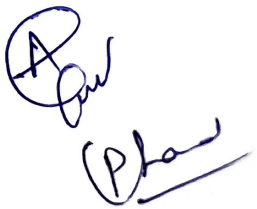
SCHEME FOR EXAMINATION
B.TECH (FOUR YEAR) DEGREE COURSE
THIRD YEAR, INFORMATION TECHNOLOGY
SEMESTER VIII
EFFECTIVE FROM SESSION 2023-24

SL. NO.	SUBJECT CODE	SUBJECTS	PERIODS/ WEEK			EVALUATION SCHEME			CREDITS
			L	T	P	IA	ESE	TOTAL	
THEORY									
1	IT208TPC6X	ELECTIVE – VI	3	0	0	30	70	100	3
2	IT208TOE3X	OPEN ELECTIVE - III	3	0	0	30	70	100	3
3	IT208TOE4X	OPEN ELECTIVE - IV	3	0	0	30	70	100	3
PRACTICAL									
1	IT208PPC31	PROJECT-III	0	0	18	60	40	100	9
TOTAL CREDITS									**18**
IA- INTERNAL ASSESSMENT, ESE-END SEMESTER EXAMINATION, L-LECTURE, T-TUTORIAL, P-PRACTICAL									



LIST OF ELECTIVE – VI

1.	IT208TPE61	MACHINE LEARNING
2.	IT208TPE62	OBJECT ORIENTED ANALYSIS & DESIGN
3.	IT208TPE63	SOFTWARE TESTING & QUALITY MANAGEMENT
4.	IT208TPE64	HUMAN COMPUTER INTERFACE

LIST OF OPEN ELECTIVE –III

1.	IT208TOE31	WIRELESS SENSOR NETWORK
2.	IT208TOE32	DIGITAL SIGNAL PROCESSING
3.	IT208TOE33	INFORMATION TECHNOLOGY FOR AUTOMATION
4.	IT208TOE34	REAL TIME SYSTEM

LIST OF OPEN ELECTIVE-IV

1.	IT208TOE01	SOFT COMPUTING
2.	CS208TOE01	ARTIFICIAL INTELIGENCE
3.	EC208TOE03	INTRODUCTION TO IoT
4.	CE208TOE03	INFRASTRUCTURE PLANNING AND MANAGEMENT
5.	ME208TOE03	SUPPLY CHAIN MANAGEMENT
6.	CH208TOE03	PLANT ENGINEERING ECONOMICS AND MANAGEMENT
7.	IP208TOE41	ADVANCED MANUFACTURING PROCESS
8.	IP208TOE51	COMPUTER AIDED PROCESS PLANNING (CAPP)

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT208TPE61	3	0	0	3 HOURS	30	70	3

MACHINE LEARNING

Course Objectives:

1. Understand the concept of learning and candidate elimination algorithms.
2. Understand the concept of perception and explore on Genetic algorithms
3. Explore on computational learning methods
4. Explore on instance based and case based learning.
5. Explore inductive learning and Reinforcement Learning methods

UNIT I

INTRODUCTION Learning Problems – Perspectives and Issues – Concept Learning – Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search.

UNIT II

NEURAL NETWORKS AND GENETIC ALGORITHMS Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evaluation and Learning.

UNIT III

BAYESIAN AND COMPUTATIONAL LEARNING - Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network – EM Algorithm – Probability Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model.

UNIT IV

INSTANT BASED LEARNING - 9 K- Nearest Neighbour Learning – Locally weighted Regression – Radial Bases Functions – Case Based Learning.

UNIT V

ADVANCED LEARNING - Learning Sets of Rules – Sequential Covering Algorithm – Learning Rule Set – First Order Rules – Sets of First Order Rules – Induction on Inverted Deduction – Inverting Resolution – Analytical Learning – Perfect Domain Theories –

Explanation Base Learning – FOCL Algorithm – Reinforcement Learning – Task – Q-Learning – Temporal Difference Learning.

TEXT BOOKS:

1. Tom M. Mitchell, —Machine Learning, McGraw-Hill Education (India) Private Limited, 2013.

REFERENCES:

1. Ethem Alpaydin, —Introduction to Machine Learning (Adaptive Computation and Machine Learning), The MIT Press 2004.
2. Stephen Marsland, —Machine Learning: An Algorithmic Perspective, CRC Press, 2009.

Course Outcomes:

1. Demonstrate fundamental understanding of Machine learning
2. Understand the concept of perception and explore on Genetic algorithms
3. Understand and use Naïve Bayes Classifier and Bayesian Belief Network
4. Explore on instance based and case based learning.
5. Explore inductive learning and Reinforcement Learning methods.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT208TPE62	3	0	0	3 HOURS	30	70	3

OBJECT ORIENTED ANALYSIS & DESIGN

Course Objectives

- To have clear idea about traditional and modern SW development Methodologies.
- Discuss the overview of Object oriented methodologies
- To introduce the concept of Object-oriented system development lifecycle
- To identify objects, relationships, services and attributes.
- To develop robust object-based models for Systems

UNIT I - OBJECT MODELING:

Objects and classes, links and association, generalization and inheritance, aggregation, abstract class, candidates keys, constraints.

UNIT II - DYNAMIC MODELING:

Events and states, operations, nested state diagrams and concurrency, advanceddynamic modeling concept, a sample dynamic model.

UNIT III - FUNCTIONAL MODELING:

Data flow diagram, specifying operations, constraints, a sample functional model. OMT (Object modeling techniques) methodologies, SA/SD, JSD

UNIT IV – INTRODUCTION TO UML

Importance of modeling, principles of modeling, object oriented modeling, conceptual model of the UML, Architecture, Software Development Life Cycle.

UNIT V – ARCHITECTURAL MODELING

Architectural Modeling: Component, Deployment, Component diagrams and Deployment diagrams.

Text Books

1. James Rumbaugh et al " object Oriented Modeling and design" PHI
2. Herbert Schieldt " The complete Reference : Java" TMH
3. E. Balagurusamy " Programming in Java", TMH

Reference Books :

1. Booch Grady, " Object Oriented Analysis & design with application 3/e", Person
2. Bjarne Stroustrup " C++ Programming Language" Addison Wesley
3. E Balagurusami " Object Oriented Programming with C++, TMH

Course Outcomes

On completion of this course the students will be able to

- Explain and apply basic OOPS concepts.
- Explain and implement the SW development Methodologies.
- Ability to analyze and model software specifications.
- Ability to abstract object-based views for software systems.
- Ability to deliver robust software components.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT208TPE63	3	0	0	3 HOURS	30	70	3

SOFTWARE TESTING AND QUALITY MANAGEMENT

Course Objectives

- Study fundamental concepts of software testing and its application in various scenarios.
- Understand white box, block box and other testing's.
- Understand the importance of software quality and assurance software systems development
- Understand the quality management, assurance, and quality standard to software.

UNIT I

Software Quality: Ethical Basis for software Quality , Total quality Management Principles, Software Processes and Methodologies , Quality Standards , Practices & conventions, Top Down and Bottom Up Approach.

UNIT II

Software managementReviews and Audits, Enterprise Resource Planning Software, Measurement Theory , Software Quality Metrics, designing Software Measurement Programs , Organizational Learning.

UNIT III

Improving Quality with methodologies: Structured information Engineering , Object-Oriented Software , Reverse Engineering , Measuring Customer Satisfaction Defect Prevention , Reliability Models , Reliability Growth Models.

UNIT IV

Software Quality Engineering: Defining Quality Requirements Management, Complexity Metrics and Models, Management issues for software Quality, Project Tracking and Oversight, Use of CASE tool Technology, Role of Groupware, data Quality Control.

UNIT V

Project Configuration management: Configuration Management Concepts, Configuration Management Process, Document Control, Configuration Management plan of the WAR Project.

List of Books:

1. Stephan Kan, Metrics and Models in Software quality, Addison Wesley.
2. Mark Paulik, The capability Maturity Model-guidelines for improving the software Process, Addison Wesley.
3. Michael, Deutsch, Willis, Ronald r-Software Quality Engineering- A Total Technical and Management approach, Prentice Hall.
4. Ginac, Frank P, Customer Oriented Software Quality Insurance, Prentice Hall.
5. Wilson, Rodney C, Software RX secrets of Engineering Quality Software, Prentice Hall.
6. Pressman, Software Engineering-A practitioner's approach
7. Pankaj Jalote, CMM Project

Course Outcomes

After completion of this course, student will be able to

- Understand importance of testing techniques in software quality management and assurance.
- Identify various types of software risks and its impact on different software application.
- Create test case scenarios for different application software using various testing techniques.
- Apply different testing methodologies used in industries for software testing.
- Describe fundamental concepts of software quality assurance.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT208TPE64	3	0	0	3 HOURS	30	70	3

HUMAN COMPUTER INTERFACE

COURSE OBJECTIVES:

- To learn the foundations of Human Computer Interaction.
- To become familiar with the design technologies for individuals and persons with disabilities.
- To be aware of mobile HCI.
- To learn the guidelines for user interface.

UNIT1: Introduction of the human, the computer, the interaction, Paradigms, Usability of Interactive Systems, Guidelines, Principles, and Theories

UNIT2: Design Process- Interaction design basics, HCI in the software process, Design rules, Implementation support, Evaluation techniques, Universal design, User support

UNIT3: Models and Theories0 Cognitive models, Socio-organizational issues and stakeholder requirements, Communication and collaboration models,Task analysis, Dialogue notations and design, Models of the system, Modelling rich interaction

UNIT4: Interaction Styles- Direct Manipulation and Virtual Environments, Menu Selection, Form Filling and Dialog Boxes, Command and Natural Languages, Interaction Devices, Collaboration and Social Media Participation

UNIT5: Design Issues- Quality of Service, Balancing Function and Fashion, User Documentation and Online Help, Information Search, Information Visualization

Text Books:

1. "Human Computer Interaction" by Alan Dix, Janet Finlay , ISBN :9788131717035, Pearson Education (2004)
2. "Designing the User Interface - Strategies for Effective Human Computer Interaction", by Ben Shneiderman ISBN : 9788131732557, Pearson Education (2010).

Reference Books:

1. Usability Engineering: Scenario-Based Development of Human-Computer Interaction, by Rosson, M. and Carroll, J. (2002).
2. The Essentials of Interaction Design, by Cooper, et al. , Wiley Publishing(2007).
3. Usability Engineering, by Nielsen, J. Morgan Kaufmann, San Francisco, 1993. ISBN 0-12-518406-9.
4. The Resonant Interface: HCI Foundations for Interaction Design , by Heim, S. , Addison-Wesley. (2007).

5. Usability engineering: scenario-based development of human-computer interaction, By Rosson, M.B & Carroll, J.M. , Morgan Kaufman.(2002)

COURSE OUTCOMES:

Students will try to learn:

- Design effective dialog for HCI
- Design effective HCI for individuals and persons with disabilities.
- Assess the importance of user feedback.
- Explain the HCI implications for designing multimedia/ ecommerce/ e-learning Web sites.
- Develop meaningful user interface.

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT208TOE31	3	0	0	3 hours	30	70	3

WIRELESS SENSOR NETWORK

COURSE OBJECTIVES:

- To learn about Wireless Networks, architectures and technologies.
- To understand Wireless sensor network platforms: Hardware and Software.
- To learn WSN layers (MAC, Link, Routing).
- To understand & implement Energy management.
- To perform Sensor data acquisition, processing and handling.
- To simulate Signal processing, target localization and tracking, self-organization.
- Case Study of Applications like (health, environmental monitoring, smart home).

UNIT I – FUNDAMENTALS OF SENSOR NETWORKS

Introduction to computer and wireless sensor networks, Motivation for a network of Wireless Sensor nodes- Sensing and sensors-challenges and constraints - node architecture-sensing subsystem, processor subsystem-communication interfaces- prototypes, Application of Wireless sensors

UNIT II- COMMUNICATION CHARACTERISTICS AND DEPLOYMENT MECHANISMS

Wireless Transmission Technology and systems-Radio Technology Primer-Available Wireless Technologies - Hardware- Telosb, Micaz motes- Time Synchronization- Clock and the Synchronization Problem - Basics of time synchronization-Time synchronization protocols - Localization- Ranging Techniques- Range based Localization-Range Free Localization- Event driven Localization

UNIT III- MAC LAYER

Overview-Wireless Mac Protocols-Characteristics of MAC protocols in Sensor networks – Contention free MAC Protocols- characteristics- Traffic Adaptive Medium Access-Y-MAC, Low energy Adaptive Clustering - Contention based MAC Protocols- Power Aware Multi-Access with signalling

UNIT IV- ROUTING IN WIRELESS SENSOR NETWORKS

Design Issues in WSN routing- Data Dissemination and Gathering-Routing Challenges in WSN - Flooding-Flat Based Routing – SAR, Directed Diffusion, Hierarchical Routing- LEACH, PEGASIS - Query Based Routing- Negotiation Based Routing- Geographical Based Routing- Transport layer- Transport protocol Design issues- Performance of Transport Control Protocols.

UNIT V - MIDDLEWARE AND SECURITY ISSUES

WSN middleware principles-Middleware architecture-Existing middleware - operating systems for wireless sensor networks-performance and traffic management - Fundamentals of network security-challenges and attacks - Protocols and mechanisms for security.

REFERENCES

1. Waltenegus Dargie, Christian Poellabauer , "Fundamentals of Wireless Sensor Networks, Theory and Practice", Wiley Series on wireless Communication and Mobile Computing, 2011
2. Kazem Sohraby, Daniel manoli , "Wireless Sensor networks- Technology, Protocols and Applications", Wiley Inter Science Publications 2010.
3. Bhaskar Krishnamachari, "Networking Wireless Sensors", Cambridge University Press, 2005
4. C.S Raghavendra, Krishna M.Sivalingam, Taiebznati , "Wireless Sensor Networks", Springer Science 2004.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to-

- Describe the overview of wireless sensor networks and enabling technologies for wireless sensor networks
- Apply the design principles of WSN architectures and operating systems for simulating environment situations.
- Apply various concepts for assignment of MAC addresses.
- Select the appropriate infrastructure, topology, joint routing and information aggregation for wireless sensor networks.
- Analyse the sensor network platform and tools state-centric programming.

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT208TOE32	3	0	0	3 hours	30	70	3

DIGITAL SIGNAL PROCESSING

Course Objectives:

Objective of the course are to make Students will able:

1. To summarize and analyze the concepts of signals, systems in time and frequency domain with corresponding transformations
2. To introduce the diverse structures for realizing digital filters.
3. To develop the understanding the concept of design and implementation of digital filters.
4. To develop basic idea of multi rate filter bank design.
5. To utilize the appropriate tools for design and realization of signal processing modules.

UNIT I

Analysis of Discrete Time Signals and Systems: Discrete Fourier analysis, Classification, Discrete Time Fourier Transform (DTFT) & its properties, Inverse DTFT. Discrete Fourier Transform (DFT) & its Properties, Inverse DFT. Fast Fourier Transform, Properties, Types of FFT, N-point Radix-2 FFT, Inverse FFT. Discrete Linear Convolution, Circular Convolution, Fast Convolution, Frequency Response of LTI system using Discrete Fourier Analysis. Discrete Cosine Transform.

UNIT II

Implementation of Discrete-time Systems: Structures for the Realization of discrete-time systems, Structures for FIR systems: Direct, Cascade, Frequency Sampling & Lattice structures. Structures for IIR systems: Direct, Signal Flow Graphs & Transposed, Cascade, Parallel, Lattice & Lattice-Ladder structures. State space system analysis and structures.

UNIT III

FIR Filter Design: Symmetric and Anti-symmetric FIR filters, FIR Filter design by window method (Rectangular, Bartlett, Hamming, Hanning, Blackman and Kaiser window), Frequency Sampling method, Optimum approximation of FIR filters, Design of FIR differentiators, Design of Hilbert transformers.

UNIT IV

IIR Filter Design: Design of Discrete-time IIR filters from Continuous-time Filters: Filter design by Impulse invariant and bilinear transformation method: Butterworth, Chebyshev& Elliptic approximation Filter, Frequency transformation.

UNIT V

Multirate Digital Signal Processing: Introduction, Decimation, Interpolation, Sampling rate conversion by rational factor, Filter design and implementation for sampling rate conversion: Direct form FIR digital filter structure, Polyphase filter structure, Time varying digital filter structure, Sampling rate conversion by an arbitrary factor.

Name of Text Books:

1.Discrete Time Signal Processing by A.V. Oppenheim, R. W. Schafer, & John R. Buck, , 2nd Edition, Prentice Hall, 1999.

2.Digital Signal Processing: Principles, Algorithms and Applications by John G. Proakis& D.G. Manolakis, Prentice Hall, 1997.
3.Digital Signal Processing by S. K. Mitra, 3rd edition, McGraw-Hill, 2007.

Name of Reference Books:

1. Signals and Systems by A. V. Oppenheim, A. S. Willsky& S. H. NAWAB, 2nd edition, Prentice Hall, 1996.
2. Digital Signal Processing by S. Salivahanan, A. Vallavaraj, C. Gnanapriya, Tata McGraw-Hill, 2000.
3. Digital Signal Processing by A. Anand Kumar, PHI Learning Pvt. Ltd, 2012.

Course Outcomes:

At the end of this course, students will demonstrate the ability to

1. Represent signals mathematically in discrete-time, and in the frequency domain.
2. Realize digital filters by use of systematic structure to simplify the complexity of the system.
3. Design and develop digital filters for various applications.
4. Analyze different signals using multi-rate systems.
5. Apply digital signal processing modules for the analysis of real-life signals.

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT208TOE33	3	0	0	3 hours	30	70	3

INFORMATION TECHNOLOGY FOR AUTOMATION

COURSE OBJECTIVES:

- Introduction to Information Technology.
- Introduce the student to advanced networking concepts.
- To introduce the process automation, design of a distributed architecture for the information processing industrial automation.
- Design and development of a centralized and distributed architecture in different administrative sectors of an organization.
- To understand challenges and applications and tools.

UNIT I

Basic concepts: Information science technology and automation principles

UNIT II

Computerization and networking: Basic computer communication and interconnection mechanism. Network topology. Networking protocols.

UNIT III

Industrial automation: Flexible manufacturing systems. .Process automation, Design of a distributed architecture for the information processing in different units, plants and factories in an industrial set up

UNIT IV

Office automation: Design and development of a centralized and distributed architecture in different administrative sectors of an organization (University, enterprises and Air traffic system)

UNIT V

Hospital information System: design of different inters connected modules for registration, medical consultancy, ward management, patient care and staff management in a hospital. Tele medicine: web based system for distant medical care.

List of Books:

1. Modern Industrial Automation Software design: Principles and Real-World Applications- By Ling Feng Wong, Kay Chen Tan Publisher John Wiley and sons.
2. Software for automation: Architecture, Integration, and Security, By Jonas Berge, ISA

COURSE OUTCOMES:

Students will try to learn:

- Students will familiar with the concepts of Information Technology.
- Students will familiar with networking concept.
- Students will ready to Analyze design of a distributed architecture for the information processing industrial automation.
- Students will be capable to design applications in different domain and be able to analyze their performance.
- Capable to implement basic applications on embedded platform.

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT208TOE34	3	0	0	3 hours	30	70	3

REAL TIME SYSTEMS

COURSE OBJECTIVES:

- To apply the terminology, and list applications, of real time systems.
- Be able to explain the purpose and structure of a real time operating system.
- To illustration of key OS analysis and optimization
- To understand purpose, structure and functions of operating systems
- General understanding of structure of modern computers.

Unit-I

Basic Real- Time Concepts, Computer Hardware, Language Issues: Basic component Architecture, terminology, Real Time Design Issues, CPU, Memories, Input- Output, Other Devices Language Features, Survey of Commonly Used Programming Languages, Code Generation

Unit-II

Software life cycle, Real Time Specification and Design Techniques, Real Time Kernels: Phases of software life cycle, Non-temporal Transition in the software life cycle, Spiral model, Natural languages, Mathematical Specification, Flow Charts, Structure Charts, Pseudocode and programmable Design Languages, Finite state Automata, Data Flow Diagrams, Petrinets, Statecharts, Polled Loop Systems, phase/State Driven Code, Coroutines, Interrupt Driven System, Foreground/Background Systems Full Featured Real Time OS

Unit-III

Intertask Communication and Synchronization, Real Time memory Management, System Performance Analysis and Optimization: Buffering Data, Mail boxes Critical Region, Semaphores, Event Flags and Signals, Deadlock, Process Stack Management, Dynamic Allocation, Static Schemes, Response Time Calculation, Interuupt Latency, Time Loading and its Measurement, Scheduling NP Complete, Relocating Response Times And time Loading, Analysis of Memory Requirements, Reducing Memory Loading, I/O Performance.

Unit-IV

Queuing Models, Reliability, Testing, And Fault Tolerance, Multiprocessing Systems: Basic Buffer size Calculation, Classical Queuing Theory, Little's Law, Faults, Failures ,bugs AND effects. Reliability, Testing, Fault Tolerence, Classification of Architectures, Distributed Systems, Non Von Neumann Architectures.

Unit-V

Hardware/ Software Integration, Real Time Applications: Goals of Real Time System Integration, Tools, Methodology, The Software Hesisenberg Uncertainity Principle, Real Time Systems As Complex System, First Real Time Application Real Time Databases, Real time Image Processing Real Time UNIX, building Real Time Applications with Real Time Programming Languages.

Text Books :

1. Real Time System, Jane W.S.Liu 2. Real Time Systems Design and Analysis by Phillip A. Laplante,PHI

Reference Books:

1 Hard Real Time Computing Systems Predictable Scheduling Algorithms and applications by Giorgio C. Buttazzo

2 Real Time Design Patterns: Robust Scalable Architecture for Real Time System by BrucePowel Douglass.

3. Real Time System: Scheduling, Analysis and Verification by Albert M.K. Change.

COURSE OUTCOMES:

Students will try to learn:

- Describe the general architecture of computers and operating system.
- Understand and analyze theory and implementation of: processes, resource control (concurrency etc.), physical and virtual memory, scheduling, I/O and files.
- Describe the foundation for programming languages developed for real time programming.
- Use real time system programming languages and real time operating systems for real time applications.
- Analyze real time systems with regard to keeping time and resource restrictions.

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT208TOE01	3	0	0	3 hours	30	70	3

SOFT COMPUTING

COURSE OBJECTIVE:

1. To familiarize with soft computing concepts.
2. To introduce the fuzzy logic concepts, fuzzy principles and relations.
3. To Basics of ANN and Learning Algorithms.
4. ANN as function approximation.
5. Genetic Algorithm and its applications to soft computing.
6. Hybrid system usage, application and optimization.

UNIT No	Syllabus Content	No of Hours
1	**Introduction to ANS Technology**: Elementary Neurophysiology, models of a neuron, neural networks viewed as directed graphs, feedback from neurons to ANS, artificial intelligence and neural networks.	8
2	**Learning & Training:** Hebbian memory based, competitive, error-correction. **Learning Credit Assignment Problem:** supervised and unsupervised learning, memory models, recall and adaptation, network architecture, single layered feed forward networks, multilayered feed forward networks, recurrent networks, topologies.	7
3	Activation and Synaptic dynamics, stability and convergence. **A suevey of neutral network models:** Single layered perception, least mean square algorithm, multi-layered perceptrons, back propagation algorithm XOR- problem, the generalized delta rule, BPN applications, Adalines and Madalines- Algorithm and applications.	7
4	**Applications:** The traveling salesperson problem, talking network and phonetic typewriter: Speech generation and Speech recognition, character recognition and retrieval, handwritten digital recognition.	7
5	**Adaptive fuzzy systems:** Introduction to Fuzzy sets, and operations, Examples of Fuzzy logic, Fuzzy Associative memories, fuzziness in neural networks, comparison of fuzzy and neural Truck-Backer upper control systems.	7

Text Books:

1. Artificial Neural Networks by B. Yagna Narayan
2. Neural Networks by James A. Freeman and David M.StrapetusReference

Books:

1. Neural Networks- A comprehensive foundation by Simon Hay kin (LPE)

COURSE OUTCOMES: The students would have learnt

CO1: List the facts and outline the different process carried out in fuzzy logic, ANN and Genetic Algorithms.
CO2: Explain the concepts and meta-cognitive of soft computing.
CO3: Apply Soft computing techniques the solve character recognition, pattern classification, regression and similar problems.
CO4: Outline facts to identify process/procedures to handle real world problems using soft computing.
CO5: Evaluate various techniques of soft computing to defend the best working solutions.
CO6: Design hybrid system to revise the principles of soft computing in various applications.

SCHEME FOR EXAMINATION
B.TECH (FOUR YEAR) DEGREE COURSE
THIRD YEAR, INFORMATION TECHNOLOGY
SEMESTER VII
EFFECTIVE FROM SESSION 2023-24

SL. NO.	SUBJECT CODE	SUBJECTS	PERIODS/ WEEK			EVALUATION SCHEME			CREDITS
			L	T	P	IA	ESE	TOTAL	
THEORY									
1.	IT207TPC01	CYBER SECURITY	3	0	0	30	70	100	3
2.	IT207TPE4X	ELECTIVE – IV	3	0	0	30	70	100	3
3.	IT207TPE5X	ELECTIVE – V	3	0	0	30	70	100	3
4.	IT207TOE2X	OPEN ELECTIVE – II	3	0	0	30	70	100	3
PRACTICAL									
1.	IT207PPC21	PROJECT-II	0	0	12	60	40	100	6
TOTAL CREDITS									**18**

IA- INTERNAL ASSESSMENT, ESE-END SEMESTER EXAMINATION, L-LECTURE, T-TUTORIAL, P-PRACTICAL

LIST OF ELECTIVE-IV

1.	IT207TPE41	ADVANCE DATABASE DESIGN
2.	IT207TPE42	DATA MINING
3.	IT207TPE43	GAME THEORY
4.	IT207TPE44	GLOBAL STRATEGY AND TECHNOLOGY

LIST OF ELECTIVE-V

1.	IT207TPE51	INTERNET OF THINGS
2.	IT207TPE52	ADVANCE OPERATING SYSTEM
3.	IT207TPE53	COMPUTER VISION
4.	IT207TPE54	OPEN SOURCE SYSTEM & PROGRAMMING

LIST OF OPEN ELECTIVE-II

1.	IT207TOE01	MACHINE LEARNING
2.	CS207TOE01	GIS & REMOTE SENSING
3.	EC207TOE02	CMOS DIGITAL VLSI DESIGN
4.	CE207TOE02A	GREEN BUILDING AND SUSTAINABLE MATERIALS
5.	ME207TOE02	PRINCIPAL OF MANAGEMENT
6.	CH207TOE02	WASTE TO ENERGY
7.	IP207TOE21	MANUFACTURING PROCESS-I
8.	IP207TOE31	PRODUCTION PLANNING AND CONTROL

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT207TPC01	3	0	0	3 HOURS	30	70	3

CYBER SECURITY

Course Objectives:

1. Identify the technical foundations of Cyber security.
2. Apply principles of cryptography for design of block ciphers.
3. Analyze the principles of public – Key Cryptosystemsand applications.
4. Explore the importance of Cyber Security and Secure financial transactions.
5. Explore the concepts of Firewall, and intrusion detection.

UNIT I

A Model for Network Security Services, Mechanisms, and Attacks, Viruses & Worms, The OSI Security Architecture, symmetric cipher model, substitution techniques Transposition techniques, Steganography.

UNIT II

Block ciphers and the data encryption standard , simplified DES , Block cipher principles , The data Encryption Standard , Differential and Linear Cryptanalysis, Block Cipher Design principles , The AES cipher , Triple DES , blowfish , RC5, Rc4 Stream Cipher

UNIT III

principles of public –Key Cryptosystems , public –Key cryptosystems , Requirements for public –Key Cryptosystems, The RSA Algorithm , Key management , key Distribution ,Hash Functions SHA, MD5. Diffie-Hellman Key Exchange Algorithm

UNIT IV

WEB & IP Security: Web Security Threats, SSL Architecture, SSL Record Protocol, Alert Protocol, Handshake Protocol, Transport Layer Security, Secure Electronic Transaction, IP Security

UNIT V

Intruders: Intrusion Techniques, Firewall Design principles, Block Chain Technology, BitCoin, Types of Firewalls.

List of Books:

1. Cryptography and Network Security, Principles and Practice Third edition , William Stallings .
2. Atul Kahate, " Cryptography and Network Security," TMH
3. Introduction to network security, Krawetz, Cengage

Course Outcomes :

1. Understand the fundamental network security mechanism and threats.
2. Understand the concept of Block cipher and cryptanalyis .
3. Learn the Concept of Public key cryptography systems.
4. Understand the concept of Web security and secure electronic transaction.
5. Understand the Firewall design principles and Block-chain technology .

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT207TPE41	3	0	0	3 HOURS	30	70	3

ADVANCE DATABASE DESIGN

Course Objectives:

1. To provide students with a comprehensive understanding of the fundamental concepts of database systems, including different architectures, design principles, and data models.
2. To develop students' skills in designing and managing parallel and distributed databases, using techniques such as I/O parallelism and query parallelism.
3. To introduce students to object-oriented and object-relational databases and their use in designing efficient database systems, including complex objects, inheritance, and class hierarchies.
4. To familiarize students with intelligent databases, including active databases, temporal databases, deductive databases, and spatial databases, and their applications in supporting complex applications.
5. To expose students to emerging technologies in the field of database systems, including XML databases, web databases, cloud-based databases, and big data storage and analysis.

UNIT I PARALLEL AND DISTRIBUTED DATABASES

Database System Architectures: Centralized and Client-Server Architectures – Server System Architectures – Parallel Systems- Distributed Systems – Parallel Databases: I/O Parallelism – Inter and Intra Query Parallelism

UNIT II OBJECT AND OBJECT RELATIONAL DATABASES

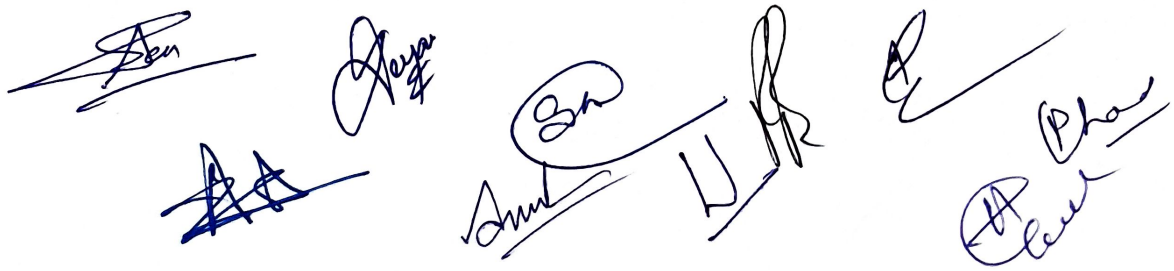
Concepts for Object Databases: Object Identity – Object structure – Type Constructors – Encapsulation of Operations – Methods – Persistence – Type and Class Hierarchies – Inheritance – Complex Objects – Object Database Standards, Languages and Design: ODMG Model – ODL – OQL – Object Relational and Extended – Relational Systems: Object Relational features in SQL/Oracle – Case Studies.

UNIT III INTELLIGENT DATABASES

Active Databases: Syntax and Semantics (Starburst, Oracle, DB2)- Taxonomy- Applications- Design Principles for Active Rules- Temporal Databases: Overview of Temporal Databases- TSQL2- Deductive Databases: Logic of Query Languages – Datalog- Recursive Rules- Syntax and Semantics of Datalog Languages- Implementation of Rules and Recursion- Recursive Queries in SQL- Spatial Databases- Spatial Data Types- Spatial Relationships- Spatial Data Structures-Spatial Access Methods- Spatial DB Implementation.

UNIT IV ADVANCED DATA MODELS

Mobile Databases: Location and Handoff Management - Effect of Mobility on Data Management - Location Dependent Data Distribution - Mobile Transaction Models - Concurrency Control - Transaction Commit Protocols- Multimedia Databases- Information Retrieval- Data Warehousing- Data Mining- Text Mining.



UNIT V EMERGING TECHNOLOGIES

XML Databases: XML-Related Technologies-XML Schema- XML Query Languages- Storing XML in Databases-XML and SQL- Native XML Databases- Web Databases- Geographic Information Systems- Biological Data Management- Cloud Based Databases: Data Storage Systems on the Cloud- Cloud Storage Architectures-Cloud Data Models- Query Languages- Introduction to Big Data-Storage-Analysis.

List of Books:

1. R. Elmasri, S.B. Navathe, "Fundamentals of Database Systems", Fifth Edition, Pearson Education/Addison Wesley, 2007.
2. Thomas Cannolly and Carolyn Begg, "Database Systems, A Practical Approach to Design, Implementation and Management", Third Edition, Pearson Education, 2007.
3. Henry F Korth, Abraham Silberschatz, S. Sudharshan, "Database System Concepts", Fifth Edition, McGraw Hill, 2006.
4. C.J.Date, A.Kannan and S.Swamynathan, "An Introduction to Database Systems", Eighth Edition, Pearson Education, 2006.
5. Raghu Ramakrishnan, Johannes Gehrke, "Database Management Systems", McGraw Hill, Third Edition 2004

Course Outcomes:

1. Students will be able to explain the different database system architectures, their advantages and disadvantages, and their use in different applications.
2. Students will be able to design and manage parallel and distributed databases using I/O parallelism and query parallelism techniques, and evaluate their performance.
3. Students will be able to design object-oriented and object-relational databases, using different standards, languages, and design principles, and compare them with traditional relational databases.
4. Students will be able to design and manage intelligent databases, including active databases, temporal databases, deductive databases, and spatial databases, to support complex applications.
5. Students will be able to evaluate emerging technologies in the field of database systems, including XML databases, web databases, cloud-based databases, and big data storage and analysis, and select appropriate technologies for different applications.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT207TPE42	3	0	0	3 HOURS	30	70	3

DATA MINING

Course Objectives:

1. To introduce the concepts and principles of data warehousing, including multidimensional data models, OLAP operations, and data warehousing architecture.
2. To familiarize students with data mining and its related areas, including KDD, DBMS, and DM techniques, and the issues and challenges involved in data mining.
3. To enable students to understand association rules and the various methods to discover them, including the apriori algorithm and hierarchical association rules.
4. To introduce clustering techniques and their applications, including partitioning algorithms, hierarchical clustering, and categorical clustering algorithms.
5. To equip students with the knowledge and skills to design and develop decision trees and understand their construction principles, including the CART, ID3, and C4.5 algorithms.

UNIT I

Data ware Housing: What is a data warehouse?, definition, Multidimensional data model, OLAP operation, warehouse schema, data ware housing architecture, warehouse serve, metadata, OLAP, engine, Data warehousing backend process, other features.

Data Mining: what is data mining? KDD Vs. data mining, DBMS Vs DM other related areas, DM techniques, other mining problem, issues & challenges in DM, Dm application areas.

UNIT II

Association rules: Methods to discover association rules, apriori algorithm ,partition algorithm, pincer –search algorithm, Dynamic Item set counting algorithm, FP-tree Growth algorithm, Incremental algorithm, Border algorithm, hierarchical association rule, generalized association rules, Association rules with item constraints.

UNIT III

Clustering Techniques: Introduction, clustering paradigms, partitioning algorithms, k-Medoid Algorithm, CLARA, CLARANS, Hierarchical clustering, DBSCAN, BIRCH, CURE, Categorical clustering algorithms , STIRR, ROCK , CACTUS.

UNIT IV

Decision trees: Tree construction principal, Best spilt splitting indices, splitting criteria, Decision tree construction algorithm, CART, ID3, C4.5, CHAID, Decision tree construction with pre-sorting, rainforest, approximate method, CLOUDS, BOAT, pruning technique, integration of pruning & construction, Hierarchcal associtation rule.

UNIT V

Web Mining: Web mining ,web content mining ,web structure mining ,web usage mining ,text mining , unstructured text , Episode rule discovery for texts , Hierarchy of categories , text clustering , Paging algorithm.

List of Books:

1. Data Mining techniques – Arun K Pujari Universities press
2. Data Mining concepts & techniques – Jiawei han, Micheline kamber Morgan Kaufmann publisher Elsevier India –2001

3. Data Mining methods for knowledge Discovery –Cios, Pedrycz, swiniarski Kluwer academic publishers London –1998

Course Outcome:

1. Students will be able to understand the fundamental concepts and principles of data warehousing and its architecture, including OLAP and metadata.
2. Students will be able to understand data mining and its related areas, including KDD and DBMS, and apply DM techniques to real-world problems.
3. Students will be able to discover association rules and understand the methods used to discover them, including the apriori algorithm and hierarchical association rules.
4. Students will be able to apply clustering techniques to group similar data and understand partitioning algorithms, hierarchical clustering, and categorical clustering algorithms.
5. Students will be able to design and develop decision trees and understand their construction principles, including the CART, ID3, and C4.5 algorithms, and apply them to real-world problems.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT207TPE43	3	0	0	3 HOURS	30	70	3

GAME THEORY

Course objectives

1.To introduce Game theory in application and improving analytical and decision-making skills.
2.To learn about Game theory and different types of game
3.To learn the strategic way of thinking about behavior of repeated games.
4.To learn their strategies and decisions in an economy, business and life.
5.To learn bargaining Mechanism

Unit 1

Introduction to game theory, routing games and mechanism design, Strategies, cost and payoffs; prisoner's dilemma, nash equilibrium, Strategic games; Best response; dominant Strategies; pure Strategy v/s mixed Strategy.

Unit 2

Repeated games; Bayesian games Routing games; Selfish routing; Quantifying inefficiency of equilibria; Price of Anarchy

Unit 3

Social optimum; price of stability; Scheduling games.
Population games; Evolutionary game theory;

Unit 4

Evolutionary stable Strategy; Replicator dynamics. Non cooperative games , cooperative game theory

Unit 5

Nash bargaining Mechanism design,Algorithmic mechanism design, distributed algorithmic mechanism design

BOOK:

1.Game Theory,by D. Fudenberg and j.Tirole, MIT press 1991.
2.Algorithmic Game Theory, edited by N.nisan, T. Roughgarden, E. Tardos, and v.v. vazirani,Cambridge University press 2007.

Other References:

1.Auction Thoery, by v. Krishna, academic press,2002.
2.A course in Game theory, by M.J . Osborne,A.Rubinstein,MIT press,1994.
3.Dynamic Non cooperative Game Theory, byT Basar and G.J. Olsder,1999
4. Evolutionary Game Theory, Jorgen W.Weibull,The MIT presss 1997.

Course Outcomes

On successful completion of this course, students will be able to:
1. Identify strategic situations and represent them as games
2. Solve simple games using various techniques
3. Analyze economic situations using game theoretic techniques
4. Recommend and prescribe which strategies to implement
5. understand the concept of bargaining Mechanism

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT207TPE44	3	0	0	3 HOURS	30	70	3

GLOBAL STRATEGY AND TECHNOLOGY

Course objective

1. To understand global strategy and its importance
2. To understand Distance and Global strategy, Home-Country Effects
3. To understand International Corporate Governance
4. To understand Technology: Productivity and Diffusion
5. To understand Investing in R&D Capabilities

UNIT 1: Introduction to Global Strategy- What the motivations to expand abroad are and how firms can manage conflicting demands in terms of global integration, local responsiveness and worldwide learning. How Global are we? How global most MNCs are? The End of Corporate Capitalism beyond off shoring Distance Still Matters Going International.

UNIT 2: Location and Global Strategy: Home-Country Effects: Shifting global leadership in the watch industry Success of Swatch as a company in this industry Potential threat on the horizon that could once again cause the decline of the Swiss watch industry. Distance and Global strategy: Host Country Choices: The Globalization of CEMEX The benefits that CEMEX has derived from expanding across borders Challenges that CEMEX is likely to confront in the future How far can Cemex's competitive advantage travel. Industry Characteristics and Global Strategy: Host - country choices: Characteristics of the global large appliances industry Design of an effective competitive strategy Haier's current global strategy Good rationale for Haier to make global expansion its top strategic priority.

UNIT 3: International Corporate Governance: International Corporate Governance with Chinese Characteristics Corporate governance matters in Chin's capital market Corporate governance model in China differ from international standards Special problems associated with Petro China's corporate governance model Conditions required for further reforms in Petro Chin's corporate governance system. Cross-cultural Negotiation: Learn from the MOUSE negotiation Issues/factors affect positively or negatively & the negotiation outcome Issues crucial in aligning different parties interests. Negotiators attitudes and culture in reaching the agreement The role of information acquisition in reaching an agreement in this negotiation. Foreign Market Entry Strategies: Issues around geographic market diversification and different strategies of internationalization Different entry modes into a foreign market Stages of internationalization International operations Tensions of a family owned enterprise going international.

UNIT 4: Technology: Productivity and Diffusion: Productivity Impact and Managing Diffusion Science, Technology and Productivity. Technology, Markets and Competition Incumbents and Entrants Commercialization Intellectual Property and Complementary Assets.

UNIT 5: Investing in R&D Capabilities: Incentives to Innovate Investing in basic/applied research; Real options and other approaches. Applying the Concepts and Frameworks: R&D Investment Decisions: Applying the NPV, Real Options and Scenario-Planning Frameworks.

Text/Reference Books:

1. Sumantra Ghoshal, "Global Strategy: an organizing framework." Strategic Management Journal (1987), pp. 425-440.

Course outcomes

1. Able to evaluate How Global are we
2. How to implement Strategy for Globalization and their Challenges
3. Techniques for Cross-cultural Negotiation
4. Managing Diffusion Science
5. R&D Investment Decisions

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT207TPE51	3	0	0	3 HOURS	30	70	3

INTERNET OF THINGS

Course Objectives:

1. To understand the fundamental concepts of parallel and distributed databases, including the different architectures, parallelism techniques, and design principles.
2. To comprehend the concepts of object-oriented and object-relational databases, including object identity, structure, persistence, and inheritance, and learn how to use them to design efficient database systems.
3. To learn about intelligent databases and their applications, including active databases, temporal databases, deductive databases, and spatial databases.
4. To explore advanced data models, such as mobile databases, multimedia databases, data warehousing, data mining, and text mining, and learn how to use them to design and manage complex data structures.
5. To understand the emerging technologies in the field of database systems, such as XML databases, web databases, cloud-based databases, and big data storage and analysis.

UNIT I – OVERVIEW IoT - An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations. M2M and IoT Technology Fundamentals- Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service (XaaS), M2M and IoT Analytics, Knowledge Management

UNIT II – REFERENCE ARCHITECTURE - IoT Architecture-State of the Art – Introduction, State of the art, Reference Model and architecture, IoT reference Model - IoT Reference ArchitectureIntroduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views. Real-World Design Constraints- Introduction, Technical Design constraints-hardware is popular again, Data representation and visualization, Interaction and remote control.

UNIT III – IOT DATA LINK LAYER & NETWORK LAYER PROTOCOLS - PHY/MAC Layer (3GPP MTC, IEEE 802.11, IEEE 802.15), Wireless HART, Z-Wave, Bluetooth Low Energy, Zigbee Smart Energy, DASH7 - Network Layer-IPv4, IPv6, 6LoWPAN, 6TiSCH,ND, DHCP, ICMP, RPL, CORPL, CARP

UNIT IV – TRANSPORT & SESSION LAYER PROTOCOLS - Transport Layer (TCP, MPTCP, UDP, DCCP, SCTP)-(TLS, DTLS) – Session Layer-HTTP, CoAP, XMPP, AMQP, MQTT

UNIT V – SERVICE LAYER PROTOCOLS & SECURITY - Service Layer -oneM2M, ETSI M2M, OMA, BBF – Security in IoT Protocols – MAC 802.15.4 , 6LoWPAN, RPL, Application Layer

REFERENCES

1. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1 st Edition, Academic Press, 2014.

2. Peter Waher, "Learning Internet of Things", PACKT publishing, BIRMINGHAM – MUMBAI

3. Bernd Scholz-Reiter, Florian Michahelles, "Architecting the Internet of Things", ISBN 978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer

4. Daniel Minoli, "Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications", ISBN: 978-1-118- 47347-4, Willy Publications

5. Vijay Madisetti and ArshdeepBahga, "Internet of Things (A Hands-onApproach)", 1 st Edition, VPT, 2014. 6. http://www.cse.wustl.edu/~jain/cse570-15/ftp/iot_prot/index.htm

Course Outcomes:

1. Students will be able to compare and contrast different database system architectures, including centralized, client-server, parallel, and distributed architectures.
2. Students will be able to design object-oriented and object-relational databases using different standards, languages, and design principles, such as ODMG, ODL, OQL, and SQL/Oracle.
3. Students will be able to design intelligent databases that incorporate active rules, temporal databases, deductive databases, and spatial databases to support complex applications.
4. Students will be able to design advanced data models, including mobile databases, multimedia databases, data warehousing, data mining, and text mining, to efficiently manage complex data structures.
5. Students will be able to design and manage emerging technologies in the field of database systems, such as XML databases, web databases, cloud-based databases, and big data storage and analysis.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT207TPE52	3	0	0	3 HOURS	30	70	3

ADVANCED OPERATING SYSTEM

Course Objective

1. To understand the general overview of UNIX Operating system
2. To understand the System Structures and operating system services
3. To understand the file structure
4. To understand Structure of process and process control.
5. To understand the distributed operating system

UNIT I

GENERAL OVERVIEW OF THE SYSTEM: Introduction to Multi user System, History of UNIX, features & Benefits, Variants, UNIX Commands - who, pwd, cd, mkdir, rm, rmdir, ls, mv, ln, chmod, cp, grep, tr, etc. Vi Editor: Command & edit Mode, Invoking Vi, deleting & inserting Line, Deleting & Replacing Character, Searching for Strings, Introduction to sed. Bourne Shell, C Shell, Shell Variables, Scripts, Meta Characters, If & CASE Statements, For, While and Until loops. AWK Pattern Scanning and Processing, AWK Arithmetic and Variables, built in functions and Operators, Arrays, Strings.

UNIT II

DESIGN OF OPERATING SYSTEM: System Structure, User Perspective, Operating System Services Assumption about Hardware, the Kernel and Buffer Cache Architecture of UNIX Operating System, System Concepts, Buffer Headers, Structure of the Buffer Pool, Scenarios for Retrieval of the Buffer, Reading and Writing Disk Blocks, Advantages and Disadvantages of Buffer Cache.

UNIT III

INTERNAL REPRESENTATION OF FILES: Overview of File system, System Calls for the File System, INODES, Structure of Regular File, Directories, Conversions of a Path, name to an INODE, Super Block, INODE Assignment to a New File, Allocation of Disk Blocks. Open, Read, Write, File and Record Close, File Creation.

UNIT IV

STRUCTURES OF PROCESSES AND PROCESS CONTROL: Process States and Transitions Layout of System Memory, The Context of a Process, Manipulation of the Process Address Space, Sleep Process Creation/Termination, The User ID of a Process, Changing the Size of a Process.

UNIT V

DISTRIBUTED OPERATING SYSTEM: Design of distributed OS, Resource sharing, Distributed OS architectures, software layers, Architectural Model, The Operating System Layer, Protection, Processes and Threads, Communication and invocation, Distributed File System: File Service Architecture, Sun Network File System, the Andrew File System, and Recent Advances.

List of Books:

1. The Design of Unix Operating System,Maurice J. Bach, Pearson Education.
2. Advance UNIX, a Programmer's Guide, S. Prata, BPB Publications, New Delhi.
3. Shell Programming, Yashvant Kanitkar, BPB Publications, New Delhi.
4. UNIX Concepts and Applications, Sumitabh Das.
5. Distributed OS, A.S Tanenbaum, PHI.

Course Outcomes

1. Create file and directory using commands and perform command based operations
2. Design and implement the I/O operation functions
3. Able to understand the operating system structure
4. Create distributed application sharing function
5. Understand the process concept

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT207TPE53	3	0	0	3 HOURS	30	70	3

COMPUTER VISION

COURSE OBJECTIVES:

1. To learn and understand the fundamentals of Computer Vision techniques.
2. To provide basic understanding of applications of Computer Vision techniques.
3. To understand the image formation process.
4. To understand the basic techniques and issues in2-D and 3-D computer vision
5. To apply Computer Vision techniques to solve real world applications.

Unit-1

Recognition Methodology: Conditioning, Labeling, Grouping,Extracting, Matching. Morphological Image Processing: Introduction, Dilation, Erosion,Opening, Closing,Hit-or-Miss transformation, Morphologicalalgorithm operations on binary images, Morphological algorithm Operations on gray-scale images, Thinning, Thickining , Regiongrowing, region shrinking.

Unit-2

Image Representation and Description: Representation schemes,Boundary descriptors, Region descriptors Binary Machine Vision: Thresholding, Segmentation, Connectedcomponent labeling, Hierarchal segmentation, Spatial clustering,Split & merge, Rule-based Segmentation, Motion-based segmentation.

Unit-3

Area Extraction: Concepts, Data-structures, Edge, Line-Linking,Hough transform, Line fitting, Curve fitting (Least-square fitting). Region Analysis: Region properties, External points, Spatialmoments, Mixed spatial gray-level moments, Boundary analysis:Signature properties, Shape numbers.

Unit-4

Facet Model Recognition: Labeling lines, Understanding linedrawings,Classification of shapes by labeling of edges, Recognition ofshapes, Consisting labeling problem, Back-tracking AlgorithmPerspective Projective geometry, Inverse perspective Projection, Photogrammetry - from 2D to 3D, Image matching:Intensity matching of ID signals, Matching of 2D image,Hierarchical image matching.

Unit-5

Object Models And Matching: 2D representation, Global vs. Localfeatures General Frame Works For Matching: Distance relational approach,Orderedstructural matching, View class matching, Models database organization.

BOOKS

Text Books:

1.RobertHaralick and Linda Shapiro, "Computer and Robot Vision", Vol I, II, Addison- Wesley, 1993.

2. David A. Forsyth, Jean Ponce, "Computer Vision: A Modern Approach"

References:

1. Milan Sonka,VaclavHlavac, Roger Boyle, "Image Processing, Analysis, and Machine Vision" Thomson Learning

COURSE OUTCOMES:

Students will try to learn:

1. Design and implement algorithms to perform image processing and feature extraction.
2. Design and implement algorithms for image segmentation.
3. Design and implement algorithms for representation of shape.
4. Design and demonstrate the 2D and 3D objects using
5. Design and build a real computer vision-based system.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT207TPE54	3	0	0	3 HOURS	30	70	3

OPEN SOURCE SYSTEM & PROGRAMMING

COURSE OBJECTIVES:

- General understanding of structure of modern computers.
- Explain the role of the operating system as a high level interface to the hardware.
- To understand purpose, structure and functions of operating systems.
- Understands the use of different process scheduling algorithm and synchronization techniques to avoid deadlock
- Explain the performance trade-offs inherent in OS implementation.

UNIT 1

Open Source System Fundamentals: Open Source Operating Systems, Linux, GNU, POSIX standards, open source software development, open source licenses.Kernel, shell, memory management, Inter-process communication, file system, device drivers, Networking, modules and debugging.

UNIT 2

System Programming: System Calls, Library Functions, GNU C library, error handling, File I/O handling, process, IDs, memory layout, virtual memory, stack, command line arguments, memory allocation, user and groups, time, system limits and options, system and process information.

UNIT 3

File Systems: File I/O buffering, devices, I-nodes, Virtual file system, Mount point, file attributes, access control list, directories and links, monitoring file events, file locking.

UNIT 4

Process: creation, termination, monitoring, execution, signals, handlers, timers, threads, process control, priorities and scheduling, daemons, secure privileged programs, capabilities, login accounting, shared libraries, pipes.

UNIT 5

Security: Security Policies, SE Linux,GRsecurity, tripwire, firewalls, network access control, authorization control, SSH, openSSH, protecting files and emails, testing and monitoring.

References

1. "The Linux Programming Interface", Michael Kerrisk, nostarch press,
2. "Linux kernel programming", Michael Beck ET. Al., Pearson Education
3. "Linux Security Cookbook", Daniel j. Barrett ET. Al., O'Reilly publication,

COURSE OUTCOMES:

Students will try to learn:

- Describe the general architecture of computers and operating system.
- Physical and virtual memory, scheduling, I/O and files.
- Use OS as a resource manager that supports multiprogramming.
- Understands the different services provided by Operating System at different level.
- They learn real life applications of Operating System in every field.

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT207TOE01	3	0	0	3 hours	30	70	3

MACHINE LEARNING

COURSE OBJECTIVE:

1. To expose the applications of machine learning.
2. To study the various algorithms related to supervised and unsupervised learning.
3. To recognize the different types of machine learning models and how to use them.
4. To learn the theoretical and practical aspects of probabilistic graphical models.
5. To acquire the knowledge of various classification techniques.
6. To learn the various neural network algorithms.

UNIT No	Syllabus Content	No of Hours
1	**Introduction to Machine Learning:** Introduction - examples of machine learning applications - Types of machine learning- Mathematical foundations of machine learning– Introduction to Parametric Models – Non-Parametric Models –Probability Basics	8
2	**Supervised Learning:** Linear Models for Regression – Linear Basis Function Models - The Bias-Variance Decomposition - Bayesian Linear Regression - Bayesian Model Comparison, Limitations of Fixed Basis Functions - Linear Models for Classification, Discriminate Functions -Probabilistic Generative Models –Probabilistic Discriminative Models - Bayesian Logistic Regression. Neural Networks – Network Training - Feed-forward Network Functions, Back Propagation Network, Bayesian Neural Network	7
3	**Unsupervised Learning:** Clustering- K-means - EM Algorithm- Mixtures of Gaussians Dimensionality Reduction - Factor analysis - Principal Component Analysis Probabilistic PCA -Independent components analysis - Singular Value Decomposition.	7
4	**Probabilistic Graphical Model:** Graphical Models - Undirected graphical models - Markov Random Fields-Directed Graphical Models -Bayesian Networks - Conditional independence properties - Inference – Learning - Generalization - Hidden Markov Models -Conditional random fields	7
5	**Genetic Algorithms:** an illustrative example, Hypothesis space search, Genetic Programming, Models of Evolution and Learning; Learning first order rules-sequential covering algorithms-General to specific beam search-FOIL; REINFORCEMENT LEARNING – The Learning Task, Q Learning.	7

Text Books:

1. Machine Learning: A Probabilistic Perspective, Kevin Murphy, MIT Press, 20122.
2. Pattern Recognition and Machine Learning, Christopher Bishop. 2e
3. Machine Learning, Tom M. Mitchell, McGraw-Hill Education (India) Private Limited, 2013

Reference Books:

1. Pattern Recognition and Machine Learning, Christopher Bishop, Springer, 1st edition, ISBN-13: 978-0387-31073-2, 2006.
2. Introduction to Machine Learning, Ethem Alpaydin, 3rd Edition, MIT Press, ISBN: 9780262028189, 2014.
3. Machine Learning: a Probabilistic Perspective, Kevin Patrick Murphy , 4th edition, MIT Press, ISBN:9780262018029, 2013.
4. Machine Learning for Hackers, Drew Conway, John Myles White, 1st Edition, O'Reilly Media, 2012.
5. Data Mining: Practical Machine Learning Tools and Techniques, Ian H. Witten, Eibe Frank, Mark A. Hall, 3rd Edition, Morgan Kaufmann, 2011.

COURSE OUTCOMES: The students would have learnt

CO1: Describe the concepts and models of machine learning.
CO2: Design and implement algorithms for supervised and unsupervised learning.
CO3: Develop skills of using recent machine learning software for solving practical problems.
CO4: Analyze the efficient clustering techniques for solving real world problems.
CO5: Implement probabilistic discriminative and generative algorithms for an application andanalyze the results.