MANONMANIAM SUNDARANAR UNIVERISTY,
TIRUNELVELI-12
SYLLABUS
PG - COURSES – AFFILIATED COLLEGES
Course Structure for M.Sc. Computer Science
(Choice Based Credit System)

(with effect from the academic year 2021-2022 onwards)

Semester-III				
Part	**Subject Status**	**Subject Title**	**Subject Code**	**Credit**
3	Core	DIGITAL IMAGE PROCESSING	ZCSM31	4
3	Core	SOFT COMPUTING	ZCSM32	4
3	Core	INTERNET OF THINGS	ZCSM33	4
3	Core	ADVANCED COMPUTER NETWORKS	ZCSM34	4
3	Core	RESEARCH METHODOLOGY	ZCSM35	2
3	Elective - 2	1. CLOUD COMPUTING 2. MOBILE COMPUTING 3. OPTIMIZATION TECHNIQUE	ZCSE31/ ZCSE32/ ZCSE33	3
3	Practical	DIGITAL IMAGE PROCESSING USING SCI LAB	ZCSL31	2
3	Project	MINI PROJECT	ZCSL32	2

Total Marks: 100   Internal Exam: 25 marks + External Exam: 75 marks

A. **Scheme for internal Assessment**:
Maximum marks for written test: **15 marks**
 3 internal tests, each of **I hour** duration shall be conducted every semester.
To the average of the **best two** written examinations must be added the marks scored
in. The **assignment** for 5 marks and Seminar for 5 marks

The break up for internal assessment shall be:
Written test- 15 marks; Assignment -5 marks; Seminar-5 Marks Total - 25 marks

B. **Scheme of External Examination**
3 hrs. examination at the end of the semester
A – Part : 1 mark question two - from each unit
B – Part : 5 marks question one - from each unit
C – Part : 8 marks question one - from each unit

➢ **Conversion of Marks into Grade Points and Letter Grades**

S.No.	Percentage of Marks	Letter Grade	Grade Point	Performance
1	90 - 100	O+	10	Outstanding
2	80 - 89	O	9	Excellent
3	70 - 79	A+	8	Very Good
4	60 - 69	A	7	Good
5	55 - 59	B+	6	Above Average
6	50 - 54	B	5	Pass
7	0 - 49	RA	-	ReAppear
8	Absent	AA	-	Absent

➢ **Cumulative Grade Point Average (CGPA)**

$$CGPA = \frac{\Sigma\,(GP\,\times\,C)}{\Sigma C}$$

- **GP** = Grade point, **C** = Credit
- CGPA is calculated only for Part-III courses
- CGPA for a semester is awarded on cumulative basis

➢ **Classification**
a) First Class with Distinction   : CGPA ≥ 7.5*
b) First Class   : CGPA ≥ 6.0
c) Second Class   : CGPA ≥ 5.0 and < 6.0
d) Third Class   :   CGPA< 5.0

DIGITAL IMAGE PROCESSING

Course Objectives:
- To provide complete knowledge on Digital Image Processing methods, such as image processing methods in Spatial domain and Frequency domain, Edge detection, Compression, Segmentation, and Morphological concepts, which enable the students to understand the concepts and implement them empirically.

Course Outcomes:
- Review the fundamental concepts of a digital image processing system and Analyze images in the frequency domain using various transforms.
- Evaluate the techniques for image enhancement and image restoration. Categorize various compression techniques.
- Interpret Image compression standards, and Interpret image segmentation and representation techniques.
- Gain idea to process various image used in various fields such as weather forecasting, Diagnosis of various disease using image such as tumor, cancer etc.

UNIT-1 Introduction and Digital Image Fundamentals
Introduction: What is Digital Image Processing- examples of fields that uses DIP - Fundamental Steps in Digital Image Processing -Components of an Image Processing Digital Image Fundamentals: Elements of Visual Perception -Light and the Electromagnetic Spectrum - Image Sensing and Acquisition - Image Sampling and Quantization - Some Basic Relationships Between Pixels - Introduction to the Basic Mathematical Tools Used in Digital Image Processing.

UNIT – II Image Enhancement and Frequency Domain Filtering
Image Enhancement: Background - Some Basic Intensity Transformation Functions -Histogram Processing - Fundamentals of Spatial Filtering -Smoothing Spatial Filters - Sharpening Spatial Filters - Combining Spatial Enhancement Methods - Using Fuzzy Techniques for Intensity Transformations and Spatial Filtering. Filtering in the Frequency Domain: Background - Preliminary Concepts - Sampling and the Fourier Transform of Sampled Functions - The Discrete Fourier Transform of One Variable - Extensions to Functions of Two Variables - Some Properties of the 2-D DFT and IDF - The Basics of Filtering in the Frequency Domain - Image Smoothing Using Low pass Frequency Domain Filters - Image Sharpening Using High pass Filters - Selective Filtering - The Fast Fourier Transform.

UNIT – III Image Restoration and Image Transforms

Image Restoration: Model of the Image Degradation/Restoration process – Noise Models - Noise Only—Spatial Filtering - Periodic Noise Reduction Using FDF - Inverse Filtering - Minimum Mean Square Error Filtering -Constrained Least Squares Filtering - Geometric Mean Filter -Image Reconstruction from Projections. Wavelet and Other Image Transforms - Preliminaries - Matrix-based Transforms - Correlation - Basis Functions in the Time-Frequency Plane - Basis Images - Fourier-Related Transforms - Walsh-Hadamard Transforms - Slant Transform -Haar Transform - Wavelet Transforms.

UNIT – IV Color Image Processing and Image Compression

Color Image Processing: Color Fundamentals - Color Models - Pseudo color Image Processing - Basics of Full-Color Image Processing - Color Transformations - Color Image Smoothing and Sharpening - Using Color in Image Segmentation - Noise in Color Images - Color Image Compression. Image Compression and Watermarking - Fundamentals - Huffman Coding - Arithmetic Coding – LZW Coding - Run-length Coding - Symbol-based Coding - Bit-plane Coding Block Transform Coding - Predictive Coding - Digital Image Watermarking.

UNIT – V Morphological Processing & Image Segmentation

Morphological Image Processing - Preliminaries - Erosion and Dilation - Some Basic Morphological Algorithms – Morphological Reconstruction Image Segmentation - Fundamentals - Point, Line, and Edge Detection - Thresholding - segmentation by Region Growing and by Region Splitting and Merging - The Use of Motion in Segmentation

Text and Reference books

1. Digital Image Processing, Fourth Edition, Rafel C. Gonzalez and Richard E. Woods, Pearson Education, 2018.
2. Fundamentals of Digital Image Processing, Chris Solomon & Toby Breckon, Wiley - Blackwell publications, 2011.
3. Digital Image Processing and Analysis, B. Chandra and D. Dutta Majumder, PHI,New Delhi, 2006.
4. Fundamentals of Digital Image Processing, Anil K. Jain, Prentice Hall of India,1989.

SOFT COMPUTING

Course Objectives:
- Develop the skills to gain a basic understanding of neural network theory and fuzzy logic theory.
- Introduce students to artificial neural networks and fuzzy theory from an engineering perspective.

Course Outcomes:
- Comprehend the fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory.
- Understand the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic
- To understand the fundamental theory and concepts of neural networks, Identify different neural network architectures, algorithms, applications and their limitations.
- Understand appropriate learning rules for each of the architectures and learn several neural network paradigms and its applications.
- Reveal different applications of these models to solve engineering and other problems.

UNIT-1 INTRODUCTION
Introduction: Soft Computing Constituents – Soft Computing Vs Hard Computing – Characteristics - Applications - Artificial Neural Network (ANN): Fundamental Concept – Application Scope - Basic Terminologies – Neural Network Architecture – Learning Process – Basic Models of ANN: McCulloch-Pitts Model – Hebb Network – Linear Separability.

UNIT – II SUPERVISED LEARNING NETWORKS
Supervised Learning Networks: Perceptron Networks – Adaline and Madaline Networks – Back Propagation Network – Radial Basis Function Network. Associative Memory Networks – BAM – Hopfield Network - Boltzmann Machine. Unsupervised Learning Networks: Kohonen Self Organizing Network – Counter Propagation Network – ART Network.

UNIT – III FUZZY SETS
Fuzzy Sets: Basic Concept – Crisp Set Vs Fuzzy Set - Operations on Fuzzy Set – Properties of Fuzzy Sets – Fuzzy Relations: Concept – Fuzzy Composition – Fuzzy Equivalence and Tolerance Relation - Membership Functions: Features –

Fuzzification – Methods of Membership value assignments – Defuzzification – Methods.

UNIT – IV FUZZY CONCEPTS
Fuzzy Arithmetic – Extension Principle – Fuzzy Measures – Fuzzy Rules and Fuzzy Reasoning: Fuzzy Propositions – Formation of Rules – Decomposition of Rules – Aggregation of Rules – Approximate Reasoning – Fuzzy Inference and Expert Systems – Fuzzy Decision Making – Fuzzy Logic Control Systems.

UNIT – V GENETIC ALGORITHM
Genetic Algorithm: Fundamental Concept – Basic Terminologies – Traditional Vs Genetic Algorithm - Elements of GA - Encoding - Fitness Function – Genetic Operators: Selection – Cross Over - Inversion and Deletion - Mutation – Simple and General GA – The Schema Theorem - Classification of Genetic Algorithm – Genetic Programming – Applications of GA.

Text and Reference books
1. S.N. Sivanandam, S.N. Deepa, "Principles of Soft Computing", Wiley India, 2007.
2. S. Rajasekaran, G.A.V. Pai, "Neural Networks, Fuzzy Logic, Genetic Algorithms", Prentice Hall India, 2004.

INTERNET OF THINGS

Course Objectives:
- In order to gain knowledge on bases of Internet of Things (IoT), IoT Architecture, and the Protocols related to IoT; and understand the concept of the Web of Thing and the relationship between the IoT and WoT.

Course Outcomes:
- Gain the basic knowledge about IoT and they will be able to use IoT related products in real life.
- It helps to rely less on physical resources and started to do their work smarter.

UNIT-1
The Internet of Things: An Overview - The Flavor of the Internet of Things, The "Internet" of "Things"- The Technology of the Internet of Things - Enchanted

Objects, Who is Making the Internet of Things? Design Principles for Connected Devices - Calm and Ambient Technology, Magic as Metaphor, Privacy, Keeping Secrets, Whose Data Is It Anyway?, Web Thinking for Connected Devices, Small Pieces, Loosely Joined, First-Class Citizens On The Internet , Graceful Degradation, Affordances.

UNIT – II

Prototyping Embedded Devices – Electronics, Sensors, Actuators, Scaling Up the Electronics, Embedded Computing Basics, Microcontrollers, System-on-Chips, Choosing Your Platform, Arduino, Developing on the Arduino, Some Notes on the Hardware, Openness, Raspberry Pi, Cases and Extension Boards, Developing on the Raspberry Pi, Some Notes on the Hardware, Openness What Are Smart Objects? - Where Do Smart Objects Come From? Challenges for Smart Objects

UNIT – III

Why IP for Smart Objects? – Interoperability, An Evolving and Versatile Architecture, Stability and Universality of the Architecture Scalability, Configuration and Management, Small Footprint, What Are the Alternatives? Why Are Gateways Bad? Security for Smart Objects - The Three Properties of Security - "Security" by Obscurity, Encryption, Security Mechanisms for Smart Objects - Security Mechanisms in the IP Architecture, IPSec, TLS - Web Services for Smart Objects - Web Service Concepts - The Performance of Web Services for Smart Objects.- Connectivity Models for Smart Object Networks - Introduction, Autonomous Smart Object Networks, IOT - Extended Internet.

UNIT – IV

Smart Object Hardware and Software – Hardware - Software for Smart Objects – Energy Management - THE APPLICATIONS - Smart Grid – Introduction – Terminology - Core Grid Network Monitoring and - Control - Smart Metering (NAN) – HAN

UNIT – V

Industrial Automation – Opportunities, Challenges, Use Cases Smart Cities and Urban Networks –introduction - Urban Environmental Monitoring - Social Networks - Intelligent Transport Systems - Home Automation – Introduction - Main Applications and Use Cases - Technical Challenges and Network Characteristics- Building Automation – Emerging Application in Building automation - Health Monitoring – Introduction - Main Applications and Use Case - Technical Challenges in Health Monitoring.

Text and Reference books
1. Adrian McEwen and Hakim Cassimally, Designing the Internet of Things, John Wiley and Sons, Ltd 2014 (For Unit I & II)
2. Jean-Philippe Vasseur and Adam Dunkels, Interconnecting Smart Objects with IP - The Next Internet, Morgan Kaufmann Publishers 2010(for Unit III to V)
3. Cuno Pfister, Getting Started with the Internet of Things, Published by O'Reilly
4. Brian Underdahl, the Internet of Things For Dummies, KORE Wireless Edition,
5. Dr. Ovidiu Vermesan and Dr. Peter Friess, IoT-From Research and Innovation to Market Deployment, River Publishers,
6. Francis daCosta, rethinking the IoT – A scalable approach to connecting everything, Apress

ADVANCED COMPUTER NETWORKS

Course Objectives:
- To study communication network protocols, different communication layer structure
- To learn security mechanism for data communication
- To learn network simulator.

Course Outcomes:
- To master the terminology and concepts of the OSI reference model and the TCP-IP reference model.
- To master the concepts of protocols, network interfaces, and design/performance issues in local area networks and wide area networks.
- To be familiar with wireless networking concepts, and be familiar with contemporary issues in networking technologies.
- To be familiar with network tools and network programming

UNIT-1
INTRODUCTION TO NETWORKS & COMMUNICATION MEDIA: Uses – Network hardware – Network software – Reference Models . Example Networks: Internet – X.25 -ATM - Transmission media – Wireless Transmission – Telephone system – ISDN, ATM communication – satellite communication.

UNIT – II
DATA TRANSFER & ACCESS PROTOCOLS: Error detection and correction methods – Elementary protocols – Sliding window protocols - IEEE 802.2

Logical Link Control – Bluetooth: architecture – protocol stack – radio layer – baseband layer – L2CAP layer – frame structure.

UNIT – III
NETWORK LAYER PROTOCOLS: Routing algorithms – Congestion control: Principles – policies –Congestion control in VC subnets – congestion control in datagram subnets - Network layer in Internet: Architecture – IP protocol- IP Address – IPv6

UNIT – IV
TRANSPORT PROTOCOLS: Transport service – Transport protocols – Transport protocols in Internet : TCP and UDP

UNIT – V
APPLICATION LAYER ISSUES: Domain Name System – Electronic mail - Network security-Cryptography. Network Simulator: Basics of Computer Network Simulation – Introduction to Network Simulator 2 (NS2) – Basic Architecture – Installation – Directories and Convention – Running NS2 Simulation – Simulation Examples .

Text and Reference books
1. Andrew S.Tanenbaum, "Computer Networks", PHI, 5 th Edition, 2013
2. Behrouz A. Forouzan, "Data communication and Networking", Tata McGraw-Hill, 4th Edition, 2006
3. William Stallings, "Data and Computer Communication", 7 th Edition, Pearson Education, 2007
4. Teerawat Ussaruyakul, Ekram Hossain, Introduction to Network Simulator NS2, Springer, 2009

RESEARCH METHODOLOGY

Course Objectives:
- To understand the importance of Research Methodology
- To perform exploratory data analysis
- To apply the statistical testing to prove the hypothesis
- To provide the inference using quantitative data analysis
- To make use of computer aids to analyze the data, prepare reports and presentations Able to evaluate methodology of teaching

Course Outcomes:
- Ability to apply different research approaches and methodologies
- Develop data collection instrument according to the underlying theoretical framework.
- Analyze quantitative data and qualitative data using software packages
- Construct and document an appropriate research design
- Discuss limitations and potential contribution to theory and practice of research
- Effectively apply the appropriate computer tools in each stage of research
- Ability to perform ICT based Teaching Methods

UNIT-1

INTRODUCTION OF RESEARCH AND FORMULATION Motivation and Objectives – Research methods vs Methodology. Types of research – Descriptive vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, Conceptual vs. Empirical. Defining and formulating the research problem - Selecting the problem - Necessity of defining the problem - Importance of literature review in defining a problem – Literature review – Primary and secondary sources – Reviews, treatise, monographs, patents –Critical literature review . RESEARCH DESIGN AND METHODS Research design – Basic Principles- Need of research design — Features of good design – Important concepts relating to research design.

UNIT – II

Observation and Facts, Laws and Theories, Prediction and explanation, Induction, Deduction, Development of Models - Developing a research plan - Exploration, Description, Diagnosis, Experimentation - Determining experimental and sample designs. DATA COLLECTION Execution of the research - Observation and Collection of data - Methods of data collection.

UNIT – III

DATA ANALYSIS Quantitative Methods: Online Quantitative Design and Survey – Descriptive Measures – Probability – Random Variables and Distribution Functions – Discrete Probability Distributions – Continuous Probability Distribution – Sampling Distributions – Theory of Estimation – Hypothesis Testing – Correlation – Regression – Principles of Sample Survey – Types of Sampling – Design of Experiments – CRD-RBD-LSD-Factor Analysis – Cluster Analysis –Discriminant Analysis – Multiple Regression and Correlation – Canonical Correlation – Application of Statistical Software Packages. REPORTING AND THESIS WRITING Reporting and thesis writing – Structure and components of scientific reports - Types of report – Technical reports and thesis – Significance – Different steps in the preparation – Layout, structure and Language of typical reports – Illustrations and tables -

Bibliography, referencing and footnotes – Use of Oral presentation – Software Packages for thesis Preparation– Planning – Preparation – Practice – Making presentation – Use of visual aids - Importance of effective communication.

UNIT – IV

APPLICATION OF RESULTS AND ETHICS Application of results and ethics - Environmental impacts - Ethical issues - ethical committees - Commercialization – Copy right – royalty – Intellectual property rights and patent law – Trade Related aspects of Intellectual Property Rights – Reproduction of published material – Plagiarism – Application of Plagiarism detection tools - Citation and acknowledgment - Reproducibility and accountability.

UNIT – V

METHODOLOGY OF TEACHING Teaching – Objectives of Teaching, Phases of Teaching – Teaching Methods: Lecture Method, Discussion Method, Discovery Learning, Inquiry, Problem Solving Method, Project method, Seminar – Integrating ICT in Teaching: Individualised Instruction, Ways for Effective Presentation with PowerPoint – Documentation – Evaluation: Formative, Summative & Continuous and Comprehensive Evaluation – Later Adolescent Psychology: Meaning, Physical, Cognitive, Emotional, Social and Moral Development – Teaching Later Adolescents.

Text and Reference books
1. C R Kothari, Paperback "Research Methodology: Methods and Techniques", 2014
2. Modern Language Association Handbook, Eight Edition, 2016
3. R. Paneerselvam, "Research Methodology" 2nd Edition, PHI, 2014
4. John W Creswel, Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, 3rd Edition, 2014
5. S.C. Gupta & V.K. Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi, 2014 Edition.
6. S.C. Gupta & V.K. Kapoor, Fundamentals of Applied Statistics, Sultan Chand & Sons. 2014 Edition.
7. Sampath.K, Panneerselvam.A & Santhanam.S (1984), Introduction to Educational Technology (2nd Revised Ed.) New Delhi: Sterling Publishers.
8. Sharma.S.R(2003).Effective Classroom teaching modern methods, tools & techniques, Jaipur: Mangal Deep.
9. Vedanayagam.E.G (1989). Teaching Technology for College Teachers, Newyark: Sterling Publishers.

CLOUD COMPUTING

Course Objectives:
- To understand the concept of cloud computing.
- To appreciate the evolution of cloud from the existing technologies.
- To have knowledge on the various issues in cloud computing.
- To be familiar with the lead players in cloud.
- To appreciate the emergence of cloud as the next generation computing paradigm.

Course Outcomes:
- Articulate the main concepts, key technologies, strengths and limitations of cloud computing.
- Learn the key and enabling technologies that help in the development of cloud.
- Develop the ability to understand and use the architecture of compute and storage cloud, service and delivery models.
- Explain the core issues of cloud computing such as resource management and security.
- Be able to install and use current cloud technologies.
- Evaluate and choose the appropriate technologies, algorithms and approaches for implementation and use of cloud.

UNIT-1 INTRODUCTION

Introduction to Cloud Computing – Definition of Cloud – Evolution of Cloud Computing – Underlying Principles of Parallel and Distributed Computing – Cloud Characteristics – Elasticity in Cloud – On-demand Provisioning.

UNIT – II CLOUD ENABLING TECHNOLOGIES

Service Oriented Architecture – REST and Systems of Systems – Web Services – Publish-Subscribe Model – Basics of Virtualization – Types of Virtualization – Implementation Levels of Virtualization – Virtualization Structures – Tools and Mechanisms – Virtualization of CPU –
Memory – I/O Devices –Virtualization Support and Disaster Recovery.

UNIT – III CLOUD ARCHITECTURE, SERVICES AND STORAGE

Layered Cloud Architecture Design – NIST Cloud Computing Reference Architecture – Public, Private and Hybrid Clouds – laaS – PaaS – SaaS – Architectural Design Challenges – Cloud Storage – Storage-as-a-Service – Advantages of Cloud Storage – Cloud Storage Providers – S3.

UNIT – IV RESOURCE MANAGEMENT AND SECURITY IN CLOUD

Inter Cloud Resource Management – Resource Provisioning and Resource Provisioning Methods – Global Exchange of Cloud Resources – Security Overview – Cloud Security Challenges – Software-as-a-Service Security – Security Governance – Virtual Machine Security – IAM – Security Standards.

UNIT – V CLOUD TECHNOLOGIES AND ADVANCEMENTS

Hadoop – MapReduce – Virtual Box — Google App Engine – Programming Environment for Google App Engine — Open Stack – Federation in the Cloud – Four Levels of Federation – Federated Services and Applications – Future of Federation.

Text and Reference books

1. Kai Hwang, Geoffrey C. Fox, Jack G. Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
2. Rittinghouse, John W., and James F. Ransome, ―Cloud Computing: Implementation, Management and Security, CRC Press, 2017.
3. Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi, ―Mastering Cloud Computing, Tata Mcgraw Hill, 2013.
4. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing – A Practical Approach, Tata Mcgraw Hill, 2009.
5. George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud: Transactional Systems for EC2 and Beyond (Theory in Practice), O'Reilly, 2009.

MOBILE COMPUTING

Course Objectives:
- To learn the fundamental technologies that help in the networking of wireless devices.
- To learn about different wireless technologies
- To learn about the evolution of cellular systems
- To understand the various wireless standards

Course Outcomes:
- Explore the concepts of new technologies in wireless networks.
- Demonstrate various protocols of wireless and cellular networks.
- Discuss the features of different wireless networks.

UNIT-1
Introduction: Mobility of bits and bytes–Mobile Device Profiles-Wireless the beginning–Mobile Computing–Dialogue control–Networks–Middle ware and gateways–Applications and services–Developing mobile computing applications. Mobile Computing Architecture: Architecture of Mobile Computing – Three Tire Architecture –Design Consideration for mobile computing –Making existing applications to mobile enabled. Mobile Computing Through Telephony: Multiple Access procedure – Satellite Communication System- Mobile Computing Through Telephone–Developing an IVR Application –Voice XML– Telephony Application Program Interface-Multi Channel and Multi-mode user Interface-Developing Mobile GUI's – VUI's

UNIT – II
Emerging Technologies: Introduction – Bluetooth – Radio Frequency Identification(RFID) –Wireless Broadband(WIMAX)– Mobile IP –Internet Protocol version6(IPV6). Global System for Mobile Communication: Introduction – GSM Architecture and Services– GSM Entities –Call
Routing in GSM – PLMN interface – GSM addresses and identifiers – Network Aspects in GSM – Mobility Management – GSM frequency allocation – Personal Communication service –Authentication and Security. Short Message Service: Mobile Computing over SMS - Short Message Service(SMS) – SMS Architecture-Value added Services through SMS– Accessing the SMS bearer.

UNIT – III
General Packet Radio Service (GPRS): Introduction – GPRS and Packet data Networking –GPRS Network Architecture - GPRS Network Operations – Data Services in GPRS – Applications for GPRS–Limitations of GPRS– Billing andCharging in GPRS– Enhanced Data rate for GSM Evaluation (EDGE).Wireless Application Protocol : Introduction–WAP–MMS –GPRS Applications . CDMA and 3G : Introduction – Spread Spectrum Technology – IS-95 – Wireless Data – Third Generation Networks–Applications of 3G.

UNIT – IV
Wireless Network: Wireless Network and Topology-Cellular Telephony-Wireless Transmission and Wireless LAN - Wireless LAN Advantages–IEEE802.11Standards– Wireless LAN Architecture – Mobility in Wireless LAN – Deploying Wireless LAN – Mobile Adhoc Networks and Sensor Networks – MAC Protocol-Routing Protocol-Transport Layer Protocol – QOS - Dynamic Linking and Services-Communication via Web-Wireless LAN security – Wireless Access in Vehicular Environment –Wireless Local Loop– Hiper LAN–WIFI versus 3G. Intelligent Networks and Interworking :

Fundamentals of Call Processing – Intelligence in the Networks – SS#7 Signaling – IN Conceptual Model (INCM) – Soft switch – Programmable
Networks– Technologies and Interfaces for IN .Client Programming: Mobile Phones– Features of Mobile phones–PDA–Design constraints in Applications for Handheld devices– Recent Developments in Client Technology.

UNIT – V

Programming for the PALM OS: History of PALM OS–PALM OS architecture– Application Development– Communication in PALM OS– Multimedia. Wireless Devices with Symbian OS: Introduction to Symbian OS- Symbian OS Architecture – Security on Symbian OS. Security Issues in Mobile Computing: Information Security– Web Security-Security Techniques and Algorithms – Security Protocols– Public Key Infrastructure.

Text and Reference books
1. AsokeK Talukder, Hasan Ahmed and Roopa Ryavagal, "Mobile Computing:Technology, Applications and Service Creation", Second Edition , TMH,2010
2. Jochen Schiller, "Mobile Communications",Second Edition, Pearson Education, 2012
3. T.G. Palanivelu, R. Nakkeeran, Wireless and Mobile Communication, PHI Learning Private Limited, 2009
4. Raj Kamal, "Mobile Computing" ,Second Edition, Oxford University Press, 2012
5. William Stallings, "Wireless Communication and Networks", Pearson Education Asia,2002
6. C.Siva Ram Murthy, B.S. Manoj, "Ad Hoc Wireless Networks –Architectures and Protocols", 2nd Edition, Pearson Education.2004
7. Ashok K Talukder, Roopa R Yavagal, "Mobile Computing", Tata McGraw-Hill, 2005.
8. Jochen Burkhardt, Dr. HorstHenn, Klaus Rintdoff, Thomas Schack, "Pervasive Computing", Pearson, 2009.

OPTIMIZATION TECHNIQUES

Course Objectives:
- To get the basic knowledge of Optimization Techniques.
- To study the measurement and scaling techniques.
- To learn about Assignment Problems.

Course Outcomes:
- Get an insight about linear programming concepts
- Able to get knowledge about network concepts
- Able to have knowledge about simulation concepts

UNIT-1 INTRODUCTION

Statement of an optimization problems – classification of optimization problem – classical optimization techniques; Single variable optimizations, Multi variable optimization, equality constrains, inequality constraints, No constraints.

UNIT – II LINEAR PROGRAMMING

Graphical method for two dimensional problems – central problems of Linear Programming – Definitions – Simples – Algorithm – Phase I and II of simplex Method – Revised Simplex Method. Simplex Multipliers – Dual and Primal – Dual Simplex Method – Sensitivity Analysis – Transportation problem and its solution – Assignment problem and its solution – Assignment problem and its solution by Hungarian method – Karmakar's method – statement, Conversion of the Linear Programming problem into the required form, Algorithm.

UNIT – III NON LINEAR PROGRAMMING

NON LINEAR PROGRAMMING (ONE DIMENSIONAL MINIMIZATION: Introduction – Unrestricted search – Exhaustive search – interval halving method – Fibonacci method.

NON LINEAR PROGRAMMING : (UNCONSTRAINED OPRIMIZATION): -
Introduction– Random search method – Uni variate method – Pattern search methods – Hooke and jeeves method, simplex method- Gradient of a function – steepest descent method – Conjugate gradient method.

UNIT – IV DYNAMIC PROGRAMMING

Introduction – multistage decision processes – Principles of optimality – Computation procedures.

UNIT – V DECISION MAKING

Decisions under uncertainty, under certainty and under risk – Decision trees – Expected value of perfect information and imperfect information.

Text and Reference books
1. Kalynamoy Deb, "Optimization for Engineering Design, Alogorithms and Examples", Prentice Hall, 2004.
2. Hamdy A Taha, "Operations Research – An introduction", Pearson Education , 2002.
3. An Introduction to optimization Techniques by vikrant Sharma,Vinod Kumar Jain,Atul Kumar April 20,2021 by Chapman and Hall/CRC
4. H.A. Taha,"Operation Research" Prentice Hall of India,2012

DIGITAL IMAGE PROCESSING LAB USING SCILAB

Course Objectives:
- To provide complete knowledge on Digital Image Processing methods, such as image processing methods in Spatial domain and Frequency domain, Edge detection, Compression, Segmentation, and Morphological concepts, which enable the students to understand the concepts and implement them empirically.

Course Outcomes:
- Review the fundamental concepts of a digital image processing system and Analyze images in the frequency domain using various transforms.
- Evaluate the techniques for image enhancement and image restoration. Categorize various compression techniques.
- Interpret Image compression standards, and Interpret image segmentation and representation techniques.
- Gain idea to process various image used in various fields such as weather forecasting, Diagnosis of various disease using image such as tumor, cancer etc.

LIST OF EXERCISES RECOMMENDED:
1. Write a program in Scilab to convert Gray Scale image to Binary Image.
2. Write a program in Scilab for finding Negative of an Image.
3. Write a program in Scilab for Histogram Equalization.
4. Write a program in Scilab for Arithmetic Operators using Image.
5. Write a program in Scilab for Gaussian Low pass Filter.
6. Write a program in Scilab for Gaussian High pass Filter.

7. Write a program in Scilab for Homomorphic Filtering.
8. Write a program in Scilab for Edge Detection.
9. Write a program in Scilab for Erosion of an Image.
10. Write a program in Scilab for Dilation of an Image.
11. Write a program in Scilab for conversion between color spaces.
12. Write a program in Scilab for Segmentation using watershed transform

Mini Project