

SCHEME OF EXAMINATION

FOR

MASTER OF TECHNOLOGY

[Mobile and Pervasive Computing]

REGULAR PROGRAMME

Offered by CSE Deptt. of



Indira Gandhi Delhi Technical University for Women
(Established by Govt. of Delhi vide Act 09 of 2012)
(Formerly Indira Gandhi Institute of Technology)
Kashmere Gate Delhi-110006

M.Tech (Mobile and Pervasive Computing)

FIRST SEMESTER

Paper Code	Paper Title	L	T/P	Credit
THEORY				
MMC – 501	Mobile Architecture and Programming	4	-	4
MMC – 503	Fundamentals of Mobile Computing	4	-	4
MMC – 505	Wireless Communication	4	-	4
MMC – 507	Advanced Network Technologies	4	-	4
MMC – 509	Analysis and Modeling Techniques	4	-	4
PRACTICAL				
MMC – 511	Mobile Architecture and Programming	0	2	1
MMC – 513	Fundamentals of Mobile Computing	0	2	1
MMC – 515	Wireless Communication	0	2	1
MMC – 517	Technical Paper Writing*	0	2	2
TOTAL		20	8	25

SECOND SEMESTER

Paper Code	Paper Title	L	T/P	Credit
THEORY				
MMC – 502	Pervasive Computing	4	-	4
MMC – 504	Embedded Systems Design	4	-	4
MMC – 506	Mobile Database Management Systems	4	-	4
ELECTIVES-(Choose any two)**				
MIS - 508	Secure Wireless Networks	4	-	4
MMC – 508	Wireless Networks	4	-	4
MMC – 510	Broadband Networks: Concepts and Technology	4	-	4
MMC – 512	Advanced Digital Signal Processing	4	-	4
MMC – 514	Mobile Operating Systems and Programming	4	-	4
MMC – 516	SoC Architecture for Mobile and Pervasive Computing	4	-	4
MMC – 518	Advanced Digital Communication	4	-	4
PRACTICALS				
MMC – 520	Embedded Systems Design based on ARM / Atmel	0	2	1
MMC – 522	Mobile Database Management Systems	0	2	1
MMC – 524	Lab based on elective (s)	0	2	1
MMC – 526	Term Paper*	0	2	2
TOTAL		20	8	25

*NUES (Non University Examination Scheme)

**Any of these subjects may be chosen in distance learning mode such as Massive Open Online Courses (MOOCs etc) and supervised by internal faculty-in-charge.

THIRD SEMESTER

Paper Code	Paper Title	L	T/P	Credit
THEORY				
MMC – 601	Design and Development of the Mobile Device	4	-	4
MMC – 603	Mobile Cloud Computing	4	-	4
ELECTIVES - (Choose any one)**				
MMC – 605	Advanced 3G and 4G Wireless Mobile Communication	4	-	4
MMC – 607	Human Computer Interactions	4	-	4
MIS – 613	E-Commerce and M-Commerce	4	-	4
PRACTICALS				
MMC – 609	Design and Development of the Mobile Device	0	2	1
MMC – 611	Mobile Cloud Computing	0	2	1
MMC – 613	Minor Project	-	8	12
TOTAL		20	12	26

FOURTH SEMESTER

Paper Code	Paper Title	L	T/P	Credit
MMC – 602	Dissertation	-	30	24
MMC – 604	Seminar and Progress Report *	-	04	04
TOTAL			34	28

*NUES (Non University Examination Scheme)

**Any of these subjects may be chosen in distance learning mode such as Massive Open Online Courses (MOOCs etc) and supervised by internal faculty-in-charge.

1. The total number of credits of the M. Tech Programme = 104.
2. Each student shall be required to appear for examination in all courses. However, for the award of the degree a student shall be required to earn the minimum of 100 Credits.

INSTRUCTIONS TO PAPER SETTERS:

Maximum Marks : 60

- 1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.**
- 2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks.**

UNIT I

Introduction to Mobile Architecture: Mobile Architecture, Mobile Hardware Architecture, Mobile Software Architecture, Mobile Architecture Vs Computer Architecture, Memory organization, Input and output devices for handled devices and Booting of Mobile devices and a case study of any mobile device.

(10 Hrs)

UNIT II

Hardware Architecture: Introduction to the processors used for Mobile and Handheld devices and SoC architecture like OMAP and Snap Dragon and its case study with reference to protocols, Input and output interfaces, GPU, DSP etc.

(10 Hrs)

UNIT III

Software Architecture: Introduction to Operating Systems, Real Time Operating systems and Mobile Real Time Operating Systems. Tool chain (SDK's) for Mobile Application Development and its functions with the case study with reference to layered architecture, communication protocols, hardware support etc.

(10 Hrs)

UNIT IV

Mobile Programming: Introduction to the Mobile Programming Languages and its selection. Programming the display, Keyboard/ touch, accessing camera, multimedia (Audio and Video), on device sensors, protocols like GSM (dialing a number, SMS), GPS etc. Testing and deploying these applications on SDK and on the device.

(10 Hrs)

Text Books:

1. Tommi Mikkonen, “Programming Mobile Devices: An Introduction for Practitioners”, John Wiley & Sons Ltd, 2007.
2. J Scheible and Ville Tuulos John, “Mobile Python Rapid Prototyping of Applications on the Mobile Platform” Wiley India Pvt. Ltd, 2008.

Reference Books:

1. S. Poslad, “Ubiquitous Computing: Smart Devices, Environments and Interactions,” Wiley, 2009.
2. Nick Lecrenski, Karli Watson, “Windows Phone 7 Application Development” version 2011
3. Jermaine G. Anderson “Flash Lite Mobile Development” version 2010

INSTRUCTIONS TO PAPER SETTERS:

Maximum Marks : 60

- 1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.**
- 2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 10 marks.**

UNIT I

Introduction: Mobile Computing, Motivations, concepts, and challenges of mobile computing, Pervasive computing, Principles, Characteristics, Architecture of Mobile Computing, Three tier architecture. Mobile computing environments, challenges and its classification. Various Communication Radio Technologies, Security and Privacy issues.

(10 Hrs)

UNIT II

Wireless System and Standards: Cellular concept, Global System for Mobile Communication GSM architecture, call routing in GSM, location management, HLR-VLR, Mobility Management, Handoffs, Frequency allocation, Personal Communication Service.

(10 Hrs)

UNIT III

Mobile Data Networking: Introduction, GPRS and Packet Data Network, GPRS Network architecture, GPRS Network operation, Data Services in GPRS, Limitations of GPRS. **CDMA and 3G:** Introduction, Spread spectrum technology, CDMA versus GSM, 3G Network. Mobile network operators and function in Cellular Networks, Disconnected Operation and Constant Data Availability (CODA) file system.

(10 Hrs)

UNIT IV

Protocols and Tools: Bluetooth (User scenarios, physical layer, MAC layer, networking, security, link management) Voice over IP and its Application. **Emerging Technologies:** Blue Tooth, WIMAX, IPV6, Mobile IP. Convergence of Mobile and Internet (Local & Adhoc Networks), Location Based Services, Context aware Computing.

(10 Hrs)

Text Books:

1. Asoke K Telukder, Roopa R Yavagal, “ Mobile Computing”, TMH, 2011.
2. Stojmenovic and Cacute, “Handbook of Wireless Networks and Mobile Computing”, Wiley, 2002.
4. Raj Kamal, “ Mobile Computing”, Oxford Higher Education, 2007.

Reference Books:

1. Reza Behravanfar, “Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML”, Cambridge University Press, October 2004.
2. Adelstein, Frank, Gupta, Sandeep KS, Richard III, Golden , Schwiebert, Loren, “Fundamentals of Mobile and Pervasive Computing”, McGraw-Hill Professional, 2005.
3. Hansmann, Merk, Nicklous, Stober, “Principles of Mobile Computing”, Springer, second edition, 2003.
4. Andy Wigley, Daniel Moth, Peter Foot “Microsoft mobile Development Handbook”, WP Publishers & Distributors (P) Limited. Edition 2007.
5. Martyn Mallick, “Mobile and Wireless Design Essentials”, Wiley Dream Tech, 2003.

Paper Code: MMC - 505
Paper Title: Wireless Communication

L	T	C
4	0	4

INSTRUCTIONS TO PAPER SETTERS:

Maximum Marks : 60

- 1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.**
- 2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 10 marks**

UNIT I

Introduction to wireless communications: Examples of wireless communication system, Cellular concept and system design fundamentals, Frequency reuse, Co-channel Interference and Reduction Technique, Channel assignment strategies, Handoff strategies, Trunk and grade services, Methods for improving coverage and capacity in cellular system.

(10 Hrs)

UNIT II

Mobile Channel Characterization: Mobile Radio propagation, Large scale path loss, Reflection, Diffraction, Scattering, Outdoor and Indoor propagation models, Small signal fading and multi path, measurement of small scale path loss, parameters of multi path channels, fading due to multi path, fading effect due to Doppler spread, equalization, Diversity.

(10 Hrs)

UNIT III

Modulation Techniques: Digital modulation, Amplitude shift keying, Frequency shift keying, Phase shift keying, DPSK modulation, minimum shift keying, Quadrature amplitude modulation, Orthogonal frequency division multiplexing, Performance of digital modulation schemes, Synchronization, Performance of digital modulation in slow-flat fading channels, performance of digital modulation in frequency selective mobile channels.

(10 Hrs)

UNIT IV

Spread Spectrum Techniques: Introduction to spread spectrum communication, multiple access techniques used in mobile wireless communication: FDMA, TDMA, Cellular CDMA, packet radio protocols, CSMA, reservation protocols, Digital Modulation. Evaluations of different generations of communications.

(10 Hrs)

Text Books:

1. T. S. Rappaport, "Wireless Communications", 2nd Edition, Pearson Education.
2. Itisaha Mishra, "Wireless Communications & Network 3G and beyond", Tata Mc-Graw Hill Education Pvt. Ltd, 2009
3. W. C. Y. Lee, "Mobile cellular Telecommunications", 2nd Edition, McGraw Hill, 1995

Reference Books:

1. T. L. Singal, "Wireless Communication", Tata Mc-Graw Hill Education Pvt. Ltd, 2012
2. V. K. Garg, "Wireless Communication and Networks", Elsevier, 2007
3. Kamilo Feher, "Wireless digital communication", PHI, 1995

INSTRUCTIONS TO PAPER SETTERS:

Maximum Marks : 60

- 1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.**
- 2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 10 marks**

UNIT I

Protocol and Network Fundamentals: Internet Evolution, Packet Switched Networks, TCP/IP Protocol Architecture, OSI Model, Internetworking, Overview of User Datagram Protocol and Internet Protocol. **High Speed Networks:** Frame Relay, Networks, ATM, High Speed LANs.

(10 Hrs)

UNIT II

Delay Models In Data Networks: Characteristics of Queuing System, Little's Theorem, Queuing Models, Single Server Queues, Multi Server Queues, Priority Queuing, and Networks of Queues. **Multi-access Communication:** Aloha Modeling, Slotted Aloha Modeling, Carrier Sensing: CSMA/CA/CD, MACA, MACAW, 802.11 MAC Protocol.

(10 Hrs)

UNIT III

Congestion Control and Traffic Management: Congestion Control in Data Network and Internet, Link level flow control, Link level error control, TCP traffic control, Traffic and Congestion control in ATM Networks.

(10 Hrs)

UNIT IV

Internet Routing: Shortest Path Length Determination, Interior Routing Protocols: Distance Vector and Link State Protocol, Exterior Routing Protocol: BGP & IRDP, Multicasting. **Quality of Service and Resource Reservation in IP Networks:** Overview of QoS, Integrated Services, Differentiated Services, Random Early Detection (RED), Resource Reservation: RSVP, Multiprotocol Label Switching (MPLS). Real Time Transport Protocol.

(10 Hrs)

Text Books:

1. Dimitri Bersekas, Robert Gallager, "Data Networks", Second Edition, Pearson Education, 2006.
2. William Stallings, "High Speed Networks and Internets", Second Edition, Pearson Education, 2010.

Reference Books:

1. James F. Kurose, Keith W. Ross, "Computer Networking: A Top-Down Approach Featuring the Internet", Third Edition, Pearson Education, 2007.
2. Nader F. Mir, "Computer and Communication Networks", Pearson Education, 2007.
3. Behrouz A. Forouzan, "Data Communications and Networking", Fourth Edition, Tata McGraw Hill, 2007.
4. S. Keshav, "An Engineering Approach to Computer Networking", Pearson Education, 1997.
5. Andrew S. Tanenbaum, "Computer Networks", Fourth Edition, Prentice Hall, 2011.

INSTRUCTIONS TO PAPER SETTERS:

Maximum Marks : 60

- 1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.**
- 2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 10 marks**

UNIT I

Probability And Random Variables: Probability – Conditional Probability – Independence – Baye’s theorem; Expectations Moment generating functions and their properties. Random variables – Binomial, Poisson, Geometric, Uniform, Normal, Exponential distributions– Functions Transformation of Random variables **Queuing Theory:** Single and Multiple servers Markovian Queuing models– finite and Infinite capacity Queues – Finite source model – Queuing applications to Computer Science.

(10 Hrs)

UNIT II

Graph Theory: Paths and Circuits – Trees – Planar Graph – Vector spaces – Matrix Representation, Graph Coloring, Directed graphs; Some basic algorithms – Spanning Tree Algorithm, Shortest path algorithms, Depth First Search on a graph, Other Graph Theoretic algorithms, Performance of graph theoretic algorithms, Graphs in Computer Programming.

(10 Hrs)

UNIT III

Linear Algebra: Introduction to Vector spaces – basic vector analysis methods – Matrix norms – Jordan canonical form – Generalized eigenvectors – Singular value decomposition – Pseudo inverse – Least square approximations – QR algorithm. Linear Algebra application to the Computer Science.

(10 Hrs)

UNIT IV

Optimization Techniques: Linear programming – Basic concepts, Graphical and Simplex methods, Transportation problem, Assignment problem; Dynamic programming – Elements of the dynamic programming model – optimality principle – dynamic programming Problems and their solutions. **Simulation:** Discrete Event Simulation, Stochastic Simulation.

(10 Hrs)

Text Books:

1. Kishor S.Trivedi, “Probability & Statistics with reliability, queuing and Computer ScienceApplications”, Prentice Hall India, 2001.
2. Narasingh Deo, “Graph Theory with applications to Engineering and Computer Science”, Prentice Hall India, 1997.
3. Taha H .A, “Operations Research: An Introduction”, Seventh Edition, Pearson Education Edition, Asia, New Delhi, 2002.
4. Lewis.D.W. “Matrix Theory”, Allied Publishers, Chennai 1995.

Reference Books

1. Robertazzi. T.G. “Computer Networks and Systems – Queuing Theory and Performance Evaluation”, Third Edition, Springer, 2002 Reprint.
2. Walpole R.E., Myer R.H., Myer S.L., and Ye, K., “Probability and Statistics for Engineers and Scientists”, 7th Edition, Pearson Education, Delhi, 2002.
3. Harary, “Graph Theory”, Narosa publishing house, 2000.
4. Lyn James, “Advanced Engineering Mathematics”, 7th Edition, Pearson Education, (2007).

Paper Code: MMC - 511 **L P C**
Paper Title: Mobile Architecture and Programming Lab **0 2 1**
Experiments will be based on Mobile architecture, booting, flashing, accessing on device peripherals (Hardware and Software) and Programming.

Paper Code: MMC - 513 **L P C**
Paper Title: Fundamentals of Mobile Computing Lab **0 2 1**
Experiments will be based on GSM Architecture, Protocols, accessing on device peripherals (Hardware and Software) related to Mobile Computing and Programming.

Paper Code: MMC - 515 **L P C**
Paper Title: Wireless Communication Lab **0 2 1**
Experiments will be based on communications technologies to demonstrate practical aspects of various systems and associated tools for simulation.

Paper Code: MMC - 517 **L P C**
Paper Title: Technical Report Writing **0 2 1**
Technical reports describe the progress or results of scientific or technical research and development. The purpose of a technical report is to completely and clearly describe technical work, why it was done, result obtained and implications of those results. Technical reports present facts and conclusion about the designs and other projects. Typically, a technical report includes research about technical concepts as well as graphical depictions of designs and data. For guidelines of technical report writing following websites may be referred. <http://www.theiet.org/students/resources/technicalreport.cfm>

Paper Code: MMC - 502
Paper Title: Pervasive Computing

L	T	C
4	0	4

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**
UNIT I
1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
2. Apart from Question No.1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 10 marks
Architecture: Introduction to Pervasive computing, Relationship of Mobile Computing, Ubiquitous Computing, Internet Computing and Wearable Computing, Elements of Pervasive architecture, Infrastructure of pervasive computing, Characteristics of pervasive computing environments, Vision and challenges of pervasive computing, General issues: security, performance, dependability. Web architectures. Local networks. Store and forward. Multi-network architectures (e.g. Wireless LAN to LAN to Internet, hand held synchronized to PC to LAN).

UNIT I (10 Hrs)
Fundamental design aspects: Embedded design life cycle-Product Specification- Hardware Software Partitioning-Design and Integration-Selection Process-Performance Selections and **Devices Technology:** Device and network technologies, Devices categories, Devices characteristic Heterogeneity and Interoperability, Mobile Agents, Device management, Palm Pungster, Windows devices, J2ME-enabled devices, Smart Homes and its computing (10 Hrs)

UNIT II
Embedded controllers: Processor Selection for embedded systems and its issues, Overview of 8051 architecture, Atmel AVR controllers, Atom architecture in terms of architecture, networks, Types of sensor networks, Berkeley Motes, RFID: Introduction, transponder and reader programming, interfacing and applications. (10 Hrs)

UNIT III
Introduction to ARM Architectures and Its Programming: Interrupt Service Routines- Watchdog timers-Flash memory-Basic toolset-Host based debugging-Remote debugging- ROM emulators-Logic Analyzer-Caches-Computer Optimization- Statistical profiling-In circuit emulators-Buffer control-Real-Time trace-Hardware break points-Overlay memory-Timing Constraints-Usage Issues-Triggers-Comparison between ARM and Atom processors. (10 Hrs)
Applications and Case study: The Internet of things, Smart Homes, Smart Workplaces, Smart Spaces, Social Computing, Religious Computing, Health and Medical Computing, Surveillance, Monitoring etc and a case study.

UNIT IV (10 Hrs)
Interfacing and Application Development: Cortex M4/A0/Atom (E6xx) Architecture and Programming by using Atmel SAM4 L Starter Kit/ NXP LPC11U24 (mbed)/, Tools, remote compilation, debugging and testing, Interfacing of displays, keyboard and sensors. (10 Hrs)

Text Books:
1. Burkhardt, Henn, Hepper, Rindorff, Schaeck. "Pervasive Computing". Addison Wesley, 2002.
2. F. Adelstein, S.K.S. Gupta, "Fundamentals of Mobile and Pervasive Computing". The McGraw-Hill, 2005.
3. Andrew Sloss, Dominic Symes, Chris Wright, "ARM System Developer's Guide: Designing and Optimizing System Software". The Morgan Kaufmann Series an imprint of Elsevier, 2009.
4. William Hohl, "ARM Assembly Language: Fundamentals and Techniques", CRC Press, 2012

Reference Books:
1. Uwe Hansmann, E. Merk, M. Nicklous, T. Stober, U. Hansmann, "Pervasive Computing (Springer Professional Computing)", Springer Verlag, 2003
2. David E. Simon, "An Embedded Software Primer", Pearson Education 2001
3. S. Postlad, "Ubiquitous Computing: Smart Devices, Environments and Interactions", Wiley, 2009.
4. Frank Vanid and Tony Wargle "Embedded System Design", John Wiley & Sons 2002
5. Steve Heath "Embedded System Design" Elserian Second Edition Petter Barry, 2004
6. Peter Barry, Patrick Crowley, "Modern Embedded Computing", Morgan Kaufmann, 2012

Paper Code: MMC - 504
Paper Title: Embedded Systems Design

L	T	C
4	0	4

INSTRUCTIONS TO PAPER SETTERS:

Maximum Marks : 60

- 1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.**
- 2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks**

INSTRUCTIONS TO PAPER SETTERS:

Maximum Marks : 60

- 1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.**
- 2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks**

UNIT I

Introduction to Database Management Systems: Centralized Databases, Relational DBMS, Normalization in Relational DBMS, Spatial Databases, Distributed Databases: Data Fragmentation, Data Replication, Local versus Global Transactions, Distributed Transactions, Distributed Query Processing, Concurrency Control & Commit Protocols in Distributed Databases.

(10 Hrs)

UNIT II

Mobile database system: Types of Mobility. Wireless network communication- Introduction, Continuous connectivity. Location and Handoff Management- Location management, Handoff management, Roaming. Characteristics of Mobile Devices, Fully connected Information Space, Personal Communication Systems, Requirements of Mobile Databases, Client Server Architecture of Mobile Databases, Peer to Peer Mobile Databases, Issues & Challenges in Mobile Databases: Network Reliability, Security, Synchronization, Mobility.

(10 Hrs)

UNIT III

Transaction-Models in Mobile Databases: Hi Commit Mobile Transaction Model(HiCoMo), Moflex Transaction Model, Kangaroo Mobile Transaction Model, MDSTPM Transaction Execution Model, Mobilaction, Execution model based on ACID Transaction Framework, Pre-write Transaction Execution model, Mobilaction- A Mobile Transaction model, Atomicity for Mobilaction, Isolation for Mobilaction, Consistency and Durability for Mobilaction, Data Consistency in Intermittent connectivity, The consistency Model, Weak Connectivity Operation, A consistency Restoration Schema, Consistency Control Mechanism, Transaction Commit, Commitment of Mobile Transaction, Transaction Commitment in Mobile Database System-TCOT Steps, protocol.

(10 Hrs)

UNIT IV

Data management in Mobile Databases: Data categorization in Mobile Database, Query-processing & Concurrency Control in Mobile Databases, Recovery in Mobile Databases, Introduction, Log Management in Mobile Database System, Mobile database recovery Scheme- Three Phase recovery scheme, low-cost check pointing and failure recovery, mobile agent based log management scheme. Forward strategy schemes. Applications of Mobile Databases. CASE STUDY: Microsoft SQL Server Compact, ORACLE Lite

(10 Hrs)

Text Books:

1. Vijay Kumar, "Mobile Database Systems," Wiley-Interscience, 2006

Reference Books:

1. E. Pitoura and G. Samaras, "Data Management for Mobile Computing", Kluwer Academic Publishers, 1998
2. Ceri and Pelagatti, "Distributed Databases", MC GrawHill Publications, 1984

Paper code: MIS-508
Paper Title: Secure Wireless Networks

L	T	C
4	0	4

INSTRUCTIONS TO PAPER SETTERS:

Maximum Marks : 60

- 1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.**
- 2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks**

UNIT I

Wireless Networks, Wireless Network Architecture, Adhoc Networks, Sensor Networks, Wireless Devices, Access Points, PDA, Smart Phones, Wireless Standards, IEEE 802.11 a/b/g/n Emerging Wireless Technologies, Service Set Identification (SSID), Basic Service Set Identification (BSSID), MAC Address, Beacons and Broadcasts, Associating and Authenticating.

(10 Hrs)

UNIT II

WLAN Architecture, Frequency and Data rates, WLAN components, Security feature of 802.11 Problems With the IEEE 802.11 Standard, WEP, Problems in WEP, WPA, WPA2, Security Requirements and Threats, Loss of Confidentiality, Loss of Integrity, Risk Mitigation.

(10 Hrs)

UNIT III

Secure Design Principles for Wireless Networks, Defence In Depth, Least Privilege, Network Segmentation, Wireless Assessments, Secure the Infrastructure, Rogue AP Detection, Physical Security, Firewalls, Routers, Switches, Intrusion Detection Systems and Intrusion Prevention Systems Wireless Intrusion Detection and Intrusion Prevention Systems, Honey pots, Web Authentication Gateways.

(10 Hrs)

UNIT IV

Preventing Rogue Wireless Networks, Manually Detecting Rogue Wireless Networks, Tracing Malicious Rogue Access Points, Handling Rogue Access Points, Automated Detection of Rogue Wireless Networks, Other Wireless Technologies, Next-Gen Solutions, Lightweight Wireless Solutions, Cloud-based Wireless Solutions, Dedicated Wireless IDS, Client Protection.

(10 Hrs)

Text Books:

1. Tyler Wrightson , “Wireless Network Security: A Beginner’s Guide”, McGraw-Hill. 2012
2. Liu , Donggang, “Security for mobile wireless sensor networks”, Springer. 2007

Reference Books:

1. Ahson Syed, “ Wimax Standard & Security”, CRC Press (Taylor & Francis), 2013
2. Earle Aaron E Auerbac Publication, “Wireless Security handbook”, Taylor & Francis Group.2006
3. Yang Xiao, “ Security in Sensor Networks”, AuerBach Publications, 2007

INSTRUCTIONS TO PAPER SETTERS:

Maximum Marks : 60

- 1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.**
- 2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks**

UNIT I

Introduction: Introduction to adhoc networks – definition, characteristics features, applications. Characteristics of Wireless channel, Adhoc Mobility Models:- Indoor and outdoor models.**MAC Protocols:** design issues, goals and classification. Contention based protocols- with reservation, scheduling algorithms, protocols using directional antennas. IEEE Standards: 802.11a, 802.11b, 802.11g, 802.15. HIPERLAN. (10 Hrs)

UNIT II

Network Protocols: Routing Protocols: Design issues, goals and classification, Proactive Vs reactive routing, Unicast routing algorithms, Multicast routing algorithms, hybrid routing algorithm, Energy aware routing algorithm, Hierarchical Routing, QoS aware routing, Integration of adhoc with Mobile IP networks. **Transport Layer And Security:** Issues in designing Transport Layer, Transport layer classification, adhoc transport protocols. Security issues in adhoc networks: issues and challenges, network security attacks, secure routing protocols. (10 Hrs)

UNIT III

Wireless Mesh Networks: Necessity for Mesh Networks, MAC enhancements, IEEE 802.11s Architecture, Opportunistic Routing, Self Configuration and Auto Configuration, Capacity Models, Fairness, Heterogeneous Mesh Networks, Vehicular Mesh Networks (10 Hrs)

UNIT IV

Wireless Sensor Networks: Introduction, Sensor Network architecture, Data Dissemination, Data Gathering, MAC Protocols for sensor Networks, Location discovery, Quality of Sensor Networks, Sensor Network Platforms And Tools, Evolving Standards, Security Issues, Recent trends in Infrastructure less Networks. (10 Hrs)

Text Books:

1. C.Siva Ram Murthy and B.S.Manoj, “Ad hoc Wireless Networks Architectures and Protocols”, 2nd edition, Pearson Education. 2004
2. Charles E. Perkins, “Ad hoc Networking”, Addison – Wesley. 2000
3. Holger Karl & Andreas Willig, " Protocols And Architectures for Wireless Sensor Networks", John Wiley. 2005

Reference Books:

1. Stefano Basagni, Marco Conti, Silvia Giordano and Ivan Stojmenovic, Mobile Adhoc Networking, Wiley-IEEE press. 2004
2. A survey of integrating IP mobility protocols and Mobile Ad hoc networks, Fekri M. Abduljalil and Shrikant K. Bodhe, IEEE communication Survey and tutorials, v 9.no.1 2007.
3. Feng Zhao and Leonidas Guibas, “Wireless Sensor Networks”, Morgan Kaufman Publishers.2004
4. C.K.Toh, “Adhoc Mobile Wireless Networks”, Pearson Education. 2001
5. Thomas Krag and Sebastin Buettrich, ‘Wireless Mesh Networking ’,O’ Reilly Publishers.2004
6. Feng Zhao & Leonidas J. Guibas, “Wireless Sensor Networks- An Information Processing Approach", Elsevier. 2004
7. Kazem Sohraby, Daniel Minoli, & Taieb Znati, “Wireless Sensor Networks- Technology, Protocols, And Applications”, John Wiley, 2007.

INSTRUCTIONS TO PAPER SETTERS:

Maximum Marks : 60

- 1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.**
- 2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks.**

UNIT I

Overview of internet –concepts, challenges and history, Next Generation Internet- challenges and problems, Multicasting in Internet and Real time communication over Internet and its challenges.
(10 Hrs)

UNIT II

Packet scheduling Algorithms- requirements and choices, Admission control in internet, Differentiated Services in internet and Internet Telephony and voice over IP (VoIP)- RTP and RTCP and Broadband ISDN.
(10 Hrs)

UNIT III

ATM Networks- ATM protocols, IP switching and MPLS- Overview of IP over ATM and its evolution to IP switching, Policy based Networking. Policy servers. Web in QoS domain. Architecture for Web QoS, Web Access – Intelligent web browsing and web caching, Internet and web Traffic measurement and characterization.
(10 Hrs)

UNIT IV

Prediction for network management. Optical communication networks- DWDM based transport network. Issues in IP over, DWDM optical IP routers and λ switching.
(10 Hrs)

Text Books:

1. Naoaki Yamanaka, Kohei Shiimoto, Eiji Oki, “ GMPLS Technologies: Broadband Backbone Networks and Systems” CRC Press, 2010.
2. By Chris Hellberg, Truman Boyes, Dylan Greene, “ Broadband Network Architectures: Designing and Deploying Triple-Play Services”, Pearson Education, 2007

INSTRUCTIONS TO PAPER SETTERS:

Maximum Marks : 60

- 1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.**
- 2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks**

UNIT I

Review DSP: Discrete Fourier Transform, linear filtering method based on the DFT, FFT at radix 2. Digital filter design FIR and IIR (Butterworth and Chebyshev). Introduction - Decimation, Interpolation Sampling rate conversion by rational factor

(10 Hrs)

UNIT II

Linear Prediction and Optimum Linear Filters : Representation of a stationary random process, Forward and Backward linear prediction, solution of normal equations (levinson-durbin), lattice structure, Wiener – Hopf equation for filtering and prediction

(10 Hrs)

UNIT III

System Modeling and Identification: Adaptive systems - definitions and characteristics - applications - properties-examples - adaptive linear combiner-input signal and weight vectors - performance function - gradient and minimum mean square error -introduction to filtering-smoothing and prediction - linear optimum filtering -orthogonality - wiener

(10 Hrs)

UNIT VI

Adaptive Filtering Algorithms: Least Mean Squares (LMS) LMS algorithm - convergence of weight vector - properties, and Recursive Least square (RLS) algorithms and their convergence performance, Application of adaptive filters

(10 Hrs)

Text Books:

1. Proakis, Rader, Ling, Nikias, “Advanced Digital Signal Processing”, Macmillan Publishing House 2002
2. Alexander “Adaptive Signal Processing Theory and Applications” Springer Verilog, 1986

Reference Books:

1. Widrow, Stearns “Adaptive Signal Processing”, Pearson Education
2. Vaseghi “Advanced Digital Signal Processing and Noise Reduction”, Wiley 2009

INSTRUCTIONS TO PAPER SETTERS:**Maximum Marks : 60**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.

2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

UNIT I	
<p>Introduction to Mobile Operating Systems: Introduction to Operating Systems, Real Time Operating systems and Mobile Real Time Operating Systems, classifications and its comparisons. Generic Architecture of Mobile OS and functions of each component with reference to Desktop and or Real time operating systems with case existing platforms. Programming Languages support and its selection. (10 Hours)</p>	
UNIT II	
<p>A Case study of Windows Phone OS: Windows Phone 7 Overview, Windows Phone 7 Platform, Windows Phone 7 Development Tools, Downloading and installing the tools, Windows Phone 7 SDK overview, Running and Debugging the App. (10Hours)</p>	
UNIT III	
<p>Case study of Android:• The Android Platform, Android SDK, Building a sample Android application, Brief of Android Application Design Essentials ,Android User Interface Design Essentials , Common Android APIs. (10 Hours)</p>	
UNIT IV	
<p>Mobile Programming: Introduction to the Mobile Programming, Programming the display, Keyboard/ touch, accessing camera, multimedia (Audio and Video), on device sensors, protocols like GSM (dialling a number, SMS), GPS etc. Testing and deploying these applications on SDK and on the device. Mobile Application Development: Web Based Applications, Database Applications, JQuery, Qt, HTML5. (10 Hours)</p>	
<p><u>Text Books:</u></p> <ol style="list-style-type: none"> 3. Arash Habibi Lashkari, Mohammadreza Moradhaseli, "Mobile Operating Systems and Programming", VDM Publishing, 2011 4. Lauren Darcey and Shane Conder, "Android Wireless Application Development", Pearson Education, 2nd ed. (2011) 3. Jonathan Marbutt, Robb Schiefer, Windows Phone 7 Silverlight Cookbook, PACKT Publishing . 	

Paper Code: MMC – 516

Paper Title: SoC Architecture for Mobile and Pervasive Computing

L	T	C
4	0	4

INSTRUCTIONS TO PAPER SETTERS:

Maximum Marks : 60

- 1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.**
- 2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks.**

UNIT I

Introduction to SoC Architecture: Introduction to SoC architecture and design, Various other design approaches-Blocks based architecture and Platform based architecture, Classification of IP, Platform based design, AMBA based architecture, On- Chip memory architecture. System-on-chip and Board-Based-Systems, Interconnect.

(10 Hrs)

UNIT II

Case Study of OMAP Architecture and its Applications: Introduction to OMAP, Evolution and their family hierarchy, Similar platforms, Scalar Vs Vector processors, Memory management issues and Applications and supporting platforms.

(10 Hrs)

UNIT III

Case Study of Snap Dragon Architecture and its Applications: Introduction to Snapdragon, Evolution and their family hierarchy, Memory management issues and Applications, supporting platforms

(10 Hrs)

UNIT IV

SoC customization, Challenges and its applications: Customization and Configurability, What's Next: Challenges Ahead Security Issues in On-Chip Communication Architecture Design, Networks-On-Chip, and Emerging On-Chip Interconnect Technologies, Applications and its case studies

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**

1. **Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.**

2. **Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 10 marks.**

UNIT I

Introduction: Digital communication system (description of different modules of the block diagram), Complex baseband representation of signals, Gram-Schmidt Orthogonalization procedure. M-ary orthogonal signals, bi-orthogonal signals, simplex signal waveforms. **Modulation:** Pulse amplitude modulation (binary and M-ary, QAM), Pulse position modulation (binary and M-ary), Carrier modulation (M-ary ASK, PSK, FSK, DPSK), Continuous phase modulation (QPSK and variants, MSK, GMSK).

(10 Hrs)

UNIT II

Receiver in additive white Gaussian noise channels: Coherent and non-coherent demodulation: Matched filter, Correlator demodulator, square-law, and envelope detection; Detector: Optimum rule for ML and MAP detection Performance: Bit-error-rate, symbol error rate for coherent and non-coherent schemes.

(10 Hrs)

UNIT III

Band-limited channels: Pulse shape design for channels with ISI: Nyquist pulse, Partial response signaling (duo-binary and modified duo-binary pulses), demodulation; Channel with distortion: Design of transmitting and receiving filters for a known channel and for time varying channel (equalization); Performance: Symbol by symbol detection and BER, symbol and sequence detection, Viterbi algorithm.

(10 Hrs)

UNIT IV

Synchronization: Different synchronization techniques (Early-Late Gate, MMSE, ML and spectral line methods. **Communication over fading channels:** Characteristics of fading channels, Rayleigh and Rician channels, receiver performance-average SNR, outage probability, amount of fading and average bit/symbol error rate.

(10 Hrs)

Text Books:

1. S. Haykins, "Communication Systems", 5th ed., John Wiley, 2008.
2. M. K. Simon, S. M. Hinedi and W. C. Lindsey, "Digital Communication Techniques: Signaling and detection", Prentice Hall India, N. Delhi, 1995.

Reference Books:

1. J. G. Proakis and M. Salehi, "Fundamentals of Communication Systems", Pearson Education, 2005.
2. W. Tomasi, "Advanced Electronic Communication Systems", 4th Ed., Pearson Education, 1998.
3. M. K. Simon and M. S. Alouini, "Digital Communication over Fading Channels", 2000.

Paper Code: MMC - 520

L **P** **C**

Paper Title: Embedded Systems Design

0 **2** **1**

Experiments will be based on ARM Architecture, Interfacing and its Programming. The same will be repeated for Atmel Controllers

Paper Code: MMC - 522

L **P** **C**

Paper Title: Mobile Database Management System

0 **2** **1**

Experiments will be based on Mobile databases using actual devices and its SDK's for creating tables, modifying the real-time data, accessing, deleting and other operations.

Paper Code: MMC - 524

L **P** **C**

Paper Title: Lab based on elective (s)

0 **2** **1**

Paper Code: MMC -526

L **P** **C**

Paper Title: Term Paper*

0 **2** **2**

Term papers are generally intended to describe an event, a concept or argue a point. The topic for the term paper may be based on the recent trends in Technology/Industry or Academia research outcomes. The guidelines for writing are same as that for technical report writing.

INSTRUCTIONS TO PAPER SETTERS:

Maximum Marks : 60

- 1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.**
- 2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks**

UNIT I

Introduction to mobile /hand held device design and development: Types of design Approaches: Top down and Bottom Up and its development life cycle. Components selections: processor (ARM, Atom and its derivatives) (SoC), SDK(Operating System and tool chain) Input and output peripherals etc and its issues for design and development.

(10 Hrs)

UNIT II

Hardware Design and Development: Introduction to various SoC's for hand held devices. Selection and configuration of the SoC based on the application like Memory, Processor, protocols, and its I/O peripherals and its interfaces and case study of Intel Atom processor and applications.

(10 Hrs)

UNIT III

Selection and configuration of Mobile development Platform: Introduction to various mobile software development platforms and its selection based on the various issues like cost, open source, hard or soft real time, memory and peripherals interfaces and its customization etc.

(10 Hrs)

UNIT IV

Development, Porting and Testing: Development of simple applications and its integration, porting the entire application and integration with OS, SoC and peripherals (touch screen technology), Designing User Interface, Accelerometer, Gestures recognition and voice activated commands. Testing, debugging, prototyping and final deployment and its issues.

(10 Hrs)

Text Books:

1. Hooper&Berkman," Designing Mobile Interfaces", O'reily (SPD)
2. Ben Shneidermann," Designing the user interface" 3rd Edition, Pearson Education Asia., 1998.

Reference Books:

1. S. Poslad, "Ubiquitous Computing: Smart Devices, Environments and Interactions," Wiley, 2009.
2. Wilbert O Galitz," The essential guide to user interface design" , Wiley DreamaTech., 2007.
3. Andy Wigley, Daniel Moth,Peter Foot "Microsoft mobile Development Handbook", WP Publishers & Distributors (P) Limited. Edition 2007.
4. Sharp Rogers Preece, "Interaction Design Beyond Human-Computer Interaction", Second Edition, Wiley,2012

Paper Code: MMC -603

Paper Title: Mobile Cloud Computing

L	T	C
4	0	4

INSTRUCTIONS TO PAPER SETTERS:

Maximum Marks : 60

- 1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.**
- 2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks**

UNIT I

Overview of Distributed Computing: Trends of computing, Introduction to distributed computing, Next big thing: cloud computing: **Introduction to Cloud Computing** :What's cloud computing, Properties & Characteristics, Service models, Deployment models Mobile cloud computing: A survey, Executing mobile applications on the cloud: Framework and issues Architecture, Applications, and Approaches

(10 Hrs)

UNIT II

Assessing the Value Proposition: Measuring the Cloud's Value, Avoiding Capital Expenditures, Computing the Total Cost of Ownership, Specifying Service Level Agreements (SLA), Defining Licensing Models. **Understanding Cloud Architecture:** Exploring the Cloud Computing Stack (Composability, Infrastructure, Platforms, Virtual Appliances, Communication Protocols, Applications), Connecting to the Cloud

(10 Hrs)

UNIT III

Understanding Services and Applications by Type. Infrastructure as a Service (IaaS) Introduction to IaaS, Resource Virtualization: Server, Storage, Network. **Platform as a Service (PaaS)** Introduction to PaaS, Cloud platform & Management: Computation, Storage. **Software as a Service (SaaS)** Introduction to SaaS, Web services, Web 2.0, Web OS.

(10 Hrs)

UNIT IV

The Mobile Cloud: Working With Mobile Devices Defining the Mobile Market, Connecting to the Cloud, Adopting mobile cloud applications, Feature phones and the cloud. Using Smartphones with the Cloud: Android, Apple iPhone: The App Store, Mobile Me, Iphone apps Hosting services. Research in Motion BlackBerry, Symbian, Windows Mobile. **Working With Mobile Web Services** Understanding Service Types: Mobile interoperability, Performing Service Discovery: Context-aware services, MEMS, Location awareness, Push Services, The BlackBerry Push Service, The Lemonade Profile, Using SMS, Defining WAP and other Protocols, Performing Synchronization. Case Study: icloud, sky drive and drop box, Windows Azure.

(10 Hrs)

Text Books:

Barrie Sosinsky, "Cloud Computing Bible", Wiley; 1st edition (January 11, 2011)

Reference Books:

1. Jean Dollimore, Tim Kindberg, George Coulouris, “Distributed Systems: Concepts and Design”, Fourth Edition, Addison Wesley, 2005.
2. Randal E. Bryant and David R. O'Hallaron, “Computer Systems: A Programmer's Perspective”, Prentice Hall, 2003.
3. Tanenbaum and van Steen, “Distributed Systems: Principles and Paradigms”, Pearson, 2007.
4. Aidan Finn, and Hans Vredevort “Microsoft Private Cloud Computing”, Wiley India Edition, 2012.

1.				
2.	Paper Code: MMC- 605		L	T
C				
3.	Paper Title: Advanced 3G and 4G Wireless Communication		4	0
4				

INSTRUCTIONS TO PAPER SETTERS:

Maximum Marks : 60

Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks.

Wireless Communications and Diversity: Fast Fading, Wireless Channel Modeling, Rayleigh Fading Channels, BER Performance in Fading Channels, Diversity modeling for Wireless Communications, BER Performance Improvement with Diversity, Types of Diversity: Frequency, Time, Space. Broadband Wireless Channel Modeling: WSSUS Channel Modeling, RMS Delay Spread, Doppler Fading, Jakes Model, Autocorrelation, Jakes Spectrum, Impact of Doppler Fading.

(10 Hrs)

UNIT II

Cellular Communications: Introduction to Cellular Communications, Frequency reuse, Multiple Access Technologies, Cellular Processes - Call Setup, Handover etc. Tele traffic Theory. **CDMA:** Introduction to CDMA, Walsh codes, Variable tree OVSF, PN Sequences, Multipath diversity, RAKE Receiver, CDMA Receiver Synchronization.

(10 Hrs)

UNIT III

OFDM: Introduction to OFDM, Multicarrier Modulation and Cyclic Prefix, Channel model and SNR performance, OFDM Issues – PAPR, Frequency and Timing Offset Issues. **MIMO:** Introduction to MIMO, MIMO Channel Capacity, SVD and Eigenmodes of the MIMO Channel, MIMO Spatial Multiplexing – BLAST, MIMO Diversity – OSTBC, MRT, MIMO - OFDM

(10 Hrs)

UNIT IV

UWB (Ultrawide Band): UWB Definition and Features, UWB Wireless Channels, UWB Data Modulation, Uniform Pulse Train, Bit-Error Rate Performance of UWB. **3G and 4G Wireless Standards and ITS Standardization Bodies:** GSM, GPRS, WCDMA, LTE, WiMAX, Feature Radio Technologies, cognitive Radio.

(10 Hrs)

Text Books:

1. David Tse and Pramod Viswanath, “ Fundamentals of Wireless Communications”, Cambridge University Press, 2005.
2. Theodore Rappaport, “Wireless Communications - Principles and Practice”, Prentice Hall.

Reference Books:

1. Andrea Goldsmith, “ Wireless Communications”, Cambridge University Press.
2. Ezio Biglieri, “ MIMO Wireless Communications”, Cambridge University Press.
3. John G Proakis, “ Digital Communications”, McGraw Hill Science/Engineering/Math.
4. Andreas Molisch, “ Wireless Communications”, Wiley IEEE Press.

Paper Code: MMC -607
Paper Title: Human Computer Interactions

L	T	C
4	0	4

INSTRUCTIONS TO PAPER SETTERS:

Maximum Marks : 60

- 1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.**
- 2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1**

UNIT I

Introduction: Importance of user interface, definition, importance of good design, Benefits of good design, A brief history on screen design. Graphical User Interface: Popularity of Graphics, the concept of direct manipulation, graphical system, characteristics, web user interface popularity, characteristics-principles of user interface.

(10 Hrs)

UNIT II

Design process: Human interaction with computers, importance of human characteristics, human considerations, human interaction speeds, understanding business junctions. Limitations and constraints of mobile and hand held platforms and issues related to network, power, memory and UI responsiveness required with reference to other computing platforms.

(10 Hrs)

UNIT III

Screen Designing (UI Design), Window & : Design goals, screen planning and purpose, organizing screen elements, ordering of screen data and content, screen navigation and flow, visually pleasing composition, amount of information, focus and emphasis, presentation information simply and meaningfully, information retrieval on web, statistical graphics, technological consideration in interface design. Windows: new and Navigation schemes selection of window, selection of devices based and screen based controls.

(10 Hrs)

UNIT IV

Components and Software Tools: Components: text and messages, Icons and increases, multimedia, colors, user problems, choose colors. Software tools: Specification methods interface, building tools. **Interacting Devices:-** Keyboard and function keys, touch screen technology, pointing devices, speech recognition digitization and generation, image and video displays(LED,LCD,HD displays). Introduction to voice activated commends and its implementation

(10 Hrs)

Text Books:

1. Wilbert O Galitz, "the essential guide to user interface design" , Wiley DreamaTech, 2007.
2. Ben Shneidermann, "Designing the user interface", 3rd Edition, Pearson Education Asia.
3. Sharp Rogers Preece, "Interaction Design Beyond Human-Computer Interaction", Second Edition, Wiley,2012

Reference Books:

1. Alan Dix, Janet Finckay, Gre Goryd, Abowd, Russel Bealg, " Human Computer Interaction" , Pearson.

Paper Code: MIS-613

Paper Title: E-Commerce and M-Commerce

L	T	C
4	0	4

INSTRUCTIONS TO PAPER SETTERS: :**Maximum Marks : 60**

- 1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.**
- 2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks**

UNIT 1

Electronic Commerce Introduction:- Definition of E- Commerce ,Electronic commerce and Physical Commerce, Architectural framework, Impact of E-commerce on business, different type of ecommerce, some e-commerce scenario, Economic potential of electronic commerce, Advantages and Disadvantages , Incentives for engaging in electronic commerce, forces behind E-Commerce, Management responses to e-commerce and e-business and Online Commercial Solutions.

(10Hrs)

UNIT 2

E-business strategy: Introduction, Characteristics of e-Business, Business models, E-Business vs E-commerce,e-Business role and their challenges, e-business Requirements, impacts of e-business, Strategic positioning, Levels of e-business strategies, Strategic planning process, consequences of e-Business, Success factors for implementation of e-business strategies, CRM, MRP. **ERP:-** Introduction, need of ERP, Enterprise perspective Production Finance, Personnel disciplines and their relationship, Transiting environment, MIS Integration for disciplines, Information Workflow, , Virtual Enterprise, Modules of ERP (HRD, Personnel Management, Training and Development, Skill Inventory Material Planning and Control, Inventory, Forecasting, Sales and Distribution, Finance, Resource Management in global scenario.

(10Hrs)

UNIT 3

Electronic Payment Methods: Overview, SET Protocol for credit card payment, E-cash, E-check, Micropayment system, Credit card, magnetic strip card,Smart cards, Electronics Data Interchange(basics, EDI versus Internet and EDI over Internet), E-Commerce Law. **Security Architecture:-** Network structure , Internet and, Client Server Integrator System , Secure online and Offline transaction processing, Encryption techniques, Symmetric Encryption- Keys and data encryption standard, Triple encryption, Asymmetric encryption- Secret key encryption, public and private pair key encryption, Digital Signatures, Virtual Private Network, IPsec, Threats, Firewalls.

(10Hrs)

UNIT-4

M-Commerce: Introduction, Attributes, customer and provider views, Architecture, Infrastructure of m-commerce, Requirement of the m-commerce, characteristics, Mobile Information device, Mobile Computing Applications, Mobile wallet,Mobile payments, G-Cash, P2P, Mobile portals, Research issues in Mobile Commerce, Pros and Cons of m-commerce

Secure Transaction Processes: Wireless Application Protocol, Bluetooth, The role of emerging wireless LANs and 3G/4G wireless networks, personalized content management, Secure Socket Layer and Transport Layer Secure.

(10Hrs)

Text Books:

1. Ravi Kalakota, Andrew Winston, "Frontiers of Electronic Commerce", Addison Wesley.
2. E-Business Organizational and technical foundation (Michael P) Wiley Publication
3. "Enterprise resource Planning- Concepts and Practice", V.K. Garg and N. K. Venkita Krishna, 1998, PHI.
4. Brian Mennecke and Troy Strader, "Mobile Commerce: Technology, Theory and Applications", Idea Group, 2003.
5. Nansi Shi, "Mobile Commerce Applications", IGI Global, 2004.
6. Dave Chaffey, "E-Business and E-Commerce Management", Third Edition, 2009, Pearson Education.

References:

1. E-Commerce Fundamentals and application (Henry Chan), 1st edition, 2001, Wiley publication
2. Bajaj and Nag, "E-Commerce the cutting edge of Business", 2nd edition, 2005, TMH
3. P. Loshin, John Vacca, "Electronic commerce", Firewall Media, 1st edition, 2005, New Delhi
4. E-Commerce Concepts, Models, Strategies- :- G.S.V.Murthy, 1st edition, 2002, Himalaya Publishing House

Paper Code: MMC -609

Paper Title: Design and Development of the Mobile Device

L	P	C
0	2	1

Experiments will be based on customizing the design of a handheld or mobile device based on the available hardware/software architectures.

Paper Code: MMC -611

Paper Title: Mobile Cloud Computing

L	P	C
0	2	1

Paper Code: MMC -613

Paper Title: Minor Project

L	P	C
0	8	12