PONDICHERRY UNIVERSITY

Master of Technology
(Network & Internet Engineering)

( CBCS )
(Effective from the academic year 2009 – 2010)

Eligibility for Admission

B.Tech. / B.E. degree in computer science and Engineering/ Information Technology/ Electronics and Communication Engineering/ Electrical and Electronics Engineering/ Electronics and Instrumentation Engineering

OR

M.Sc in Computer Science/ Information Technology/ Software Engineering with a minimum of 55% marks.

OR

MCA with Bachelor’s degree in Computer science/ Computer Applications/ Mathematics/ Statistics/ Physics/ Electronics/ Applied Science with a minimum of 55% marks in each degree.

Duration of the Course

The course duration shall normally be of two years duration spread over four semesters. The maximum duration to complete the course shall be 4 years.

Medium

The medium of instruction shall be English.

Passing Minimum

Passing Eligibility & Classification for the award of the Degree are as per the Choice Based Credit System norms.
Curriculum
(Effective from the academic year 2007-2008)

Note: All Course codes are to be preceded with “NIE”

H – Hardcore Subject
S – Softcore Subject

Semester I

<table>
<thead>
<tr>
<th>Code No</th>
<th>Course Title</th>
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<td>Mathematics for Network Engineering</td>
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Semester II

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### Semester III

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### Semester IV

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UNIT I
Graph Theory Introduction: Introduction Of Graphs, Paths, Cycles, And Trails, Vertex Degrees And Counting - Directed Graphs - Trees and Distance: Basic Properties. Spanning Trees and Enumeration, Optimization and Trees.

UNIT II

UNIT III

UNIT IV
Introduction to Probability Theory: Probability concepts, Random variables, moments, Moment Generating function, Binomial, Poisson, Geometric, Negative binominal, Exponential, Gamma, Weibull distributions, Functions of random variable, Chebychev inequality, Application in Networks.

UNIT V
Queueing Theory: Markovian queueing models, Little's formula, Multi-server queues, M/G/1 Queues, Pollaczek-Khintchine formula, Applications in Networks.

REFERENCE BOOKS:
UNIT I

UNIT - II

UNIT III

UNIT IV

UNIT V

REFERENCE BOOKS:
UNIT I

UNIT II
Network installation and upgrades, Connectors, Components, Structured Wiring Systems, Wiring Techniques, Crimping Cables, Cabling Diagram, Wiring for a UTP Patch Cable, Wiring for a Cross-over Cable, Network Adapter Cards, Network Card Drivers, Configuring network services.

UNIT III
Network Design: Major challenges in network design, centralized network design, distributed network design, Technical consideration of networking design and planning, Similarities and comparisons between LAN and WAN design, Performance analysis.

UNIT IV
LAN and WAN network design: Management overview of LAN design and planning, Information source for baseline LAN models, LAN planning and design tools, Management overview of WAN network design, Technical overview of WAN network design, Major features and functions of automated design tools.

UNIT V
Troubleshooting: Troubleshooting equipment, Terminators, Loopback test, Crossover cable, Volt-Ohm meters, Tone generators and probe, Cable Testers and Certifiers, Time-Domain Reflectometer (TDR), Product Indicators, Test Frame and Packet Generators, Network Monitors, Protocol Analyzer, SNMP, Troubleshooting Networks, Troubleshooting Cabling, Troubleshooting Infrastructure, Troubleshooting Name Resolution, Establishing a Session, Troubleshooting services, Service Packs and Driver Updates, Performance Monitor, Network Monitor.

REFERENCE BOOKS:
1. Teresa C. Mann-Rubinson, Kornel Terplan, Network Design Management and Technical Perspective.
2. Network analysis architecture and design, James D. McCabe, Published 2003
4. Data and computer communications: Networking and Internetworking, Gurdeep S. Hura, Mukesh Singhal
UNIT I

UNIT- II

UNIT III

UNIT IV
Web documents distribution and caching : caching the web data - Interactions with enterprise server , application server etc. Web services : architecture, design and implementation issues , advantages and applications of web services.

UNIT V

REFERENCE BOOKS:
4. Ajax in Action By Dave crane, Eric Pascarello and Darren James, 2005
UNIT I

UNIT II
Relational DB Design : Integrity constraints- Referential Integrity – assertions – triggers – Functional Dependency - Normalization - Programming Relational Databases- Interfacing to Relational databases; Extending the relational model; extending SQL with programming facilities (using PL/SQL); active rules (using Oracle Triggers).

UNIT III
Object oriented Databases: Object oriented DBs -Object modelling in database systems- Object identity – OODBMS architecture and storage issues - Querying persistent objects- Transactions and concurrency control – clustering – indexing – case study

UNIT IV

UNIT V
Multimedia Databases: Nature of multimedia data: multimedia data storage and management; content-based querying and retrieval; meta-data generation, ontologies, challenges; retrieval from textual databases.

REFERENCE BOOKS:
UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V
Usability evaluation and standards – Emerging paradigms of user interaction- Designing for Users with special needs: Need – Various accessibility techniques– Case studies

REFERENCE BOOKS:
UNIT I
HIGH SPEED NETWORKS

UNIT II
ATM

UNIT III
CONGESTION AND TRAFFIC MANAGEMENT

UNIT IV
FRAME RELAY AND SONET
Introduction to Frame Relay – operation and layers – Introduction to SONET – Optical components – SONET and SDH frames – Virtual tributaries - Synchronization and timing – Maintenance. Traffic Management Frame work. Introduction to VOIP

UNIT V
OPTICAL NETWORKS

REFERENCE BOOKS:
NIE 622 - NETWORK SECURITY

UNIT I
INTRODUCTION

UNIT II
CRYPTOGRAPHY

UNIT III
DIGITAL SIGNATURE AND AUTHENTICATION PROTOCOLS

UNIT IV

UNIT V
SECURITY AUDITING AND E-MAIL SECURITY
Security Monitoring and Auditing - Designing an Auditing System, Implementation Considerations, Auditing to Detect Violations of a security Policy, Auditing Mechanisms, Audit Browsing - Electronic mail security – PEM and S/MIME security protocol – Pretty Good Privacy

REFERENCE BOOKS:
UNIT I

UNIT II
Ontology Languages for the Semantic Web: Introduction - OIL and DAML+OIL - Semantic web pyramid of languages - design rationale for OIL - OIL language constructs - Different syntactic forms - language layering - semantics - From OIL to DAML+OIL

UNIT III

UNIT IV

UNIT V
Ontology based knowledge management - case studies - Semantic web tools

REFERENCE BOOKS:

UNIT I

UNIT II
PROCESSES AND DISTRIBUTED OBJECTS: Inter Process Communication - The API for the Internet Protocols - External Data Representation and Marshalling - Client-Server Communication - Group Communication - Case Study - Distributed Objects and Remote Invocation - Communication Between Distributed Objects - Remote Procedure Call - Events and Notifications - Java RMI - Case Study.

UNIT III

UNIT IV
DISTRIBUTED TRANSACTION PROCESSING: 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

UNIT V
GRID COMPUTING: Standards for Distributed and Grid Computing: Web Services Resource Framework (WSRF) - Common Object Request Broker Architecture (CORBA) - Distributed Resource Management Application API (DRMAA) - A Simple API for Grid Applications (SAGA) - Grid Security Infrastructure (GSI) - Open Grid Services Architecture (OGSA) - Open Grid Services Infrastructure (OGSI)

REFERENCE BOOKS:
UNIT I

UNIT II
Wireless LAN standard - Evolution of IEEE 802.11- Introduction to IEEE 802.11 – General Description – Medium Access Control (MAC) for the IEEE 802.11 WLANs – Physical Layer for IEEE 802.11 WLANs; Radio systems –IR Systems – Applications - RF Standards: DECT – Bluetooth –WATM – Home RF – HIPERLAN

UNIT III

UNIT IV

UNIT V

REFERENCE BOOKS:
NIE 712 - NETWORK MANAGEMENT

UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V

REFERENCE BOOKS:
NIE 651 - STORAGE AREA NETWORKS

UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V

REFERENCE BOOKS:
6. Christopher Poelker, “Storage Area Networks for Dummies”
UNIT I

UNIT II

UNIT III

UNIT IV
Wavelength rerouting algorithms – Network survivability – backup multiplexing, link based restoration, path based restoration – Multicast traffic routing – source rooted trees.

UNIT V

REFERENCE BOOKS:
UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V

REFERENCE BOOKS:
UNIT I

UNIT II

UNIT III
Electronic payment systems : e-cash , electronic wallets, smart cards etc – credit cards payment acceptance and processing . e-commerce strategies : web auctions, virtual communities, web portals etc
Supply Chain Management and e-Commerce: Introduction to SCM – e-commerce implementation with SCM.

UNIT IV

UNIT V
Legal and Ethical Issues in e-Commerce : - Global, Social, and Other Issues in e-Commerce
Recent Trends – case studies.

REFERENCE BOOKS:
UNIT I
Introduction to Web Search Engines: Roadmap - Architecture - Overview of Crawlers: Design - Working principles – Engineering the large scale crawlers: DNS caching, prefetching – Link extraction and normalization – Robot exclusion – Avoiding repetitions etc.

UNIT II

UNIT III
Link Analysis: Need & Importance - Techniques. Clustering: Clustering of web search results: Formulation and approaches - Collaborative filtering techniques - Dynamic clustering - Query Optimization techniques

UNIT IV

UNIT V
Recent Trends in search engine domain – Case studies – Implementation of search engine using appropriate technologies.

REFERENCE BOOKS:
1. Mining the Web: Discovering Knowledge from Hypertext Data (Hardcover) By Soumen Chakrabarti, 2002
UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V

REFERENCE BOOKS:
UNIT I
Advanced Networks Introduction: Switching concepts; Switch forwarding techniques; switch path control - LAN switching; cut through forwarding; store and forward; ATM Switching Switch models - Blocking networks – basic and enhanced banyan networks - sorting networks - merge sorting - rearrangeable networks - full and partial connection networks - nonblocking networks – construction and comparison of non-blocking network.

UNIT II

UNIT III

UNIT IV
NFS Performance Tuning: NFS server constraints, NFS client improvements, NFS over WANs, Automounter and other tricks.

UNIT V

REFERENCE BOOKS:
UNIT I

Introduction


UNIT II

SECURITY IN PERVERSIVE COMPUTING


Security Technologies: Public Key Infrastructure (PKI) – terms of PKI – Simple Public Key Infrastructure (SPKI) – terms of SPKI – Role Based Access Control (RBAC) – terms of RBAC.


UNIT III

ISSUES, CHALLENGES AND ATTACKS


Assumptions made in security analysis: Social basis – threat assumptions – existence of a trusted computing base

Challenges: Challenges on attacks – computation power – lack of clarity and firewall approach.


UNIT IV

LOCAL AREA AND WIDE AREA WIRELESS TECHNOLOGIES


UNIT V

PROTOCOLS AND APPLICATIONS

REFERENCES


NIE 659 – INFORMATION STORAGE ARCHITECTURE

Unit – I

Concepts of Storage Networking: The Data Storage and Data Access Problem - The Battle for Size and Access - Decoupling the Storage Component: Putting Storage on the Network - Decoupling the Storage Component: Creating a Network for Storage

Unit – II

Storage Fundamentals: Storage Architectures - Device Overviews - Connectivity Options - Data Organizational Methods

Unit – III

Network Attached Storage: Putting Storage on the Network: A Detailed Discussion - NAS Hardware Devices - NAS Software Components - NAS Connectivity Options

Unit- IV

Storage Area Networks: Architecture Overview - Hardware Devices - Software Components - Configuration Options for SANs

Unit V

Application & Management -Putting It Together - Defining the I/O Workload - Applying the SAN Solution - Applying the NAS Solution - Considerations When Integrating SAN and NAS - Planning Business Continuity - Managing Availability

REFERENCES

UNIT I

SENSOR NETWORKS


UNIT II LOCALIZATION AND TRACKING

A tracking scenario – sensing model – Collaborative localization – Bayes state estimation – distributed representation – Tracking multiple objects – Ranging techniques – Range based localization algorithms – location services

UNIT III


UNIT IV

NETWORKING SENSORS AND NETWORK PLATFORMS


UNIT V

RFID BASICS


REFERENCES

UNIT I  FUNDAMENTAL DESIGN ASPECTS


UNIT II  PROCESS MODELS AND CO DESIGN


UNIT III  INSTRUCTION SET ARCHITECTURE


UNIT IV  EMBEDDED SOFTWARE


UNIT V  EMBEDDED SYSTEM VERIFICATION AND VALIDATION


REFERENCES


NIE 662 – CLOUD COMPUTING

UNIT – I
Cloud Computing
The Cloud – Cloud Versus Grid - Cloud Application Architectures - Cloud Computing components - Cloud Infrastructure Models - An Overview of Amazon Web Services

UNIT – II
Amazon Cloud Computing - Amazon S3 - Amazon EC2 - Before the Move into the Cloud - The Shift to a Cloud Cost Model - Service Levels for Cloud Applications - Security - Disaster Recovery

UNIT – III
Ready for the Cloud - Web Application Design - Machine Image Design - Privacy Design - Database Management

UNIT – IV

UNIT – V
Disaster Recovery - Disaster Recovery Planning - Disasters in the Cloud - Disaster Management. Scaling a Cloud Infrastructure - Capacity Planning - Cloud Scale

REFERENCES
1. Cloud Application Architectures: Building Applications and Infrastructure in the Cloud (Theory in Practice (O'Reilly))
   By George Reese

NIE 663 – REAL TIME SYSTEM

Unit – I

Task Assignment and Scheduling: Different task model, Scheduling hierarchy, offline vs Online Scheduling, Clock Drives.

Unit – II
Model of Real Time System: Processor, resources, temporal parameter, Periodic Task Model, Sporadic Task Model, Precedence Constraints and Data Dependencies, Scheduling hierarchy
**Scheduling of Periodic Task:** Assumptions, fixed versus dynamic priority algorithms, schedulability test for fixed priority task with arbitrary deadlines.

**UNIT - III**

**Scheduling of Aperiodic and Sporadic Tasks:** Assumptions and approaches, deferrable, sporadic servers, slack stealing in deadline driven and fixed priority systems. Two level schemes for integrated scheduling, Scheduling for applications having flexible constrains.

**Resources and Resource Access Control:** Assumptions on resources and their usage, resource contention, resource access control (Priority Ceiling Protocol, Priority Inheritance protocol, Slack Based Priority Ceiling Protocol, Preemption Ceiling Protocol).

**UNIT - IV**

**Multi Processor Scheduling:** Model of multi processor and distributed systems, scheduling algorithms for end to end periodic tasks in homogeneous/heterogeneous systems, Predictability and validation of dynamic multiprocessor system.

**UNIT - V**

**Real time Communication:** Model of real time Communication, Priority base service

For switched network, Weighted Round Robin Service, Medium access Control Protocol, Real Time Protocol.

**REFERENCES :**


**NIE 664 – BIO - METRIC BASED SECURITY SYSTEMS**

**UNIT I**
**Introduction to Biometrics Authentication:** Biometrics authentication Traditional methods for personal authentication. Some definitions of biometrics authentication technologies and systems, Software and hardware biometrics systems. Image processing and pattern recognition in living body, including human head & face, the mechanism of human eye, hand & skin characteristics.

**UNIT II**
**Biometrics Sensors and Data Acquisition:** Biometric data acquisition and database. **Biometrics Pre-processing:** The related biometrics preprocessing technologies, including: noise removing, edge sharpening, image restoration, image segmentation, pattern extraction and classification.

**UNIT III**
**Biometrics Feature Extraction:** Basic elements in pattern recognition system, and some basic introduction of pattern recognition systems on biometrics (such as fingerprint, palm-print, finger, hand, face, iris, and face, as well as dental, DNA, and retina recognition). **Features Matching and Decision Making:** Various matching methods, including PCA and LDA. Introduce decision theory and their examples.

**UNIT IV**
**Design and Implementation of Biometric Systems**
Basic approaches of automated biometrics identification and verification systems. Various performance comparison and their analysis for large population authentication, accuracy and reliability of authentication in an e-world.

UNIT V

Biometric Authentication Applications
Various applications, including access control like a lock or an airport check-in area; immigration and naturalization; welfare distribution; military identification; banking, e.g., check cashing, credit card, ATM (automated teller machine); computer login; intruder detection; smart card; multi-media communication; WWW and an electronic purse; sensor fusion; decision fusion; categorization: e.g., age and gender; industrial automation; gesture interpretation; efficient enrollment; audio-visual tracking; stock market; on-line shopping; compact embedded systems and other commercialized services.

REFERENCES:

IEEE Transaction on Pattern Analysis and Machine Intelligence.