# SEMESTER II

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**PRACTICAL**

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# SEMESTER III

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# SEMESTER IV

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**TOTAL** 0 0 24 12

Total no. of credits to be earned for the award of Degree 21+20+15+12 =68
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UNIT I CONVENTIONAL ENCRYPTION
Introduction, Conventional encryption model, Stenography , Data Encryption Standard, block cipher, Encryption algorithms, confidentiality, Key distribution

UNIT II PUBLIC KEY ENCRYPTION AND HASHING
Principles of public key cryptosystems, RSA algorithm, Diffie- Hellman Key Exchange. Elliptic curve cryptology, message authentication and Hash functions, Hash and Mac algorithms, Digital signatures

UNIT III IP SECURITY
IP Security Overview, IP security Architecture, authentication Header, Security payload, security associations, Key Management

UNIT IV WEB SECURITY
Web security requirement, secure sockets layer, transport layer security, secure electronic transaction, dual signature

UNIT V SYSTEM SECURITY
Intruders, Viruses, Worms, firewall design, Trusted systems, antivirus techniques, digital Immune systems

TOTAL: 45 PERIODS

REFERENCES
UNIT III   TCP AND ATM CONGESTION CONTROL  9

UNIT IV   INTEGRATED AND DIFFERENTIATED SERVICES  9

UNIT V   PROTOCOLS FOR QOS SUPPORT  9

TOTAL: 45 PERIODS

REFERENCES

UNIT V RAMSEY THEORY AND RANDOM GRAPHS


TOTAL: 45 PERIODS

REFERENCES

5. Wilson “Introduction to Graph Theory”, 2nd edition, Pearson Education India

CP9222 WIRELESS NETWORKS LT P C

UNIT I WIRELESS LOCAL AREA NETWORKS

Introduction to wireless LANs - IEEE 802.11 WLANs - Physical Layer - MAC sublayer - MAC Management Sublayer - Wireless ATM - HIPERLAN- HIPERLAN-2, WiMax

UNIT II 3G OVERVIEW & 2.5G EVOLUTION

Migration path to UMTS, UMTS Basics, Air Interface, 3GPP Network Architecture, CDMA2000 overview - Radio and Network components, Network structure, Radio network, TD-CDMA, TD-SCDMA.

UNIT III ADHOC & SENSOR NETWORKS

Characteristics of MANETs, Table-driven and Source-initiated On Demand routing protocols, Hybrid protocols, Wireless Sensor networks - Classification, MAC and Routing protocols.

UNIT IV INTERWORKING BETWEEN WLANS AND 3G WWANS

Interworking objectives and requirements, Schemes to connect WLANs and 3G Networks, Session Mobility, Interworking Architectures for WLAN and GPRS, System Description, Local Multipoint Distribution Service, Multichannel Multipoint Distribution system.

UNIT V 4G & BEYOND

4G features and challenges, Technology path, IMS Architecture, Convergent Devices, 4G technologies, Advanced Broadband Wireless Access and Services, Multimedia, MVNO.

TOTAL: 45 PERIODS
REFERENCES


<table>
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<tr>
<th>NE9227</th>
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I. Using CDMA Spread Spectrum Trainer
   (1) Embedded wireless solutions using CDMA network
   (2) GPS integrated GSM modules using SMS for in tracking & remote monitoring applications

II. Using GPS Trainer
   (3) Embedded GPS modules interfaced with other embedded modules for location based applications
   (4) GPS integrated GSM modules using SMS for in tracking & remote monitoring applications

III. Using GSM Trainer
   (5) Developing GSM board+ SIM card based applications emulating mobile phones (Eg. Mobile ATM Vans)
   (6) SMS based remote monitoring/control applications using existing GSM network

IV. Using Bluetooth Trainer
   (7) Bluetooth based wireless personal area networking (WPAN) – printers, mouse, keypads, and mobiles
   (8) Combining RFID and Bluetooth
V. Mobile Communication Trainer MT2000
   (9) Can be used as stand alone or full product development kit in 49 MHz ISM band

VI. RFID Development Kit
   (10) Tag all assets inside Embedded Wireless Lab with RFID
   (11) Use of passive and active tags for Library Management system

VII. Smart Wireless Applications & Wireless Sensor Networks
   (12) Remote door locks and gate openers

TOTAL: 60 PERIODS

CS9251                MOBILE COMPUTING                LT P C
                      3 0 0 3

UNIT I  WIRELESS COMMUNICATION FUNDAMENTALS  9

UNIT II  TELECOMMUNICATION SYSTEMS  11

UNIT III  WIRELESS NETWORKS  9

UNIT IV  NETWORK LAYER  9

UNIT V  TRANSPORT AND APPLICATION LAYERS  7

TOTAL: 45 PERIODS
REFERENCES

NE9251 RELIABILITY ENGINEERING LT P C 3 0 0 3

UNIT I PROBABILITY PLOTTING AND LOAD-STRENGTH INTERFERENCE 9
Statistical distribution, statistical confidence and hypothesis testing, probability plotting techniques – Weibull, extreme value, hazard, binomial data; Analysis of load – strength interference, Safety margin and loading roughness on reliability.

UNIT II RELIABILITY PREDICTION, MODELLING AND DESIGN 9
Statistical design of experiments and analysis of variance Taguchi method, Reliability prediction, Reliability modeling, Block diagram and Fault tree Analysis, Petri Nets, State space Analysis, Monte carlo simulation, Design analysis methods – quality function deployment, load strength analysis, failure modes, effects and criticality analysis.

UNIT III ELECTRONICS AND SOFTWARE SYSTEMS RELIABILITY 9
Reliability of electronic components, component types and failure mechanisms, Electronic system reliability prediction, Reliability in electronic system design; software errors, software structure and modularity, fault tolerance, software reliability, prediction and measurement, hardware/software interfaces.

UNIT IV RELIABILITY TESTING AND ANALYSIS 9
Test environments, testing for reliability and durability, failure reporting, Pareto analysis, Accelerated test data analysis, CUSUM charts, Exploratory data analysis and proportional hazards modeling, reliability demonstration, reliability growth monitoring.

UNIT V MANUFACTURE AND RELIABILITY MANAGEMENT 9
Control of production variability, Acceptance sampling, Quality control and stress screening, Production failure reporting; preventive maintenance strategy, Maintenance schedules, Design for maintainability, Integrated reliability programmes, reliability and costs, standard for reliability, quality and safety, specifying reliability, organization for reliability.

TOTAL: 45 PERIODS
REFERENCES

1. Patrick D.T. O’Connor, David Newton and Richard Bromley, Practical Reliability
Engineering, Fourth edition, John Wiley & Sons, 2002
2. David J. Klinger, Yoshinao Nakada and Maria A. Menendez, Von Nostrand Reinhold,
1996.

AP9252 NEURAL NETWORKS AND ITS APPLICATIONS

UNIT I BASIC LEARNING ALGORITHMS
Biological Neuron – Artificial Neural Model - Types of activation functions – Architecture:
Feedforward and Feedback – Learning Process: Error Correction Learning –Memory
Based Learning – Hebbian Learning – Competitive Learning - Boltzman Learning –
Supervised and Unsupervised Learning – Learning Tasks: Pattern Space – Weight
Space – Pattern Association – Pattern Recognition – Function Approximation – Control
– Filtering - Beamforming – Memory – Adaptation - Statistical Learning Theory – Single
Layer Perceptron – Perceptron Learning Algorithm – Perceptron Convergence Theorem
– Least Mean Square Learning Algorithm – Multilayer Perceptron – Back Propagation

UNIT II RADIAL-BASIS FUNCTION NETWORKS AND SUPPORT VECTOR MACHINES RADIAL BASIS FUNCTION NETWORKS
Cover’s Theorem on the Separability of Patterns - Exact Interpolator – Regularization
Theory – Generalized Radial Basis Function Networks - Learning in Radial Basis
Function Networks - Applications: XOR Problem – Image Classification.
Support Vector Machines:
Optimal Hyperplane for Linearly Separable Patterns and Nonseparable Patterns –
Support Vector Machine for Pattern Recognition – XOR Problem - $\varepsilon$-insensitive Loss
Function – Support Vector Machines for Nonlinear Regression

UNIT III COMMITTEE MACHINES
Ensemble Averaging - Boosting – Associative Gaussian Mixture Model – Hierarchical
Mixture of Experts Model(HME) – Model Selection using a Standard Decision Tree – A
Priori and Postpriori Probabilities – Maximum Likelihood Estimation – Learning
Strategies for the HME Model - EM Algorithm – Applications of EM Algorithm to HME
Model

NEURODYNAMICS SYSTEMS
Dynamical Systems – Attractors and Stability – Non-linear Dynamical Systems-
UNIT IV  ATTRACTION NEURAL NETWORKS
Associative Learning – Attractor Neural Network Associative Memory – Linear
Associative Memory – Hopfield Network – Content Addressable Memory – Strange
Attractors and Chaos - Error Performance of Hopfield Networks - Applications of
Hopfield Networks – Simulated Annealing – Boltzmann Machine – Bidirectional
Associative Memory – BAM Stability Analysis – Error Correction in BAMs - Memory
Annihilation of Structured Maps in BAMS – Continuous BAMS – Adaptive BAMS –
Applications

ADAPTIVE RESONANCE THEORY
Noise-Saturation Dilemma - Solving Noise-Saturation Dilemma – Recurrent On-center –
Off-surrond Networks – Building Blocks of Adaptive Resonance – Substrate of
Resonance Structural Details of Resonance Model – Adaptive Resonance Theory –
Applications

UNIT V  SELF ORGANISING MAPS
Self-organizing Map – Maximal Eigenvector Filtering – Sanger’s Rule – Generalized
Learning Law – Competitive Learning - Vector Quantization – Mexican Hat Networks -
Self-organizing Feature Maps – Applications

PULSED NEURON MODELS
Spiking Neuron Model – Integrate-and-Fire Neurons – Conductance Based Models –
Computing with Spiking Neurons.

REFERENCES:
Thomson Learning, New Delhi, 2003.
4. James A. Freeman and David M. Skapura, “Neural Networks Algorithms,
Applications, and Programming Techniques, Pearson Education (Singapore) Private
Limited, Delhi, 2003.
UNIT II  EMBEDDED/REAL TIME OPERATING SYSTEM  9

UNIT III  CONNECTIVITY  9

UNIT IV  REAL TIME UML  8

UNIT V  SOFTWARE DEVELOPMENT AND CASE STUDY  9

TOTAL: 45 PERIODS

REFERENCES

NE9254  SOFTWARE ENGINEERING METHODOLOGIES  LT P C
3 0 0 3

UNIT I  9
Definition – systems approach – modeling the process and lifecycle – meaning of process – software process models – tools and techniques – practical process modeling – information systems – planning and managing the project – tracking project – project personnel – effort estimation – risk management – project plan – process models and project management

UNIT II  9
UNIT III

UNIT IV

UNIT V

TOTAL: 45 PERIODS

REFERENCES

CS9225 WEB TECHNOLOGY LT P C 3 0 0 3

UNIT I

UNIT II
Client side programming – Java script language – java script objects – host objects : Browsers and the DOM

UNIT III

UNIT IV

UNIT V

TOTAL: 45 PERIODS
REFERENCES


CP9253 HIGH SPEED SWITCHING ARCHITECTURE LT P C 3 0 0 3

UNIT I LAN SWITCHING TECHNOLOGY 9
Switching Concepts, switch forwarding techniques, switch path control, LAN Switching, cut through forwarding, store and forward, virtual LANs.

UNIT II ATM SWITCHING ARCHITECTURE 9

UNIT III QUEUES IN ATM SWITCHES 9
Internal Queueing -Input, output and shared queueing, multiple queueing networks – combined Input, output and shared queueing - performance analysis of Queued switches.

UNIT IV PACKET SWITCHING ARCHITECTURES 9
Architectures of Internet Switches and Routers- Bufferless and buffered Crossbar switches, Multi-stage switching, Optical Packet switching; Switching fabric on a chip; Internally buffered Crossbars.

UNIT V IP SWITCHING 9
Addressing model, IP Switching types - flow driven and topology driven solutions, IP Over ATM address and next hop resolution, multicasting, Ipv6 over ATM.

TOTAL: 45 PERIODS

REFERENCES

UNIT I

UNIT II
Genetic technology: steady state algorithm - fitness scaling - inversion. Genetic programming - Genetic Algorithm in problem solving

UNIT III
Genetic Algorithm in engineering and optimization-natural evolution –simulated annealing and Tabu search .Genetic Algorithm in scientific models and theoretical foundations.

UNIT IV
Implementing a Genetic Algorithm – computer implementation - low level operator and knowledge based techniques in Genetic Algorithm.

UNIT V
Applications of Genetic based machine learning-Genetic Algorithm and parallel processors, composite laminates, constraint optimization, multilevel optimization, real life problem.

REFERENCES

TOTAL: 45 PERIODS
UNIT III  SATELLITE LINK DESIGN  9
Basic link analysis, Interference analysis, Rain induced attenuation and interference, Ionospheric characteristics, Link Design with and without frequency reuse.

UNIT IV  SATELLITE NAVIGATION AND GLOBAL POSITIONING SYSTEM  8
Radio and Satellite Navigation, GPS Position Location Principles, GPS Receivers and Codes, Satellite Signal Acquisition, GPS Receiver Operation and Differential GPS

UNIT V  APPLICATIONS  8

TOTAL: 45 PERIODS

REFERENCES

NE9257  MULTIMEDIA COMPRESSION TECHNOLOGIES  LT P C
3 0 0 3

UNIT I  INTRODUCTION  9

UNIT II  TEXT COMPRESSION  9

UNIT III  AUDIO COMPRESSION  9

UNIT IV  IMAGE COMPRESSION  9
UNIT V VIDEO COMPRESSION


TOTAL: 45 PERIODS

REFERENCES


NE9258 ADVANCED ALGORITHMS

UNIT I INTRODUCTION
Mathematical Background - Design and Analysis of algorithms – Time and Space Complexity - Basic concepts

UNIT II SORTING AND ORDER STATISTICS

UNIT III DESIGN TECHNIQUES

UNIT IV GRAPH AND PARALLEL ALGORITHMS
Graphs - Representation - Traversals - Topological sort - Minimum spanning tree - Shortest paths – Bi connected and strongly connected components - Parallel algorithms - Sorting - Matrix multiplication - Numerical - Graph.

UNIT V SELECTED TOPICS
NP Completeness - Approximation algorithms - Matrices - Transitive closure - Warshall's - Kronrod's algorithm - Computational Geometry

TOTAL: 45 PERIODS
TEXT BOOKS

REFERENCES

NE9259  TELECOMMUNICATION AND SWITCHING TECHNIQUES  LT P C
                    3 0 0 3

UNIT I  EVOLUTION OF TELECOMMUNICATION SWITCHING AND CIRCUIT
Evolution of Public Switched Telecommunication Networks Strouger exchange, Crossbar exchange, Stored programme exchange Digital exchange – Basic Telecommunication equipments – Telephone handset, Hybrid circuit, Echo suppressors and cancellers, PCM coders, Modems and Relays.

UNIT II  ELECTRONIC SWITCHING
Circuit Switching, Message switching, Centralized stored programme switching, Time switching, Spare switching, Combination switching – Digital switching system hardware configuration, Switching system software, Organization, Switching system call processing software, Hardware software integration.

UNIT III  TELECOMMUNICATION SIGNALLING AND TRAFFIC
Channel associated signaling, Common channel signaling, SS7 signaling protocol, SS7 protocol architecture, Concept of Telecommunication traffic, Grade of service, Modeling switching systems, Blocking models and Delay systems.

UNIT IV  INTEGRATED DIGITAL NETWORKS
Subscriber loop characteristics, Local access wire line and wire less PCM / TDM carrier standards transmission line codes, Digital multiplexing techniques, Synchronous, Asynchronous, Plesiochronous multiplexing techniques, SONET / SDH, Integrated Digital Network (IDN) environment – Principles of Integrated Services Digital Network (ISDN) – Cellular Mobile Communication Principles.

UNIT V  DATA NET WORKS

TOTAL: 45 PERIODS

TEXT BOOK
REFERENCES

NE9260 STORAGE AREA NETWORKS LT P C
3 0 0 3

UNIT I
9

UNIT II
9

UNIT III
9

UNIT IV
9

UNIT V
9

TOTAL: 45 PERIODS

TEXT BOOK
UNIT I  INTRODUCTION TO NETWORK CONCEPTS, STANDARDS AND PROTOCOLS  9

UNIT II  LOCAL AND WIDE AREA NETWORK TOPOLOGIES AND HARDWARE  9
Physical and Logical Topologies - Network Switching - Ethernet Local Area Networks - Networking Hardware - Wide Area Networking Technologies - WAN Topologies - WANs and WAN Transmission Methods - WAN Implementation and Remote Connectivity

UNIT III  ENTERPRISE NETWORKING WITH WINDOWS 2000 AND NETWARE  9
Network Operating Systems - Networking with Windows 2000 – Enterprise Networking with NetWare - NetWare Based Networking

UNIT IV  ENTERPRISE NETWORKING WITH UNIX  9
Networking with UNIX – Internetworking with TCP/IP for Enterprise Applications - Networking with TCP/IP: Internet, Intranet and Extranet - Internet Applications for Enterprise

UNIT V  ENTERPRISE NETWORK MANAGEMENT  9

TOTAL: 45 PERIODS

TEXTBOOK

UNIT I  INTRODUCTION AND TECHNOLOGY  9

UNIT II  MODULATION, DEMODULATION AND TRANSMISSION OF OPTICAL SIGNAL  9
Modulation - Demodulation - transmission system engineering - Optical amplifiers - crosstalk - dispersion - fiber non linearities - wavelength stabilization - overall design considerations.
UNIT III     NETWORKS  9

UNIT IV     CONTROL AND MANAGEMENT  9

UNIT V      ACCESS NETWORKS & SWITCHING  9
Network architecture overview - today’s access networks - future Access networks - optical access network architecture - application area - OTDM - mux and demuxing - synchronization - broadcast OTDM networks - switch bared networks - OTDM Test beds

TOTAL: 45 PERIODS

TEXT BOOK

REFERENCES
Distributed Debugging - Distributed Mutual Exclusion - Elections - Multicast Communication Related Problems.

UNIT V DISTRIBUTED TRANSACTION PROCESSING 9
Transactions - Nested Transactions - Locks - Optimistic Concurrency Control - Timestamp Ordering - Comparison - Flat and Nested Distributed Transactions - Atomic Commit Protocols - Concurrency Control in Distributed Transactions - Distributed Deadlocks - Transaction Recovery - Overview of Replication And Distributed Multimedia Systems

TOTAL: 45 PERIODS

TEXT BOOK

REFERENCES

CS9256 MULTIMEDIA SYSTEMS

UNIT I INTRODUCTION AND QOS 9

UNIT II OPERATING SYSTEMS 9
Real-Time Processing-Scheduling-Interprocess Communication-Memory and Management-Server Architecture-Disk Management.

UNIT III FILE SYSTEMS AND NETWORKS 9
Traditional and Multimedia File Systems-Caching Policy-Batching-Piggy backing- Ethernet-Gigabit Ethernet-Token Ring-100VG AnyLAN-Fiber Distributed Data Interface (FDDI)- ATM Networks-MAN-WAN.

UNIT IV COMMUNICATION 9

UNIT V SYNCHRONIZATION 9
Synchronization in Multimedia Systems-Presentation-Synchronization Types-Multimedia Synchronization Methods-Case Studies-MHEG-MODE-ACME

TOTAL: 45 PERIODS
TEXT BOOKS:

REFERENCES

CS9266 AGENT BASED INTELLIGENT SYSTEMS LT P C
3 0 0 3

UNIT I INTRODUCTION

UNIT II KNOWLEDGE REPRESENTATION AND REASONING
Logical Agents-First order logic-First Order Inference-Unification-Chaining- Resolution Strategies-Knowledge Representation-Objects-Actions-Events

UNIT III PLANNING AGENTS

UNIT IV AGENTS AND UNCERTAINTY
Acting under uncertainty – Probability Notation-Bayes Rule and use - Bayesian Networks-Other Approaches-Time and Uncertainty-Temporal Models- Utility Theory - Decision Network – Complex Decisions

UNIT V HIGHER LEVEL AGENTS
Knowledge in Learning-Relevance Information-Statistical Learning Methods- Reinforcement Learning-Communication-Formal Grammar-Augmented Grammars-Future of AI

TOTAL: 45 PERIODS

TEXT BOOK:

REFERENCES:
UNIT I  MODELLING OF COMMUNICATION SYSTEM  9
Model of speech and picture signals, Pseudo noise sequences, Non-linear sequences,
Analog channel model, Noise and fading, Digital channel model-Gilbert model of bursty
channels, HF, Troposcatter and satellite channels, Switched telephone channels, Analog
and Digital communication system models, Light wave system models.

UNIT II  SIMULATION OF RANDOM VARIABLES AND RANDOM PROCESS  9
Unvaried and multivariate models, Transformation of random variables, Bounds and
approximation, Random process models-Markov AND ARMA Sequences, Sampling rate
for simulation, Computer generation and testing of random numbers

UNIT III  ESTIMATION OF PERFORMANCE MEASURES  9
Quality of an estimator, estimator for SNR, Probability density functions of analog
communication system, BER of digital communication systems, Montre carlo method
and Importance sampling method, estimation of power spectral density of a process

UNIT IV  COMMUNICATION NETWORKS  9
Queuing models, M/M/I and M/M/I/N queues, Little formula, Burke's theorem, M/G/I
queue, Embedded Markov chain analysis of TDM systems, Polling, Random access
systems

UNIT V  NETWORK OF QUEUES  9
Queues in tandem, store and forward communication networks, capacity allocation,
Congestion and flow chart, Routing model, Network layout and Reliability

TOTAL:  45 PERIODS

TEXT BOOK:
1. M.C.Jeruchim,Philip Balaban and K.Sam Shanmugam, "Simulation of
   communications systems",PlenumPress,New York,1992

REFERENCES:
   Press, New York,1984
3. Jerry Banks and John S.Carson, Discrete-event system Simulation, Prentice
   Hall,Inc.,New Jersey,1984

UNIT I  MICROWAVE SOURCES  10
Passive waveguide components, Microstrip line structure and components, Simple
theory and operating characteristics of Reflex klystrons, Two cavity Klystrons,
Magnetrons, and TWTS - solid state source - TEDS, IMPATTS, TRAPATT, GaAs FETs
and Tunnel diode.

UNIT II  RADAR PRINCIPLES  8
Introduction to Radar – Radar range equation – Receiver noise and signal to noise ratio-
Radar cross section (RCS) – Radar system – Radar Antennas
UNIT III TYPES OF RADARS

UNIT IV RADAR SIGNAL PROCESSING

UNIT V TRACKING RADAR
Tracking with radar – Monopulse Tracking – conical scan and sequential lobing – limitations to tracking Accuracy- Kalman Tracker -Fundamentals of Airborne radar

REFERENCES:

NE9264 DETECTION AND ESTIMATION THEORY LT P C
UNIT I REVIEW OF PROBABILITY AND STOCHASTIC PROCESS 9

UNIT II SINGLE AND MULTIPLE SAMPLE DETECTION 9

UNIT III FUNDAMENTALS OF ESTIMATION THEORY 9

UNIT IV WIENER AND KALMAN FILTERS 9
Orthogonality Principle, Autoregressive Techniques, Discrete Wiener Filter, Continuous Wiener Filter, Generalization of Discrete and Continuous Filter Representations, Linear Least-Squares Methods, Minimum-Variance Weighted Least-Squares Methods,
UNIT V APPLICATIONS

Detector Structures in Non-Gaussian Noise, Examples of Noise Models, Receiver Structures, and Error-Rate Performance, Estimation of Non-Gaussian Noise Parameters Fading Multipath Channel Models, Receiver Structures with Known Channel Parameters, Receiver Structures without Knowledge of Phase, Receiver Structures without Knowledge of Amplitude or Phase, Receiver Structures and Performance with No Channel Knowledge.

TOTAL : 45 PERIODS

REFERENCES:

