AFFILIATED INSTITUTIONS

ANNA UNIVERSITY, CHENNAI

Regulations - 2009

M.E. MOBILE AND PERVASIVE COMPUTING

II TO IV SEMESTER (FULL TIME) CURRICULUM AND SYLLABI

SEMESTER II

SL. NO.	CODE NO	COURSE TITLE	L	T	P	C
THEORY						
1.	MP9221	Wireless Sensor Networks	3	0	0	3
2.	CS9222	Advanced Operating Systems	3	0	0	3
3.	MP9222	Distributed Systems	3	0	0	3
4.	MP9223	Software Technologies for Pervasive Computing	3	0	0	3
5.	E1	Elective I	3	0	0	3
6.	E2	Elective II	3	0	0	3
PRACTICAL						
7.	MP9226	Pervasive Computing Lab	0	0	3	2
8.	MP9227	RFID and Sensor Networks Lab	0	0	3	2
			18	0	6	22

SEMESTER III

SL. NO.	CODE NO	COURSE TITLE	L	T	P	C
THEORY						
1.	E	Elective – III	3	0	0	3
2.	E	Elective – IV	3	0	0	3
3.	E	Elective – V	3	0	0	3
PRACTICAL						
4.	MP9231	Project Work (Phase I)	0	0	12	6
			9	0	12	15

SEMESTER IV

Sl. No.	Code No	Course Title	L	T	P	C
THEORY						
PRACTICAL						
1.	MP9241	Project Work (Phase II)	0	0	24	12
			0	0	24	12

LIST OF ELECTIVES FOR

SEMESTER II

SL. NO	CODE NO.	COURSE TITLE	L	T	P	C
1.	MP9251	RFID and its Applications	3	0	0	3
2.	MP9252	XML and Web Services	3	0	0	3
3.	MP9253	Security in Sensor Networks	3	0	0	3

SEMESTER III

SL. NO	CODE NO.	COURSE TITLE	L	T	P	C
1.	MP9261	Wearable Computing	3	0	0	3
2.	MP9262	Human Computer Interactions	3	0	0	3
3.	MP9263	High Performance Communication Networks	3	0	0	3
4.	MP9264	Context Aware computing	3	0	0	3

MP9221   **WIRELESS SENSOR NETWORKS**   **LT P C**
                                                                          3 0 0 3

UNIT I   INTRODUCTION   9
Challenges for wireless sensor networks, Comparison of sensor network with ad hoc network, Single node architecture – Hardware components, energy consumption of sensor nodes, Network architecture – Sensor network scenarios, types of sources and sinks, single hop versus multi-hop networks, multiple sinks and sources, design principles, Development of wireless sensor networks.

UNIT II   PHYSICAL LAYER   9
Introduction, wireless channel and communication fundamentals – frequency allocation, modulation and demodulation, wave propagation effects and noise, channels models, spread spectrum communication, packet transmission and synchronization, quality of wireless channels and measures for improvement, physical layer and transceiver design consideration in wireless sensor networks, Energy usage profile, choice of modulation, Power Management .

UNIT III   DATA LINK LAYER   9
MAC protocols – fundamentals of wireless MAC protocols, low duty cycle protocols and wakeup concepts, contention-based protocols,   Schedule-based protocols - SMAC, BMAC, Traffic-adaptive medium access protocol (TRAMA), Link Layer protocols – fundamentals task and requirements, error control, framing, link management.

UNIT IV   NETWORK LAYER   9
Gossiping and agent-based uni-cast forwarding, Energy-efficient unicast, Broadcast and multicast, geographic routing, mobile nodes, Data-centric routing – SPIN, Directed Diffusion, Energy aware routing, Gradient-based routing – COUGAR, ACQUIRE, Hierarchical Routing – LEACH, PEGASIS, Location Based Routing – GAF, GEAR, Data aggregation – Various aggregation techniques.

UNIT V   CASE STUDY   9
Target detection tracking, Habitat monitoring, Environmental disaster monitoring, Practical implementation issues, IEEE 802.15.4 low rate WPAN, Operating System Design Issues, Introduction to TinyOS – NesC, Interfaces, modules, configuration, Programming in TinyOS using NesC, Emulator TOSSIM.

                                                                  TOTAL : 45 PERIODS

REFERENCES:
1. Kazem Sohraby, Daniel Minoli and Taieb Znati, " Wireless Sensor Networks Technology-Protocols and Applications", John Wiley & Sons, 2007.
2. Feng Zhao, Leonidas Guibas, "Wireless Sensor Networks: an information processing approach", Else vier publication, 2004.
3. C.S.Raghavendra Krishna, M.Sivalingam and Tarib znati, "Wireless Sensor Networks", Springer publication, 2004.
4. Holger Karl , Andreas willig, "Protocol and Architecture for Wireless Sensor Networks", John wiley publication, Jan 2006.
5. K.Akkaya and M.Younis, " A Survey of routing protocols in wireless sensor networks", Elsevier Adhoc Network Journal, Vol.3, no.3,pp. 325-349, 2005.
6. Philip Levis, " TinyOS Programming", 2006 – www.tinyos.net.
7. I.F. Akyildiz, W. Su, Sankarasubramaniam, E. Cayirci, "Wireless sensor networks: a survey", computer networks, Elsevier, 2002, 394 - 422.
8. Jamal N. Al-karaki, Ahmed E. Kamal, "Routing Techniques in Wireless sensor networks: A survey", IEEE wireless communication, December 2004, 6 – 28.

CS9222   **ADVANCED OPERATING SYSTEMS**   **LT P C**
                                                                                     3 0 0 3

UNIT I   INTRODUCTION   9
Overview - Functions of an Operating System – Design Approaches – Types of Advanced
Operating System - Synchronization Mechanisms – Concept of a Process, Concurrent
Processes – The Critical Section Problem, Other Synchronization Problems – Language
Mechanisms for Synchronization – Axiomatic Verification of Parallel Programs - Process
Deadlocks - Preliminaries – Models of Deadlocks, Resources, System State – Necessary and
Sufficient conditions for a Deadlock – Systems with Single-Unit Requests, Consumable
Resources, Reusable Resources**.**

UNIT II   DISTRIBUTED OPERATING SYSTEMS   9
Introduction – Issues – Communication Primitives – Inherent Limitations - Lamport's Logical
Clock; Vector Clock; Causal Ordering; Global State; Cuts; Termination Detection. Distributed
Mutual Exclusion – Non-Token Based Algorithms – Lamport's Algorithm   - Token-Based
Algorithms – Suzuki-Kasami's Broadcast Algorithm – Distributed Deadlock Detection – Issues –
Centralized Deadlock-Detection Algorithms - Distributed Deadlock-Detection Algorithms.
Agreement Protocols – Classification - Solutions –Applications.

UNIT III   DISTRIBUTED RESOURCE MANAGEMENT   9
Distributed File systems – Architecture – Mechanisms – Design Issues – Distributed Shared
Memory – Architecture – Algorithm – Protocols - Design Issues. Distributed Scheduling – Issues
– Components – Algorithms.

UNIT IV   FAILURE RECOVERY AND FAULT TOLERANCE   9
Basic Concepts-Classification of Failures – Basic Approaches to Recovery; Recovery in
Concurrent System; Synchronous and Asynchronous Checkpointing and Recovery; Check
pointing in Distributed Database Systems; Fault Tolerance; Issues - Two-phase and Non-
blocking Commit Protocols; Voting Protocols; Dynamic Voting Protocols;

UNIT V   MULTIPROCESSOR AND DATABASE OPERATING SYSTEMS   9
Structures – Design Issues – Threads – Process Synchronization – Processor Scheduling –
Memory Management – Reliability / Fault Tolerance; Database Operating Systems –
Introduction – Concurrency Control – Distributed Database Systems – Concurrency Control
Algorithms.

                                                                  TOTAL : 45 PERIODS
TEXT BOOKS

1. Mukesh Singhal and N. G. Shivaratri, "Advanced Concepts in Operating Systems", McGraw-
    Hill, 2000

REFERENCES .

1. Abraham Silberschatz, Peter B. Galvin, G. Gagne, "Operating System Concepts", Sixth
    Edition, Addison Wesley Publishing Co., 2003.
2. Andrew S. Tanenbaum, "Modern Operating Systems", Second Edition, Addison   Wesley,
    2001.

MP9222   **DISTRIBUTED SYSTEMS**   **L T P C**
                                                                        3 0 0 3

UNIT I   ARCHITECTURES AND PROCESSES   9
Introduction to Distributed System – Goals – Types of Distributed System, Architectural Styles,
system Architecture – Architecture Vs Middle wave – Self Management in Distributed System -
Threads – Virtualization – Clients – Servers – code migration.

UNIT II   COMMUNICATION AND NAMING   9
Fundamentals – Remote procedure call – Message Oriented communication – Stream Oriented
Communication Multicast Communication – Names, Identifiers and addresses – Flat, structured
and Attribute – based Naming.

UNIT III   SYNCHRONIZATION, CONSISTENCY AND REPLICATION   9
Clock synchronization – Logical clocks – Lamport – vector clocks – Token based and non-token
based algorithms – Ricart – Agrawala Algorithms. Distributed deadlock detection - Agreement
protocols. Introduction to consistency and Replication – Data Centric and client centric
consistency models – Replica Management, consistency protocols.

UNIT IV   DISTRIBUTED RESOURCE MANAGEMENT   9
Distributed File System – Architecture, Mechanisms for building Distributed File system –
Design issues – case studies: Sun NFS, Sprite, Apollo DOMAIN Coda, x-Kernel Logical File
Systems Log structured File Systems – Distributed shared Memory – Architecture and
Motivation – Algorithms for Implementing Distributed Shared Memory, Memory coherence,
Coherence protocols – Design issues – case studies: Ivy, mirage and clouds. Fault Tolerance –
Issues – Atomic Actions and Committing – Commit protocols – Non blocking commit protocols –
voting and dynamic voting protocols –Majority based dynamic and dynamic vote reassignment
protocols – Failure resilient processes – Reliable communication – Fault tolerance under Unix .

**UNIT V   DISTRIBUTED OBJECT-BASED, WEB-BASED AND CO-ORDINATION
                  BASED SYSTEMS   9**
Architecture – processes – Communication – Naming – Synchronization – consistency and
Replication, Faculty tolerance and security in distributed web based, object based and co-
ordination based systems.

                                                              TOTAL : 45 PERIODS

TEXT BOOKS

1. Andrew S.Tanenbaum, Maarten Van Steen, Distributed Systems, Principles and paradigms
    – Second Edition, Prentice Hall of India, New Delhi 2008.
2. Mukesh Singhal, Niranjan G.Shivaratri, Advanced concepts in Operating Systems, Tata
    McGraw-Hill Publishing Co.Ltd. New Delhi, 2001.

REFERENCES

1. George Coulouris, Jean Dollimore, Tim Kindberg, "Distributed Systems Concepts and
    Design", Third Edition, Pearson Education Asia, 2002.
2. M.L.Liu, "Distributed Computing Principles and Applications", Pearson Addison Wesley,
    2004.

MP9223   **SOFTWARE TECHNOLOGIES FOR PERVASIVE COMPUTING**   **L T P C**
                                                                                                          3 0 0 3

UNIT I   ISSUES AND CHALLENGES   9
Challenges of Concurrent and Networked Software: Service Access and Configuration – Other Challenges for Networked Software **–** The Mobile Development Process – Architecture – Design and Technology Selection for Mobile Applications

UNIT II   APPLICATION AND USER INTERFACE DEVELOPMENT   9
Introduction to Mobile Development Frameworks and Tools Accessed today – Fully Centralized Frameworks and Tools – N – Tier Client–Server Frameworks and Tools – JAVA – BREW – WINDOWS CE – WAP – Symbian EPOC

UNIT III   UML AND USER INTERFACE DEVELOPMENT   9
Introduction to UML – Class diagrams – Object diagrams – Collaboration diagrams – Sequence diagrams – Activity diagrams – State chart diagrams – Component diagrams – Deployment diagrams – Use case diagrams – Device – Independent and Multi – channel User Interface Development Using UML

UNIT IV   J2ME OVERVIEW   9
J2ME Overview – J2ME and Wireless Devices – Small Computing technology – Wireless Technology – Radio Data Networks –   Microwave Technology – Mobile Radio Networks – J2ME Architecture and Development Environment – Runtime Environment – Midlet Programming – J2ME Wireless Toolkit

UNIT V   J2ME USER INTERFACE   9
J2ME User Interface – Commands, Items and Event Processing – Exception Handling – High – Level Display – Screens – Low Level Display – Canvas – User Interactions – graphics – Clipping Regions – Animations.

                                                                                  TOTAL : 45 PERIODS

TEXT BOOKS
1. Reza B'Far, "Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML", Cambridge University Press
2. James Keogh, "J2ME: The Complete Reference", Tata McGraw Hill, 2003.

MP9227   **RFID & SENSOR NETWORKS LAB**   **L T P C**
                                                                                                          0 0 3 2
EXPERIMENTS ON RFID
1. Study of RFIDs in 125 KHz, 13.56 MHz and 8.2 to 9.15 MHz range.
2. ASK & FSK Modulation & Demodulation in RFID tags and readers
3. Design of Power Conversion circuits to convert RF into DC with RFID tag(Energy Harvesting)
4. Simple RFID application through API configuration using LF,HF and UHF reader.
5. RFIC transmitter & receiver circuit using Harmonic balance simulation
6. RFIC transmitter & receiver circuit using DC circuit simulation
7. Design of RFID reader antenna using Momentum Simulation
8. Design of RFID antenna using S-parameter simulation

                                                                                  TOTAL : 45 PERIODS

MP 9227 – Requirements for RFID & Sensor Networks Lab

S.No	Experiment name as prescribed in the syllabus	Required Resources	Available Quantity / Users
1	Study of RFIDs in 125 KHz, 13.56 MHz and 8.2 to 9.15 MHz range.	125KHz RFID Reader, HF Mullion Reader , UHF Handheld Reader	1 3 1
2	ASK & FSK Modulation & Demodulation in RFID tags and readers	ADS	5 Users
3	Design of Power Conversion circuits to convert RF into DC with RFID tag (Energy Harvesting)	ADS	5 Users
4	Simple RFID application through API configuration using LF,HF and UHF reader	Microsoft Visual Basic, 125KHz RFID Reader, HF Mullion Reader , UHF Handheld Reader	25 Systems 1 3 1
5	RFIC transmitter & receiver circuit using Harmonic balance simulation	ADS	5 Users
6	RFIC transmitter & receiver circuit using DC circuit simulation	ADS	5 Users
7	Design of RFID reader antenna using Momentum Simulation	ADS	5 Users
8	Design of RFID antenna using S-parameter simulation	ADS	5 Users

LIST OF EXPERIMENTS

I STUDY EXPERIMENT:
To explore overall view about
- Pervasive Computing Architecture
- Communication protocols
- Software infrastructure
- Security mechanisms.

II TO DESIGN THE SOFTWARE FOR MOBILE PHONES

USING J2ME

1. Develop a small MIDLET program, and display the simple text message on the screen

2. With the different User Interface, construct the MIDLET program for simple applications

3. Write a MIDLET program, for displaying title, bars and grid using Chart canvas

4. Develop J2ME program, to add, change & Remove data from database

5. Write a J2ME program to find a specific records using RMS Interface

6. Develop communication Socket program using J2ME.

7. Design and Develop a J2ME code to communicate with a server through HTTP connection.

USING SYMBION OS

1. Text based Applications
   Coding and implementing a simple programme for basic text string handling.
   Example: Displaying a user defined text string

2. Simple Graphical Applications:
   Display a user defined text within a graphical window.

3. Dialog based Applications:
   Create a dialog box-attached with buttons such as "DISPLAY" (this will display a text string) and "CLOSE", (which will close the dialog box)

4. Drawing Application
   Drawing basic shapes (points, lines, arcs, filled shapes and bitmaps within a graphical window

5. Basics of File handling:
   Implement the following file operations.
       1. Create
       2. Write text data
       3. Save
       4. Open
       5. Edit

6. **CASE STUDIES. PROJECTS IN PERVASIVE COMPUTING:**
   To explore wearable and handheld computing and their enabling technologies

TOTAL : 45 PERIODS

MP 9226 – Requirement for Pervasive Computing Lab

S.No	Experiment name as prescribed in the syllabus	Required Resources	Available Quantity / Users
1	Develop a small MIDLET program, and display the simple text message on the screen	**J2ME (Free Software)**	25 Systems
2	With the different User Interface, construct the MIDLET program for simple applications	**J2ME (Free Software)**	25 Systems
3	Write a MIDLET program, for displaying title, bars and grid using Chart canvas	**J2ME (Free Software)**	25 Systems
4	Develop J2ME program, to add, change & Remove data from database	**J2ME (Free Software)**	25 Systems
5	Write a J2ME program to find a specific records using RMS Interface	**J2ME (Free Software)**	25 Systems
6	Develop communication Socket program using J2ME	**J2ME (Free Software)**	25 Systems
7	Design and Develop a J2ME code to communicate with a server through HTTP connection.	**J2ME (Free Software)**	25 Systems
8	Text based Applications-Coding and implementing a simple programme for basic text string handling. Example: Displaying a user defined text string	**Symbion OS, Carbide C++, Professional Edition**	4 Systems
9	Simple Graphical Applications: Display a user defined text within a graphical window.	**Symbion OS, Carbide C++, Professional Edition**	4 Systems
10	Dialog based Applications: Create a dialog box-attached with buttons such as "DISPLAY" (this will display a text string) and "CLOSE", (which will close the dialog box)	**Symbion OS, Carbide C++, Professional Edition**	4 Systems
11	Drawing Application Drawing basic shapes (points, lines, arcs, filled shapes and bitmaps within a graphical window	**Symbion OS, Carbide C++, Professional Edition**	4 Systems

12	Basics of File handling:
	Implement the following file operations.
	    1. Create
	    2. Write text data
	    3. Save
	    4. Open
	    5. Edit
		Symbion OS, Carbide C++, Professional Edition	4 Systems

13	Case Study :To explore wearable and handheld computing and their enabling technologies	**Handheld UHF RFID reader**	2

MP9251   **RFID AND ITS APPLICATIONS**   **L T P C**
                                                                         3 0 0 3

UNIT I   **RF FUNDAMENTALS**   **9**
RF operating principle – Frequency divider –Coupling – Inductive coupling, Electromagnetic back scatter coupling, close coupling, Electrical coupling – Frequency ranges used in RF- Coding - Digital Modulation – ASK,FSK,PSK.

UNIT II   **RFID SYSTEM PRINCIPLES**   **9**
RFID systems – Component of an RFID System – Frequency, Range & Coupling – Transponder & Reader System – Equivalent Circuit – RFID Antennas: Antenna Parameters – Gain & directional effect, EIRP & ERP, Input impedance, Effective aperture and scatter aperture, Effective length. Antenna types – Dipole antennas, Yagi – Uda Antenna, Patch or microstrip antenna, Slot antennas

UNIT III   **RFID SYSTEM ARCHITECTURE**   **9**
Architecture of Transponder – HF interface, Address & Security logic, Memory architecture – Microprocessors. Architecture of Reader - Components, Control Unit, Example – Reader IC U2270B, Connection of Antennas for inductive systems.

UNIT IV   **RFID MIDDLEWARE FOR APPLICATIONS**   **9**
Motivations – Logical Architecture – Application Level Events Specification – Commercial RFID Middleware – Example

UNIT V   **RFID APPLICATIONS**   **9**
Example Applications – Contact less Smart Cards, Public Transport, Ticketing, Access Control, Transport Systems, Animal Identification. Electronic immobilization, Container Identification, Waste Disposal, Industrial Automation, Medical Applications

                                               TOTAL : 45 PERIODS
TEXT BOOK
1. K.Finkenzeller, RFID Handbook: Fundamentals and Applications in contact less smart cards and identifications, John Wiley and sons Ltd, 2003

REFERENCES
1. Bill Glover and Himanshu Bhatt ,RFID Essentials,Oreilly,2006
2. Patrick J.Sweeney II ,RFID for Dummies ,Wiley Publishing, Inc.
3. Sandip Lahiri,RFID Handbook,IBM ,2006

MP9252   **XML AND WEB SERVICES**   **L T P C**
                                                                          3 0 0 3

UNIT I   XML TECHNOLOGY FAMILY   9
XML – benefits – Advantages of XML over HTML – EDI – Databases – XML based standards – DTD – XML Schemas – X – Files – XML processing – DOM – SAX – presentation technologies – XSL – XFORMS – XHTML – voice XML – Transformation – XSLT – XLINK – XPATH – XQ

UNIT II   ARCHITECTING WEB SERVICES   9
Business motivations for web services – B2B – B2C – Technical motivations – limitations of CORBA and DCOM – Service – oriented Architecture (SOA) – Architecting web services – Implementation view – web services technology stack – logical view – composition of web services – deployment view – from application server to peer to peer – process view – life in the runtime

UNIT III   WEB SERVICES BUILDING BLOCK   9
Transport protocols for web services – messaging with web services – protocols – SOAP – describing web services – WSDL – Anatomy of WSDL – manipulating WSDL – web service policy – Discovering web services – UDDI – Anatomy of UDDI – Web service inspection – Ad – Hoc Discovery – Securing web services.

UNIT IV   IMPLEMENTING XML IN E – BUSINESS   9
B2B – B2C Applications – Different types of B2B interaction – Components of e – business XML systems – ebXML – Rosetta Net Applied XML in vertical industry – web services for mobile devices.

UNIT V   XML AND CONTENT MANAGEMENT   9
Semantic Web – Role of Meta data in web content – Resource Description Framework – RDF schema – Architecture of semantic web – content management workflow – XLANG – WSFL .

                                                                 TOTAL: 45 PERIODS

TEXT BOOKS
1. Ron Schmelzer et al, "XML and Web Services", Pearson Education, 2002.
2. Sandeep Chatterjee and James Webber, "Developing Enterprise Web Services: An Architect's Guide", Prentice Hall, 2004.

REFERENCES

1. Frank P.Coyle, "XML, Web Services and the Data Revolution", Pearson Education, 2002.
2. Keith Ballinger, ".NET Web Services Architecture and Implementation", Pearson Education, 2003.
3. Henry Bequet and Meeraj Kunnumpurath, "Beginning Java Web Services", Apress, 2004.
4. Russ Basiura and Mike Batongbacal, "Professional ASP .NET Web Services", Apress, 2

MP9253　　　　　**SECURITY IN SENSOR NETWORKS**　　　　　**LT P C**
　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　3 0 0 3

UNIT I　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　**9**
Introduction- Overview of Sensor Networks - Classification of sensor networks -Architecture and Protocol Stack -Communication Protocols for Sensor Networks-Energy Efficient hardware design-Factors Influencing WSN-Wireless Sensor Network Applications

UNIT II　　　　　　　　　　　　　　　　　　　　　　　　　　　　　**9**
Protocols-Application Layer -Transport Layer -Routing Algorithms -Medium Access Control-Error Control -Physical Layer –Localization-Time Synchronization –QOS

UNIT III　　　　　　　　　　　　　　　　　　　　　　　　　　　　　**9**
Security-Security for Wireless Sensor Networks-Overview-Basic cryptographic primitives, including encryption, authentication, hashing, signatures and attacks they can prevent-Key Management-Security in Sensor Networks: Watermarking Techniques

UNIT IV　　　　　　　　　　　　　　　　　　　　　　　　　　　　　**9**
Localization and management-Group communication-Coordination and Communication Problems in WASNs-Localization in Sensor Networks-Sensor Management-.Adapting to the inherent dynamic nature of WSNs, and Sensor Networks and mobile robots.

UNIT V　　　　　　　　　　　　　　　　　　　　　　　　　　　　　**9**
Broadcast Authentication protocols-TELSA-Variation of TELSA-BiBa-HORNS-Sensor network simulators.

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REFERENCES

1. Donggang Liu, Peng Ning, "Security for Wireless Sensor Networks", Springer. ISBN: 0387327231, December 2006.
2. C. S. Raghavendra, Krishna M. Sivalingam, Taieb F. Znati, "Wireless sensor networks", Springer ISBN 1402078838, 2004.
3. Steven Strauss, S Iyengar Sitharama Iyengar, Brooks R R, IYENGAR S SITHARAMA, "Distributed Sensor Networks", CRC Press Technology ISBN 1584883839 , 2004.
4. Edgar H. Callaway, "Wireless Sensor Networks: architectures and protocols", CRC Press ISBN 0849318238, 2004.
5. Holger, "Protocols and Architectures for Wireless Sensor Networks", John Wiley and Sons Technology & IndustrialArts ISBN 0470095105, 2005.
6. Ivan Stojmenovi,"Handbook of Sensor Networks: Algorithms and Architectures", CRC Press ISBN: 978-0-471-68472-5, 2005.
7. Adrian Perrig, J. D. Tygar, "Secure Broadcast Communication: In Wired and Wireless Networks",Springer ISBN 0792376501, 2006.
   TinyOS 2.0 Simulation Working Group http://tinyos.stanford.edu:8000/SimWG

MP9261   **WEARABLE COMPUTING**   **L T P C**

                                                                        3 0 0 3

OBJECTIVE:
To examine and debate current research topics in wearable computing and to impart expertise to the student n the design and implementation of wearable computing solutions.

UNIT I   **9**
Introduction- Basic Concepts-Augmented Reality-Technology- A survey of Tracking Technologies for Virtual Environments-optical versus video see through head mounted displays-Augmenting reality using affine object representations.

UNIT II   **9**
Augmented Reality- Fundamental issues in Mediated Reality, Wear comp and camera based augmented reality- tracking for object centric Augmented Reality- A palmtop device Approach-Exterior Construction Application.

UNIT III   **9**
Wearable computers - Computational clothing and accessories – Situation aware computing with wearable computers - collaboration with wearable computers - computer networks for wearable computing

UNIT IV   **9**
Human Computer Interaction-Context awareness and adaptive user interface Design and development of wearable user interface-Evaluation of user interface

UNIT V   **9**
Applications of wearable com puting- Military Applications-Medical Application constructing wearable computers for maintenance application

                                                        TOTAL : 45 PERIODS

REFERENCES:

1. Woodrow Barfield, Thomas caudell, Fundamentals of wearable computers and augmented reality - Lawrence Erlbaum Associates 2001.

2. Hendrik Witt, User Interfaces for Wearable Computers, Development and evaluation – 1st Edition 2008.

3. James Everett Katz, Machines That Become Us. Transaction Publishers, 2001.

4. Maria-Isabel Sanchez-Segura, Developing Future Interactive Systems. Idea Group Inc (IGI) 2004

MP9262　　　　　　　　**HUMAN COMPUTER INTERACTIONS**　　　　　**L T P C**
　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　3 0 0 3

OBJECTIVE:
This course will introduce the students to the evolution of human-computer interaction, complexities in the interaction of people with machines, enumerate the types of hardware and focus on the various design paradigms. The students will learn how to design, Manage, maintain, train, refine and evaluate the user interface of interactive systems.

UNIT I　　　INTRODUCTION THE HUMAN AND COMPUTER　　　9
The Human: Introduction. Input-output Channels, Human memory, Thinking: reasoning and problem-solving, Individual differences, Psychology and the design of interactive systems. The computer: Introduction, Text entry devices, Positioning, pointing and drawing, Paper: printing and scanning, Memory, Processing and networks.

UNIT II　　　INTERACTION　　　　　　　　　　　　　　9
The Interaction: Introduction, Models of interaction, Frameworks and HCI, Ergonomics, Interaction styles, Elements of the WIMP interface, Interactivity, The context of the interaction, Experience, Engagement and fun, Paradigms: Introduction, Paradigm for interaction.

UNIT III　　　DESIGNING　　　　　　　　　　　　　　9
Interaction design basics: Introduction, The process of design, User focus, Scenarios, Navigation design, Screen design and layout, Iteration and Prototyping, HCI in the software process: Introduction, The software life cycle, Usability engineering, Iterative design and prototyping, Design rationale, Design rules: Introduction, Principles to support usability, Standards, Guidelines, Golden rules and heuristics, HCI patterns.

UNIT IV　　　MODELS　　　　　　　　　　　　　　　9
Cognitive models: Introduction, Goal and task hierarchies, Linguistics models, The challenge of display-based systems, Physical and device models, cognitive architecture, Communication and collaboration model: Introduction, Face-to-face communication, Conversation, Text-based communication, Group working, Models of the system: Introduction, Standard formalisms, Interactive models, Continuous behavior.

UNIT V　　　APPLICATIONS　　　　　　　　　　　　　9
Groupware: Introduction, Groupware systems, Computer-mediated communication, Meeting and decision support systems, Shared applications and artifacts, Frameworks for groupware, Implementing synchronous groupware, Hypertext, multimedia and the World Wide Web: Introduction, Understanding hyper text, Finding things, Web technology and issues, Static web content, Dynamic web content.

TOTAL : 45 PERIODS

REFERENCES:
1. Alan Dix, Janet Finlay, Gregory D.Abowd and Russell Beale. Human-Computer Interaction. Prentice Hall, Third edition, 2009.
2. J. Preece, Y. Rogers, H. Sharp, D. Benyon, S. Holland and T. Carey. Human-Computer Interaction. Addison Wesley, 1994.
3. Andrew Sears, Julie A. Jacko, The Human-Computer Interaction Handbook Fundamentals, Evolving Technologies, and Emerging Applications, Second Edition, Taylor & Francis Group, 2008.
4. Claude Ghaoui, Encyclopaedia of Human Computer Interaction. Wiley, 2000.

MP9263   HIGH PERFORMANCE COMMUNICATION NETWORKS   L T P C
3 0 0 3

OBJECTIVE:
The objective of this course is to enable students to understand various high performance communication networking technologies, switching, delay and congestion control, optical network, ISDN and their performances. Wireless high speed network and future technology along issues and challenges.

UNIT I   OVERVIEW OF HIGH PERFORMANCE COMMUNICATION
NETWORKS   8
MPLS-Label stack and label distribution - Traffic Engineering-Design of Switching systems and routers-switching networks-Crossbar switches, Multistage switches, shared memory switches -Optical networks and WDM techniques-IP over optical core switches.

UNIT II   CONGESTION CONTROL   8
Integrated Services - Differentiated service method, Congestion control - effects of congestion control, congestion control in packet switching networks - Frame relay congestion control-Flow control at link level, TCP congestion control.

UNIT III   VOICE OVER IP AND ISDN   11
Basic IP Telephone System -Digital Voice Sampling and Distortion - Compression Techniques for high speed Networks - Limit of compression - signalling - Protocol for VOIP -Telephone Numbering - H.323 Protocol - Session Initiation Protocol- Real Time Transport Protocols. ISDN: ISDN overview, ISDN Interfaces and functions, ISDN physical layer, ISDN services, signalling system number.

UNIT IV   ATM AND HIGH SPEED LAN NETWORKS   9
Frame relay - Packet switching networks, Frame relay networks - Asynchronous Transfer mode - ATM protocol architecture, ATM logical connections, ATM cells, ATM service categories, AAL - High speed LANs- Emergency of high speed LAN, Ethernet, Fiber channel, WLAN.

UNIT V   ADVANCED WIRELESS NETWORKS   9
Wireless WAN - GSM and TDMA technology, CDMA technology, Mobile data networks – Ad - hoc networking and WPAN - Wireless Geolocation System.

TOTAL: 45 PERIODS

 REFERENCES:

1. William Stallings "High-Speed Networks and Internets" Second Edition, Pearson Education, 2005.
2. Kaveh Pahlavan, Prasanth Krishnamurthy "Principles of Wireless Networks" Prentice Hall 2002 Edition.
3. Dougles E.Comer "Internetworking with TCP/IP" Volume I, Prentice -Hall 1995 Edition.
4. Dougles E.Comer "Computer Networks and Internet with Internet Applications" Prentice -Hall Fifth Edition 2008.
5. William Stallings "Data and Computer Communication" Pearson Education 2007 Edition.
6. H.Jonathan Chao, Bin Liu "High Performance Switches and Routers" John wiley & sons Inc. 2007 Edition.

MP9264   **CONTEXT AWARE COMPUTING**   **L T P C**
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OBJECTIVE:
This course will teach students the basics of context-aware systems. Perspectives from Artificial Intelligence machine learning, sensors and effectors, embedded devices, information visualization, philosophy and psychology are explored. The course also covers how the problem of context is treated and discusses the design of context-sensitive hardware and software.

UNIT I   INTRODUCTION AND CLASSIFICATIONS   9
Introduction to context-aware computing, Philosophical & Mathematical Positions on Context, Context Aware Computing Approaches, Types of context, Low level and high level context, Active and Passive context.

UNIT II   CAPABILITIES   9
Sensing, Adaptation, Resource discovery, Augmentation, Information delivery approaches, AI, Agents and System Reflection.

UNIT III   MODELING AND EVALUATION   9
Interaction design for applications and evaluation, Experimental design, Modeling and evaluation: context modeling, task modeling, User modeling, Systems modeling, committed action in context-aware systems, Context management.

UNIT IV   LEARNING AND RECOGNITION   9
Learning, machine learning, common sense applications of Context aware computing, Designer learning, reasoning and uncertainty Recognizing and interpreting intention, Context - aware: recognition and interpretation.

UNIT V   SOFTWARE SUPPORT AND APPLICATION   9
Context toolkits, Middleware support for Context Aware Computing Case studies and Applications of context-aware computing, Limitations of Context Aware Computing.

REFERENCES:
1. Thomas P. Moran. Context-aware Computing. Lawrence Erlbaum Assoc Inc, 2002.
2. Gay, Geri and Hem Brooke, Helene. Activity-centered design: an ecological approach to designing smart tools and usable systems. Cambridge, MA: MIT Press, 2004.
3. Ahmed Seffah, Homa Javahery. Multiple User Interfaces: Cross-Platform Applications and Context-Aware Interfaces. Hardcover- 2004.

SOURCES:

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2005/Readingsl

University: Lancaster University
http://www.comp.lancs.ac. uk/postgraduates/mod mobcomp.html

University: University of KENT
http://www.cs.kent.ac. uk/teaching/prospectus/msc *dsnl*