

B.E INFORMATION TECHNOLOGY

Fourth Year Semester VII

Subject: Mobile Computing

Lectures: 4 hrs per week

Practical: 2 hrs per week

Theory: 100 marks

Term work: 25 marks

Oral: 25 marks

Objective: Recent developments in devices and high bandwidth ubiquitous wireless networks have made mobile computing a reality. Indeed, it is widely predicted that within the next few years access to Internet services will be primarily from wireless devices, with desktop browsing the exception. Such predictions are based on the huge growth in the wireless phone market and the success of wireless data services. This course will help in understanding fundamental concepts, current developments in mobile communication systems and wireless computer networks.

Pre-requisites: Computer Networks

DETAILED SYLLABUS

- 1. Introduction: Applications, A short history of wireless communication**
- 2. Wireless Transmission: Frequency for radio transmission, signals, Antennas, Signal Propagation, Multiplexing, Modulation, Spread Spectrum, Cellular systems.**
- 3. Medium Access Control: Motivation for a specialized MAC: Hidden and Exposed terminals. Near and Far terminal; SDMA, FDMA, TDMA: Fixed TDM, Classical Aloha, Slotted Aloha, Carrier sense multiple access, Demand assigned multiple access, PRMA packet reservation multiple access, Reservation TDMA, Multiple access with collision avoidance, Polling, Inhibit sense multiple access; CDMA: Spread Aloha multiple access.**
- 4. Telecommunication systems: GSM: Mobile services, System architecture, Radio Interface, Protocols, Localization and Calling, Handover, Security, New data services; DECT: System architecture, Protocol architecture, TETRA, UMTS and IMT-2000: UMTS Basic architecture, UTRA FDD mode, UTRA TDD mode.**
- 5. Satellite Systems: History, Applications, Basics: GEO, LEO, MEO; Routing, Localization, Handover, Examples.**
- 6. Broadcast Systems: Overview, cyclic repetition of data, Digital audio broadcasting: Multimedia object transfer protocol; Digital video broadcasting.**
- 7. Wireless LAN: Infrared Vs Radio Transmission, Infrastructure and Ad hoc Networks, IEEE 802.11: System architecture, Protocol architecture, Physical layer, Medium access control layer, MAC management, Future development;**

- HIPERLAN: Protocol architecture, Physical layer, Channel access control. Sublayer, Medium Access control Sublayer, Information bases and Networking; Bluetooth: User scenarios, Physical layer, MAC layer, Networking. Security, Link management.**
- 8. Wireless ATM: Motivation for WATM, Wireless ATM working group, WATM services, Reference model: Example configurations, Generic reference model; Functions: Wireless mobile terminal side, Mobility supporting network side; Radio access layer: Requirements, BRAN; Handover: Handover reference model, Handover requirements, Types of Handover, Handover scenarios, Backward Handover, Forward Handover; Location management: Requirements for location management, Procedures and Entities; Addressing, Mobile quality of service, Access point control protocol.**
 - 9. Mobile Network Layer: Mobile IP: Goals, assumptions and requirements, Entities and Terminology, IP packet delivery, Agent advertisement and discovery, Registration, Tunneling and Encapsulation, Optimizations, Reverse tunneling, Ipv6; Dynamic host configuration protocol, Ad hoc networks: Routing, Destination sequence distance vector, Dynamic source routing, Hierarchical algorithms, Alternative metrics.**
 - 10. Mobile Transport Layer: Traditional TCP: Congestion control, Slow start, Fast retransmit/fast recovery, Implications on mobility; Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission/time-out freezing, Selective retransmission, Transaction oriented TCP.**
 - 11. Support for Mobility: File systems: Consistency, Examples; World Wide Web: Hypertext transfer protocol, Hypertext markup language, some approaches that might help wireless access, System architectures; wireless application protocol: Architecture, Wireless datagram protocol, Wireless transport layer security, Wireless transaction protocol, Wireless session protocol, Wireless application environment, Wireless markup language, WML script, Wireless telephony application, Examples Stacks with Wap, Mobile databases, Mobile agents.**

BOOKS

Text Books:

- 1. Jochen Schiller, “Mobile communications”, Addison wisely, Pearson Education**
- 2. William Stallings, “Wireless Communications and Networks’**

References:

1. Rappaort, “Wireless Communications Principles and Practices”
2. YI Bing Lin, “Wireless And Mobile Network Architectures”, John Wiley
3. P.Nicopolitidis, “Wireless Networks”, John Wiley
4. K Pahlavan, P.Krishnamurthy, “Principles of Wireless Networks”
5. M.Richharia, “Mobile Satellite Communication: Principles and Trends”,
Pearson Education.

TERM WORK

Term work should consist of at least 10 practical experiments and two assignments covering the topics of the syllabus.

ORAL EXAMINATION

An Oral examination is to be conducted based on the above syllabus.

**B.E Information Technology
Fourth Year Semester VII**

**Subject: Pattern Recognition
(Elective – I)**

**Lectures: 4 hrs per week
Practical: 2 hrs per week
Marks**

**Theory: 100 Marks
Term Work: 25**

Oral: 25 Marks

Objective: This course teaches the fundamentals of techniques for classifying multidimensional data to be utilized for problem solving in a wide variety of applications such as engineering system design, manufacturing, technical and medical diagnostics, image processing, economics, psychology.

Pre-requisites: Linear Algebra, Probability and Statistics.

DETAILED SYLLABUS

- 1. Introduction: Machine perception, Pattern recognition systems, Design cycle, learning and Adaptation.**
- 2. Bayesian Decision Theory: Bayesian Decision theory: continuous features, Minimum-Error rate classification, classification, classifiers, Discriminant Functions and decision surfaces, Normal Density, Discriminant functions for normal density, Bayes Decision theory: discrete features**
- 3. Maximum-Likelihood and Bayesian Parameter Estimation: Maximum Likelihood estimation, Bayesian estimation, Bayesian parameter estimation, Gaussian cause and General Theory, problems of dimensionality, hidden markov model.**
- 4. Non Parametric Techniques: Density estimation, parzen windows, K_n –Nearest Neighbor Estimation, Nearest Neighbor rule, Matrices and Nearest-Neighbor classification.**
- 5. Linear Discriminants Functions: Linear discriminant functions and decision surfaces, Generalized linear discriminant functions, 2-category linearly separable case, Minimising the Perception criterion function, Relaxation procedure, Non-separable behaviour, Minimum squared error procedure, Ho-Kashyap procedures, Multicategory generalizations.**
- 6. Nonmetric Methods: Decision tree, CART, ID3, C4.5, Gramatical methods, Gramatical interfaces.**
- 7. Algorithm Independent Machine Learning: Lack of inherent superiority of any classifier, Bias and Variance, Resampling for estimating statistic, Resampling for classifier design, Estimating and comparing classifiers, combining classifiers.**

8. Unsupervised Learning and Clustering: Mixture densities and Identifiability, Maximum-Likelihood estimations, Application to normal mixtures, Unsupervised Bayesian learning, Data description and clustering criterion function for clustering, Hierarchical clustering.

9. Applications of Pattern Recognition

BOOKS

Text Books:

- 1. Duda, Hart and Stock, “Pattern Classification”, John Wiley and Sons.**
- 2. Gose, Johnson Baugh and Jost, “Pattern Recognition and Image Analysis”, PHI.**

TERM WORK

Term work should consist of atleast 10 practical experiments and two assignments covering the topics of the syllabus.

ORAL EXAMINATION

An Oral Examination is to be conducted based on the above syllabus.

B.E. INFORMATION TECHNOLOGY
FOURTH YEAR SEMESTER VII

SUBJECT: ADVANCED COMPUTER NETWORKS
(ELECTIVE-I)

Lectures: 4 Hrs per Week
Practicals: 2 Hrs per Week

Theory: 100 Marks
Term Work: 25 Marks
Oral Examination: 25 Marks

Objectives: In first part, advanced technologies like High speed devices etc. are to be considered. Second part Network programming is to be studied. Not just SOCKETS but also protocols, drivers, simulation programming. In third part we should study Network Design, Protocol Design and analysis considering deterministic and non-deterministic approach. We expect natural thinking from student. For example he should be able to consider different constraints and assume suitable data and solve the problems.

Pre-requisites: Computer networks

DETAILED SYLLABUS

- 1. Data Communications:** business drivers and networking directions, data communication past and future.
- 2. Understanding the Standards and their Maker:** creating standards, players and process, current forums, standard protocols, layered reference models, the OSIRM, standard computer architectures.
- 3. Introduction to Transmission Technologies:** hardware selection in the design process.
- 4. Optical Networking:** SONET/SDH standards, dense wavelength division multiplexing (DWDM), performance and design considerations.
- 5. Physical Layer Protocols and Access Technologies:** physical layer protocols and interfaces, accessing the network, copper access technologies, cable access technologies, fiber access technologies, air access technologies.
- 6. Common Protocols and Interfaces in the LAN environment:** data link layers protocols, LLC and MAC sub layer protocol, Ethernet, token ring, token bus and FDDI, bridge protocol, switching in the LAN environment.
- 7. Frame Relay:** FR specification and design, VoFR: performance and design considerations, advantages and disadvantages of FR.

- 8. Common WAN Protocol: ATM:** many faces of ATM, ATM protocol Operation (ATM cell and transmission), ATM networking basics, theory of operations, B-ISDN protocol reference model, PHY layer, ATM layer (protocol model), ATM layer and cell (definition), traffic descriptors and parameters, traffic and congestion control defined, AAL protocol model, traffic contract and QoS, user plane overview, control plane AAL, management plane, sub-DS3 ATM, ATM public services.
- 9. Common Protocols and Interfaces in the Upper Layers (TCP/IP):** background (routing protocols), TCP/IP suite, network layer (internetwork layer), transport layer, application layer, addressing and routing design.
- 10. Mature Packet Switched Protocol:** ITU recommendation X.25, user connectivity, theory of operation, network layer functions, X.75 internetworking protocol, switched multimegabit data service (SMDS), SMDS and IEEE 802.6, subscriber interface and access protocol, addressing and traffic control.
- 11. Requirements Definition:** user requirements, traffic sizing, traffic characteristics, protocols, time and delay considerations, connectivity, availability, reliability and maintainability, service aspects, budget constraints.
- 12. Traffic Engineering and Capacity Planning:** background (throughout calculations), traffic engineering basics (traffic characteristics), traditional traffic engineering, queued data and packet switched traffic modeling, designing for peaks, delay or latency, availability and reliability, network performance modeling, creating the traffic matrix, capacity planning and network vision, design tool, categories of tools, classes of design tools, components of design projects, types of design projects.
- 13. Technology Comparisons:** circuits-message-packing and cell switching methods, packet switching service aspects, generic packet switching network characteristics, private versus public networking, public network service selection, business aspects of packet-frame and cell switching services, high speed LAN protocols comparisons, application performance needs.
- 14. Access Network Design:** network design layers, access layer design, access network capacity, network topology and hardware, completing the access network design.
- 15. Backbone Network Design:** backbone requirements, network capacities, topologies, topologies strategies, tuning the network.

BOOKS
Text Books:
1.Darren L Spohn, “Data Network Design”, TMH 2.D. Bertsekas, R. Gallager, “Data Networks”,PHI
References:
1. W.R. Stevens, “UNIX Network Programming”, Vol. 1, Pearson Education 2. J.Walrand, P.Varaiya, “High Performance Communication Networks”, Morgan Kauffman 3. Y.Zheng, S.Akhtar, “Networks for Computer Scientists and Engineers”, Oxford 4. A.S.Tanenbaum, “Computer Networks” 5. Peterson and Davie, “Computer Networks”, Harcourt Asia 6. James D. McCabe, “Practical Computer Analysis and Design”, Harcourt Asia
TERM WORK
Term work should consist of at least 10 practical experiments and two assignments covering the topics of the syllabus
ORAL EXAMINATION
An oral examination is to be conducted based on the above syllabus

B.E INFORMATION TECHNOLOGY
FOURTH YEAR SEMESTER VII

SUBJECT: ADVANCED DATABASE SYSTEMS
(ELECTIVE-I)

Lectures: 4 Hrs per week
Practical: 2 Hrs per week

Theory: 100 Marks
Term work: 25 Marks
Oral Exam: 25 Marks

Objectives: To study the further database techniques beyond which covered in the second year, and thus to acquaint the students with some relatively advanced issues. At the end of the course students should be able to: gain an awareness of the basic issues in objected oriented data models, learn about the Web-DBMS integration technology and XML for Internet database applications, familiarize with the data-warehousing and data-mining techniques and other advanced topics, apply the knowledge acquired to solve simple problems.

Pre-requisites: Database systems, OOAD

DETAILED SYLLABUS

- 1. The Extended Entity Relationship Model and Object Model:** The ER model revisited, motivation for complex data types, user defined abstract data types and structured types, subclasses, super classes, inheritance, specialization and generalization, constraints and characteristics of specialization and generalization, relationship types of degree higher than two.
- 2. Object Oriented Databases:** Overview of object oriented databases, object identity, object structure and type constructors, encapsulation of operations, methods and persistence, type hierarchies and inheritance, type extents and queries, complex objects, database scheme design for OODBMS; OQL, persistent programming languages, OODBMS Architecture and storage issues, transactions and concurrency control, Example of OODBMS.
- 3. Object Relational and Extended Relational Databases:** database design for an ORDBMS-nested relations and collections, storage and access methods, query processing and optimization, an overview of QL3, implementation issues for extended type, systems comparison of

RDBMS,OODBMS,ORDBMS.

- 4. Parallel and Distributed Databases and Client-Server Architecture:** Architectures for parallel databases, parallel query evaluation, Parallelizing individual operations, sorting, joins, distributed database Concepts, data fragmentation, replication, and allocation techniques for Distributed database design, query processing in distributed databases, Concurrency control and recovery in distributed databases, overview of Client-server architecture
- 5. Databases on the Web and Semi Structured Data:** web interfaces to the web, overview of XML, structure of XML data, document scheme, querying XML data, storage of XML data, XML applications, the semi structured data model, implementation issues, indexes for text data.
- 6. Enhanced Data Models for Advanced Applications:** active database concepts, temporal database concepts, spatial databases, concepts and architecture, deductive databases and query processing, mobile databases, geographic information systems.

BOOKS

Text Books:

- 1. Elmasri and Navathe, “Fundamentals of Database Systems”, Pearson Education**
- 2. Raghuram Ramakrishnan, Johannes Gerhke, “Database Management Systems” McGraw Hill**

References:

- 1. Korth, Silberchatz, Sudarshan, “Database System Concepts” McGraw Hill**
- 2. Peter Rob and Coronel, “Database Systems, Design, Implementation and Management”, Thomson Learning**
- 3. C.J.Date, Longman, “Introduction to Database Systems”, Pearson Education**

TERM WORK

Term work should consist of at least 10 practical experiments and two assignments covering the topics of the syllabus

ORAL EXAMINATION

An oral examination is to be conducted based on the above syllabus

**B.E. INFORMATION TECHNOLOGY
SEMESTER VII
SUBJECT: EMBEDDED SYSTEMS
(ELECTIVE 1)**

Lectures: 4 Hrs per week Practical: 2 Hrs per week	Theory: 100 marks Term work: 25 marks Oral: 25 marks
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Objective: Embedded system tools and products are evolving rapidly. This course deals with various approaches to building embedded systems. It introduces unified view of hardware and software. The aim of this course is to make the students aware of the various applications of embedded systems.

Pre-requisites: Microprocessors and C programming

Detailed Syllabus

- 1. An overview of embedded systems:** Introduction to embedded systems, categories and requirements of embedded systems, challenges and issues related to embedded software development, hardware/software co-design, introduction to IC technology, introduction to design technology.
- 2. Embedded Software development:** Concepts of concurrency, processes, threads, mutual exclusion and inter-process communication, models and languages for embedded software, synchronous approach to embedded system design, scheduling paradigms, scheduling algorithms, introduction to RTOS, basic design using RTOS.
- 3. Embedded C Language:** Real time methods, mixing C and assembly, standard I/O functions, preprocessor directives, study of C compilers and IDE, programming the target device.
- 4. Hardware for embedded systems:** Various interface standards, various methods of interfacing, parallel I/O interface, blind counting synchronization and Gadget Busy waiting, parallel port interfacing with switches, keypads and display units, memory and high speed interfacing, interfacing of data acquisition systems, interfacing of controllers, serial communication interface, implementation of above concepts using C language.
- 5. Study of ATMEGA RISC Processor:** Architecture, memory, reset and interrupt functions, parallel I/O ports, timers/counters, serial communication, analog interfaces, implementation of above concepts using C language.
- 6. Case studies and applications of embedded systems:** Applications to: Communication, networking, database, process control, case studies of: Digital camera, network router, RTLinux.

**B.E. INFORMATION TECHNOLOGY
SEMESTER VII
SUBJECT: MANAGEMENT INFORMATION SYSTEM**

Lectures: 4 Hrs per week Practical: 2 Hrs per week	Theory: 100 marks Term work: 25 marks Oral: 25 marks
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Objectives: To enable students to understand the role and importance of information system.

Pre-requisites: Computer fundamentals, DBMS

Detailed Syllabus

- 1. Foundation of Information System:** Introduction to Information System and MIS, decision support and decision making systems, systems approach, the systems view of business, MIS organization within company, management information and the systems approach.
- 2. Information Technology:** A manager's overview, managerial overviews, computer hardware and software, DBMS, RDBMS and telecommunication.
- 3. Conceptual system design:** Define the problems, set system objective, establish system constraints, determine information needs, determine information sources, develop alternative conceptual design and select and document the system concept, prepare the conceptual design report.
- 4. Detailed system design:** Inform and involve the organization, aim of detailed design, project management of MIS detailed design, identify dominant and trade of criteria, define the sub-systems, sketch the detailed operating sub-systems and information flow, determine the degree of automation of each operation, inform and involve the organization again, inputs outputs and processing, early system testing, software, hardware and tools propose and organization to operate the system, document the detailed design revisit the manager user.
- 5. Implementation, evaluation and maintenance of the MIS:** Plan the implementation, acquire floor space and plan space layouts, organize for implementation, develop procedures for implementation, train the operating personnel, computer related acquisitions, develop forms for data collection and information dissemination, develop the files, test the system, cut-over, document the system, evaluate the MIS control and maintain the system, pitfalls in MIS development.
- 6. Advanced concepts in Information Systems:** Enterprise resources management (ERP), supply chain management, CRM, procurement management system.
- 7. Applications:** Applications of MIS in manufacturing sector, service sector.