**	**50**	**100**
5.	CSE6113	Elective-1 Image Processing	**3**	**0**	**2**		**8**	**4**	**1**	**3**	**10**	**40**	**50**	**100**
		SUB TOTAL	**15**	**4**	**2**			**20**			**50**	**200**	**250**	**500**

CSL6025			**Advanced Programming**				Pre Requisites			
Version R-01							Co-requisites			
L	T	S/P	C	Minor Duration	Major Duration	Internal Marks	Minor-I Marks	Minor-II Marks	Major Marks	Total Marks
3	0	2	4	1 Hours	3 Hours	10	20	20	50	100

COURSE OUTCOMES

After successful completion of this course, students shall be able to;

1. Understand the syntax, control structures, data structures of java programming language. Ability to demonstrate simple Java programmes.
2. Ability to code any given algorithm, or provide a solution to complex-real-life-problem using JAVA language
   Ability to build Desktop Applications with GUI(Graphical User Interface) and Database connectivity to create real-life/business solutions
3. Inculcating the ability to enjoy coding and build simple games like Tic-Tac-Toe etc.
4. Ability to use Industry standard IDEs (Integrated Development Environments) like NetBeans/Eclipse for coding, debugging etc.
5. Ability to code and manage at least a few thousand lines of code which enforces the use of Industry best practices like documentation etc

UNIT 1 Introduction to Java Programming

Introduction to Java Programming: Basic constructs of OOPS, Data types, Operators & Control Statements, Classes and Methods, Inheritance and Packages, Exception handling: Fundamental of Exception, Types of Exceptions, creating of Exceptions, Multithreaded programming and I/O.

UNIT 2 AWT and Event handling

AWT and Event handling: Fundamental of AWT working with Frames Fonts Layout Managers, Buttons, Menus, Event Classes, Interfaces. JDBC: Introduction to SQL, ODBC, JDBC API Application Architecture steps for creating DSN, Interfaces.

UNIT 3 Swing and Java

Swing and Java: Introduction to JFC, Features, Handling Components with Swing, listener Interfaces. Introduction of beans creation of own bean, Enterprise Java beans (EJB) other bean development tools. Remote Method Invocation: Introduction Comparison of Distributed and Non-distributed Java programs, RMI Packages, RMI Enhancements.

UNIT 4 Networking

Networking: Connecting to a Server, Implementing Servers, Sending E-Mail making URL Connections, Advance Socket programming: Socket Timeouts, Interruptible Sockets, half/Close Internet Addresses. Security: Class Loaders, Security Manager and Permissions, User Authentication Digital Signatures, Code Signing JAR file Signing, Encryption, Internationalization: Locales Number formats, Message Formatting, Text files and Character Sets, Resources Bundles Classes, Native Methods.

SUGGESTED BOOKS:

1. Java-2 Volume II by Cay S.Horstmann, Cornell, Pearson Education
2. The Complete Reference Java 2 (5th Ed.), Herbert Schildt: TMH
3. Java how to Program (6th Ed.) Deitel and Deitel: PHI Publication

CSL 6103			**Artificial Intelligence and Fuzzy Logic**				Pre Requisites			
Version R-01							Co-requisites			
L	T	S/P	C	Minor Duration	Major Duration	Internal Marks	Minor-I Marks	Minor-II Marks	Major Marks	Total Marks
3	1	0	4	1 Hours	3.0 Hours	10	20	20	50	100

COURSE OUTCOMES

After successful completion of this course, students shall be able to;

1. Familiarize with propositional and predicate logic and their roles in logic programming;
2. Understand logical programming and write programs in declarative programming style;
3. Learn the knowledge representation and reasoning techniques in rulebased systems, case-based systems, and model-based systems;

COURSE CONTENT

UNIT 1 Introduction:

AI History and applications. Overview of AI application areas: game playing, automated reasoning and theorem proving, expert systems, natural language understanding, planning and robotics, machine learning and Alan Turing Test.

UNIT 2 The Propositional and Predicate Logic:

Symbol and sentences, the semantics of the Propositional Calculus & Predicate Calculus. Inference Rules and Theorem Proving. Axioms, Literals, Horn clause & Clausal forms.

UNIT 3 Reasoning:

Inductive, Deductive, Abductive and Default reasoning. More examples on Resolution proof.

UNIT 4 Problem Solving as Search:

Structures and strategies for state space search. Algorithms for Heuristic search, Heuristic evaluation functions, Heuristic search and expert systems, using Heuristics in games, Time & Complexity issues etc**.**

UNIT 5 Knowledge Representation:

Knowledge representation Techniques; a survey of network representation; conceptual graphs; structured representations; frames, scripts; issues in knowledge representation: hierarchies, inheritance, exceptions; efficiencies.

UNIT 6 Knowledge Elicitation and Knowledge Acquisition:

An overview of the induction methods, types and tools. Stages in Knowledge acquisition with examples. Analyzing, coding, documenting and diagramming. Scope of knowledge.

UNIT 7: **Expert Systems**:

Overview of expert system technology; rule-based expert systems; Construction of ES. Components of an ES. The explanation facility. Rule-based formation and forward and backward chaining techniques for problem solving.

UNIT 8 Reasoning with uncertain and incomplete information:

The statistical approach to uncertainty, Bayesian reasoning, the Dempster-Shafer theory of evidence, Certainty Factor, Reasoning with Fuzzy sets.

SUGGESTED BOOKS:

1. Artificial Intelligence: Strategies and techniques for complex problems solving by George Luger, Addison-Wesley, 2003.

2. Artificial Intelligence - A Modern Approach by Stuart Russell & Peter Norvig, Prentice Hall.

3. Artificial Intelligence - A New Synthesis by Nils J. Nilsson, Morgan Kaufmann Publishers.

CSL 6142				**Modeling & Simulation**			Pre Requisites			
Version R-01							Co-requisites			
L	T	S/P	C	Minor Duration	Major Duration	Internal Marks	Minor-I Marks	Minor-II Marks	Major Marks	Total Marks
3	1	0	4	1 Hours	3.0 Hours	10	20	20	50	100

COURSE OUTCOMES

After successful completion of this course, students shall be able to;

1. Understand different methods for random number generation
2. Have a clear understanding of the need for the development process to initiate the real problem.
3. Have a clear understanding of principle and techniques of simulation methods informed by research direction.

UNIT 1 Concepts of systems

Concepts of systems, Models, and Simulation, Distributed Lag Model, Cobweb Models, The process of a simulation-Study, Exponential Growth Models, Exponential Decay Models, Type of simulation, Discrete-Event Simulation: Time-Advance Mechanisms, Components and Organization of a Discrete-Event Simulation Model. Monte Carlo Method. Simulation of Single-Server Queuing System, Simulation of an Inventory System.

UNIT 2 Continuous Simulation

Continuous Simulation: Pure-pursuit Problem. Random Number Generators: Linear Congruential Generators, Other kinds of Generators, Testing Random-Number Generators. Generating Random Variates: General Approaches, Continuous and Discrete distributions.

UNIT 3 Introduction to GPSS

Introduction to GPSS, General Description, GPSS block-diagram, Simulation of a Manufacturing Shop, SNA, Function, Simulation of a Supermarket, GPSS Model of a Simple Telephone system.

UNIT 4 Output Data Analysis for a Single System

Output Data Analysis for a Single System: Transient and Steady-State Behavior of a Stochastic Process, Type of Simulations with regard to output Analysis and Statistical Analysis for Testing Simulation, Verification and Validation of Simulation. An introduction of different types of simulation languages.

SUGGESTED BOOKS:

1. G.Gorden, “System Simulation”, Pearson Education
2. Law and Kelton, “Simulation Modeling and Analysis”, McGraw Hill
3. N.Deo,”System Simulation with Digital Computer”, Prentice Hall of India
4. Fred Maryanski, “Digital Computer Simulation”, CBSPD

CSL 6046			**Discrete Mathematical Structures**				Pre Requisites			
Version R-01							Co-requisites			
L	T	S/P	C	Minor Duration	Major Duration	Internal Marks	Minor-I Marks	Minor-II Marks	Major Marks	Total Marks
3	1	0	4	1 Hours	3.0 Hours	10	20	20	50	100

COURSE OUTCOMES

After successful completion of this course, students shall be able to;

1. Write an argument using logical notation and determine if the argument is or is not valid.
2. Demonstrate the ability to write and evaluate a proof or outline the basic structure of and give examples of each proof technique described.
3. Understand the basic principles of sets and operations in sets.
4. Prove basic set equalities.
5. Apply counting principles to determine probabilities

Unit 1 : Basic counting principle

Basic counting principle: Pigeonhole principle, inclusion - exclusion principle, recurrence relations, generating functions. Construction of finite fields, codes grammars and language, elements of logic.

Unit 2 : Undirected and direct graphs

Undirected and direct graphs, modelling with graphs, trials and cycles, connectivity and trees.

Unit 3 : Graph algorithms

Graph algorithms: BFS, DFS, shortest path, optimal spanning trees, matching, job assignment problem, optimal transportation through flows in networks.

Unit 4 : Introduction to Operations research

Introduction to Operations research. Linear Programming: Principles of simplex Method. Simplex method in tabular from. Duality and Dual simplex Method. Degeneracy and cycling.

SUGGESTED BOOKS:

1. K. H. Rosen, Discrete Mathematics and its applications, McGraw-Hill, 2007.
2. Kolman, Busby and Ross, “Discrete Mathematical Structures”, Pearson Education.

CSL 6073				**Network Management**			Pre Requisites			
Version R-01							Co-requisites			
L	T	S/P	C	Minor Duration	Major Duration	Internal Marks	Minor-I Marks	Minor-II Marks	Major Marks	Total Marks
3	1	0	4	1 Hours	3.0 Hours	10	20	20	50	100

COURSE OUTCOMES

After successful completion of this course, students shall be able to;

1. Describe network management and the network management architecture
2. Explain the various functions of network management.
3. Gain in-depth theoretical and practical knowledge of network management, and in particular of SNMP (Simple Network Management Protocol).
4. Compare a number of variations of the network management architecture

Unit 1 Data Communications and Network Management Overview

Data Communications and Network Management Overview: Review of Computer Network Technology, Basic Foundations: Standards, Models, and Language Networking Components, Overview of Network Management, Network Management Strategies, Configuration of client, Server and Infrastructure Components

Unit 2 Network Management

SNMPv1, SNMPv2, SNMPv3 Network Management: Organization, Information Models, Communication and Functional Models, Secure SNMPv3, RMON, RMON2

Unit 3 Network Management Tools and Systems

Network Management Tools and Systems : Network Management Applications, Broadband Network Management, ATM Network, Telecommunications Management Network, Web-Based Management , Network Management Initiatives.

SUGGESTED BOOKS:

1. Network Management: Principles and Practice, 1/e, Mani Subramaniam, Pearson Educations

CSL6062			**Advanced Computer Architecture**				Pre Requisites			
Version R-01							Co-requisites			
L	T	S/P	C	Minor Duration	Major Duration	Internal Marks	Minor-I Marks	Minor-II Marks	Major Marks	Total Marks
3	1	0	4	1 Hours	3 Hours	10	20	20	50	100

COURSE OUTCOMES

After successful completion of this course, students shall be able to;

1. Know the classes of computers, and new trends and developments in computer architecture
2. Understand pipelining, instruction set architectures, memory addressing.
3. Understand the performance metrics of microprocessors, memory, networks, and disks
4. Understand exploiting ILP using dynamic scheduling, multiple issue, and speculation.

Unit-I: Parallel computer models

The state of computing, System Attributes to Performance: Clock Rate and Cycles per Instruction, Performance Factors, System Attributes, MIPS Rate, Performance factors versus System attributes, Throughput Rate, Programming Environment, Implicit & Explicit Parallelism, MIPS Ratings and Performance Measurement, Classification of parallel computers, Multiprocessors and Multi-Computers: Shared- Memory Multiprocessors: UMA Model, Symmetric & Asymmetric Multi Processors Distributed Memory Multi-Computers, NUMA and COMA models for Multiprocessors

Unit-II: Program and network properties

Conditions of parallelism, Data and resource Dependences, Control Dependence, Resource Dependence, Bernstein's Conditions for Parallel Processing, Hardware and software parallelism, Program partitioning and scheduling, Grain Size and latency, Program flow mechanisms, Control flow versus data flow, Data flow Architecture, Demand driven mechanisms, Comparisons of flow mechanisms

Unit-III: System Interconnect Architectures

Network properties and routing, Node Degree and Network Diameter, Bisection Width, Data Routing Functions, Permutations, Perfect Shuffle and Exchange, Hypercube Routing Functions, Broadcast and Multicast, Network Performance

Unit-IV: Static and Dynamic Interconnection Networks

Static interconnection Networks: Linear Array, Ring and Chordal Ring, Barrel Shifter, Tree and Star, Fat Tree, Mesh and Torus, Systolic Array, Hypercubes, Cube-Connected Cycles, k-array n-cube networks, Network Throughput, Comparison of characteristic of various static interconnection networks, Dynamic interconnection Networks: Digital Buses, Switch Modules, Multistage Networks, Omega Network, Baseline Network, Crossbar Network.

Unit-V: Advanced processors

Advanced processor technology, Design Space of Processors, Instruction pipelines, Processors and Coprocessors, Instruction-set Architectures, Complex Instruction Sets, Reduced Instruction Sets, Architectural Distinctions, CISC Scalar Processors, Representative CISC Scalar Processors, RISC Scalar Processors, Representative RISC Scalar Processors, Superscalar Processors, VLIW Architectures, Vector and Symbolic processors

SUGGESTED BOOKS:

1. Kai Hwang, "Advanced computer architecture"; TMH. 2000
2. Hwan and Briggs, "Computer Architecture and Parallel Processing"; MGH. 1999
3. D. A. Patterson and J. L. Hennessey, "Computer organization and design", Morgan Kaufmann, 2nd

CSL6104			**Neural Networks and Probabilistic Reasoning**				Pre Requisites			
Version R-01							Co-requisites			
L	T	S/P	C	Minor Duration	Major Duration	Internal Marks	Minor-I Marks	Minor-II Marks	Major Marks	Total Marks
3	1	0	4	1 Hours	3 Hours	10	20	20	50	100

COURSE OUTCOMES

After successful completion of this course, students shall be able to;

1. The student will be able to obtain the fundamentals and types of neural networks.
2. The student will have a broad knowledge in developing the different algorithms for neural networks. Student will be able analyze neural controllers
3. Student will have a broad knowledge in Fuzzy logic principles.
4. Student will be able to determine different methods of Deffuzification

UNIT 1 Reasoning with uncertain information:

Review of Probability theory, conditional Probabilities, Probabilistic Inference, Conditional Independence, Bays Networks, Bayesian Reasoning, Dempstor-Shafer theory of evidence, Probablistic Inference in Polytrees, Evidence above and evidence below, non-monotonic systems, Certainty Factor.

UNIT 2 Genetic Algorithms: Introduction:

Operatiors: reproduction, crossover & mutation. Fitness function, Simple program demonstration. G.A. software packages.

UNIT 3 Neural Networks:

Biological neural system, Artificial Intelligent Systems, Modeling human performance. Foundation for connectionist networks. Activation functions, McCulloch-Pitts Neurons, Perceptron Learning, The Window-Hoff Procedure, Generalised Delta Procedure, Error-correction Procedure. Backpropagation learning, Competitive learning, Hebbian learning. Supervised and Unsupervised learning, Kohonon Self-Organising Maps, Reinforcement learning, Neural Networks: promises and problems. Neural Networks application.

SUGGESTED BOOKS:

1. Neural Networks : A Comprehensive Foundation by Simon Haykin, Prentice Hall of India
2. Artificial Intelligence – A New Synthesis by Nils J.Nilsson, Morgon Kaufmann Publishers.

CSL6083			**Advanced DBMS**				Pre Requisites			
Version R-01							Co-requisites			
L	T	S/P	C	Minor Duration	Major Duration	Internal Marks	Minor-I Marks	Minor-II Marks	Major Marks	Total Marks
3	0	2	4	1 Hours	3 Hours	10	20	20	50	100

COURSE OUTCOMES

After successful completion of this course, students shall be able to;

1. Explain in detail DBMS architecture.
2. Explain in detail query processing and techniques involved in query optimization.
3. Explain the principles of concurrency control.
4. Explain the principles of recovery management.
5. Know recent developments and active research topics in database.

UNIT 1 Storage and File structures

Storage and File structures: RAID, tertiary storage, storage access, file organization, Data dictionary storage

UNIT 2 Query Processing & Optimization

Query Processing: Overview, query cost, selection operation, sorting, join operation,
Other operations, evaluation of expressions

Query Optimization: Overview, Transformation of relational expression, estimating statistics of expression results, choice of evaluation plans, materialized views

UNIT 3 Database system architectures

Database system architectures: Centralized and client-server architectures, parallel systems, distributed systems

Parallel databases: Introduction, I/O parallelism, interquery parallelism, intraquery parallelism, intraoperational parallelism, interoperational parallelism, design of parallel systems

Distributed databases: homogeneous and heterogeneous databases, distributed data storage, distributed transactions, commit protocols, concurrency control in distributed databases, distributed query processing, heterogeneous distributed databases, directory systems

UNIT 4 Advance transaction processing

Advance transaction processing: Transaction processing monitors, Real time transaction systems, Long duration transactions

SUGGESTED BOOKS:

1. Silber Schatz. Korth, "Database System Concepts", Tata Mc Graw Hill.
2. ShamKanth B. Navathe, "Fundamental of DataBase System", Pearson Education.
3. C. J. Date, "An introduction to database systems", Addison Wesley publishing company

CSL6084				**Data Mining And Data Warehousing**			Pre Requisites			
Version R-01							Co-requisites			
L	T	S/P	C	Minor Duration	Major Duration	Internal Marks	Minor-I Marks	Minor-II Marks	Major Marks	Total Marks
3	1	0	4	1 Hours	3 Hours	10	20	20	50	100

COURSE OUTCOMES

After successful completion of this course, students shall be able to;

1. Describe the fundamental concepts, benefits and problem areas associated with data warehousing
2. Describe the various architectures and main components of a data warehouse.
3. Design a data warehouse, and be able to address issues that arise when implementing a data warehouse.

UNIT 1 Overview of decision support systems

Overview of decision support systems: organizational need for strategic information, Failures of past decision-support systems, operational versus decision-support systems, data warehousing-the only viable solution, data warehouse defined. Data warehouse – The building Blocks: Defining Features, data warehouse and data marts, overview of the components, metadata in the data warehouse. Defining the business requirements: Dimensional analysis, information packages - a new concept, requirements gathering methods, requirements definition: scope and content.

UNIT 2 Principles of dimensional modeling

Principles of dimensional modeling: Objectives, From Requirements to data design, the STAR schema, STAR Scheme keys, Advantages of the STAR Schema. Dimensional Modeling: Updates to the Dimension tables, miscellaneous dimensions, the snowflake scheme, aggregate fact tables, families of STARS.

UNIT 3 OLAP in the Data Warehouse

OLAP in the Data Warehouse: Demand for online analytical processing, need for multidimensional analysis, fast assess and powerful calculations, limitations of other analysis methods, OLAP is the answer, OLAP definitions and rules, OLAP characteristics, major features and functions, general features, dimensional analysis, what are hypercubes? Drill-down and roll-up, slice-and-dice or rotation, OLAP models, overview of variations, the MOLAP model, the ROLAP model, ROLAP versus MOLAP, OLAP implementation considerations.

UNIT 4 Data Mining Basics

Data Mining Basics: What is Data Mining, Data Mining Defined, The knowledge discovery process, OLAP versus data mining, data mining and the data warehouse, Major Data Mining Techniques, Cluster detection, decision trees, memory-based reasoning, link analysis, neural networks, genetic algorithms, moving into data mining, Data Mining Applications, Benefits of data mining, applications in retail industry, applications in telecommunication industry, applications in banking and finance.

SUGGESTED BOOKS:

1. Paul Raj Poonia, “Fundamentals of Data Warehousing”, John Wiley & sons.
2. Sam Anahomy, “Data Warehousing in the real world: A practical guide for building decision support systems”, John Wiley
3. Alex berson, Stephen J. Smith, “Data Warehousing, Data Mining & OLAp”, Tata McGraw Hill

CSL6113			**Image Processing**				Pre Requisites			
Version R-01							Co-requisites			
L	T	S/P	C	Minor Duration	Major Duration	Internal Marks	Minor-I Marks	Minor-II Marks	Major Marks	Total Marks
3	0	2	4	1 Hours	3 Hours	10	20	20	50	100

COURSE OUTCOMES

After successful completion of this course, students shall be able to;
(1) Understand image formation for the acquisition of images.
(2) Get broad exposure of the various applications of image processing in industry, medicine, agriculture etc.
(3) Get knowledge of existing algorithms for the processing of digital images.
(4) Apply knowledge/skills to solve industrial problems based on image processing.

COURSE CONTENTS

Unit-1 Introduction and Digital Image Fundamentals (7 Contact Periods)
Application of Image Processing, Image Processing definition, steps in image Processing, Image Sensing and Acquisition, Image Sampling and Quantization, Spatial and Intensity resolution-Effect of reducing spatial resolution, DPI, Effect of reducing image gray levels. Basic relationships between pixels and adjacency

Unit-2 Intensity Transformation and Spatial Filtering (8 Contact Periods)
Basics of intensity transformation and spatial filtering, intensity transformation functions-image negative, log transformation, power law; Piecewise-linear transformation functions-contrast stretching, intensity level slicing, bit plane slicing; Histogram Processing-histogram stretching, histogram equalization, Spatial Filtering, Spatial Correlation and Convolution, Smoothing Spatial Filters, order statistic filters, Sharpening Spatial Filters- The Laplacian, The Gradient-Robert cross gradient operator, Sobel operators

Unit-3 Image Restoration (4 Contact Periods)
Model of the image degradation/restoration process, Noise Models, Periodic Noise, Estimation of noise parameters, Restoration in the presence of noise-spatial filtering- Mean filters, Order-statistics filters, Median filter, Max and Min filters, Mid-point filter, Alpha-trimmed mean filter, adaptive filters.

Unit-4 Color Image Processing (4 Contact Periods)
Introduction to the color image processing, color models: RGB, HSI, CMY/ CMYK; Conversion of color models: converting colors from RGB to HSI, HSI to RGB, RGB to CMY and CMY to RGB etc. Pseudo coloring of images.

Unit-5 Image Compression (7 Contact Periods)
Introduction to image compression, need of compression, methods of image compression: coding redundancy, spatial and temporal redundancy, irrelevant information, models of image compression, Huffman coding, Arithmetic coding, LZW coding, run-length coding, block transform coding, JPEG compression, predictive coding

Unit-6 Image Segmentation (6 Contact Periods)
Fundamental, Point, Line and Edge detection, edge linking and boundary detection, Hough transform, thresholding, region-based segmentation, region splitting and merging

SUGGESTED BOOKS

1. Rafael C. Gonzalez & Richard E. Woods, “Digital Image Processing”, 3rd edition, Pearson Education.
2. David A. Forsyth, Jean Ponce, “Computer Vision: A Modern Approach”, Prentice Hall
3. A.K. Jain, “Fundamental of Digital Image Processing”, PHI