



**Swami Ramanand Teerth Marathwada University, Nanded**  
**Choice Based Course Credit System (distribution and details of CBCS System)**

**M.Sc. (CM) First Year (Two Semester)**

<b>Semester-I</b>					
<b>Course Code</b>	<b>Title of the Paper</b>	<b>External credit</b>	<b>Internal credit</b>	<b>Total credit</b>	<b>No. of Classes</b>
M.SC. CM-101	Elements of Information Technology	3	1	4	40hrs
M.SC. CM-102	Introduction to Programming in “C”	3	1	4	40hrs
M.SC. CM-103	Operating System	3	1	4	40hrs
M.SC. CM-104	Management Information System	3	1	4	40hrs
M.SC. CM-105	Lab-1 ( EIT+OS)	1	1	2	60hrs
M.SC. CM-106	Lab-2 ( Programming in C )	1	1	2	60hrs
<b>Total Credits</b>		<b>14</b>	<b>6</b>	<b>20</b>	<b>280 hrs</b>

<b>Semester-II</b>					
<b>Course Code</b>	<b>Title of the Paper</b>	<b>External credit</b>	<b>Internal credit</b>	<b>Total Credits</b>	<b>No. of Classes</b>
M.SC. CM-201	RDBMS AND Oracle PL/SQL	3	1	4	40hrs
M.SC. CM-202	Programing in C++	3	1	4	40hrs
M.SC. CM-203	Software Engineering	3	1	4	40hrs
M.SC. CM-204	Programing with Visual Basic 6.0	3	1	4	40hrs
M.SC. CM-205	<b>Elective-II</b>	3	1	4	40hrs
	1: Next Generation Networks				
	2: ADHOC & Sensor Networks				
	3: System & Network Administration				
M.SC. CM-206	Lab-3(Oracle PL/SQL+ C++)	1	1	2	60hrs
M.SC. CM-207	Lab-4(Visual Basic 6.0)	1	1	2	60hrs
M.SC. CM-208	Seminar	1	0	1	40hrs
<b>Total Credits</b>		<b>18</b>	<b>7</b>	<b>25</b>	<b>360hrs</b>



**Swami Ramanand Teerth Marathwada University, Nanded**  
**Choice Based Course Credit System (distribution and details of CBCS System)**  
**M.Sc. (CM) First Year (Two Semester)**

**M.Sc. CM-101**

**Elements of Information Technology**

**(4 Credits)**

**UNIT I: Introduction to Computers**

What is Computer? Definition, Characteristics, Basic Building blocks, History & Generations  
Hardware Devices & Storage Devices, Input device - keyboard, Mouse, Web Camera, Scanner  
Output Device - Monitor, Printer, Plotter, and Memory devices - primary & secondary memory devices (FDD, HDD, CD, Tape and DVD)

**UNIT II: Data Representation**

Need for binary system, Conversion, Conversions from binary to others, Conversions from others to binary, Fraction Conversions, Binary Arithmetic's - Addition, Subtraction, Multiplication, and Division  
Representation of characters- ASCII, EBCDIC, Logic Gates (AND, OR, NOT), Flip Flop

**UNIT III: Computer Software & Operating System (DOS)**

What is software?, Relationship between Hardware & Software, Types of software & examples, Compilers & interpreter, Definition, Commands, Internal Commands, External Commands

**UNIT IV: Networking concepts**

LAN, WAN, MAN, Classification- serial, simplex, duplex, half duplex, Topologies, OSI Model

**UNIT V: Introduction of Database**

What is Database?, Simple & Relational Database, Defining Structure of Database file, Saving a database file, Opening & closing Database file, Modifying Database Structure ,

**UNIT VI: Database Commands using FoxPro**

Appending data, Editing & Changing Data, Viewing a database, List Command (All Options)  
Display Command, Browse option, searching the information with Locate Command, Record Pointer Deleting Records, Global Replacement with Replace Command

**REFERENCE BOOKS –**

1. FoxPro 2.5 Made Simple For Dos & Windows - By R.K. Taxali, BPB Publication, 2003, ISBN-8170296897
2. Computer Fundamentals - By Sinha, P. K. BPB Publications 2004 ISBN – 8176567523
3. Computer Networks - By Andrew S. Tanenbaum, David J. Wetherall, 5th Edition , 2010 ISBN - 978-0132126953 ISBN-10: 0132126958
4. MS- DOS - By Peter Norton, Sams Publishing, 1994, ISBN 067230614X, 9780672306143



**Swami Ramanand Teerth Marathwada University, Nanded**  
**Choice Based Course Credit System (distribution and details of CBCS System)**  
**M.Sc. (CM) First Year (Two Semester)**

---

5. Introduction to computer -By Peter Norton, Fifth Edition, McGraw-Hill, 2002 , ISBN 0078454484, 9780078454486
6. Elements of Digital Computers - By Thomas Barteet, Second Edition, McGraw-Hill, 1966.



**Swami Ramanand Teerth Marathwada University, Nanded**  
**Choice Based Course Credit System (distribution and details of CBCS System)**  
**M.Sc. (CM) First Year (Two Semester)**

**M.Sc. CM-102                      Introduction to Programming in “C”                      (4 Credits)**

**UNIT I: Getting Started With C:**

History, Importance of C, Basic Structure of C program, Pre-processor, C Character set, C Tokens, Identifiers & Keywords, Constants, Variables, Data Types, Strings, Operators, Type Casting.

**UNIT II: Decision making, branching, & looping statements:**

Introduction, Decision making with, If statement, If-Else statements, Nested If-Else statements, Else If ladder, switch statement, Looping statements, WHILE statement, DO – while statement, For Statement.

**UNIT III: Storage Classes & Arrays:**

Storage class, types, what is Array? Array Types, Bounds checking, Passing array elements to a function.

**UNIT IV: Functions & pointers:**

What is a function?, Advanced Features of Functions, Call by Value & Call by References, Recursion, Introduction to pointers, Pointers & Arrays, Arrays of Pointers, Function Returning Pointers, Pointers to functions.

**UNIT V: Structures & Unions:**

Introduction to structures, Structure variables, Arrays within structure, Structure within structure, Introduction to Union

**UNIT VI: Input Output Functions in C:**

Console I/O Functions, Disk I/ O Functions, What are strings? String functions, Dynamic Memory Allocation

**Reference Books:**

1. Programming in ANSI C – By E. Balagurusamy, Tata McGraw-Hill Education, 2004 ISBN 0070534772, 9780070534773
2. Let Us C - By Yeshwant Kanetkar Infinity Science Press, 8th edition, 2008, ISBN - 1934015253
3. Pointers in C - By Yeshwant Kanetkar, 4th Edition, BPB Publications 2009 ISBN -9788176563581



**Swami Ramanand Teerth Marathwada University, Nanded**  
**Choice Based Course Credit System (distribution and details of CBCS System)**  
**M.Sc. (CM) First Year (Two Semester)**

**M.Sc. CM-103**

**Operating System**

**(4 Credits)**

**UNIT I: Introduction to Operating System:**

Definition of Operating System, Importance of Operating System, Basic Concept & Terminology, Extended Machine Concept, Hierarchical Machine Concept, Multi-User, Multiprocessor, Multiprogramming, Multi-Tasking.

**UNIT II: Memory Management:**

Single Contiguous memory management, Partition Memory Management, Relocatable Partition Memory Management, Paged Memory Management, Demand Page Memory Management, Segmented Memory Management Technique.

**UNIT III: Processor Management:**

What is Process? Process State model, Context Switching, Job Scheduling, Process Control Block, Process Scheduling, Multiprocessor System

**UNIT IV: Process Synchronization:**

Race Condition, Synchronization Mechanism, Deadlock- techniques for handling deadlock.

**UNIT V: Device Management:**

Techniques of device Management, Device Characteristics, Channels & Control Units, Modules of Device Management- I/O Traffic Controller, I/O Scheduler, Device Handler

**UNIT VI: Information Management**

Simple File System, General Model of file System

**Reference Books:**

- 1) Operating System – By Stuart E. Madnick, John J. Donovan, Tata McGraw-Hill Education, 1997, ISBN - 0074632736
- 2) Operating System Concepts- By Abraham Silberschatz, Greg Gagne, Peter B. Galvin, 9<sup>th</sup> Edition, Wiley Publication, 2012, ISBN - 1118063333, 9781118063330



**Swami Ramanand Teerth Marathwada University, Nanded**  
**Choice Based Course Credit System (distribution and details of CBCS System)**  
**M.Sc. (CM) First Year (Two Semester)**

**M.Sc. CM-104**

**Management Information System**

**(4 Credits)**

**UNIT I: Introduction to MIS:**

Introduction, Definition of MIS, Objectives of MIS, Characteristics of MIS, Role of MIS in business organization.

**UNIT II: Management, Organization and MIS:**

Introduction, Function Concept, Managerial functions, Organization structure, Fitting MIS to Management / Organization, MIS design, Control and feedback, Law of requisite variety.

**UNIT III: Information requirements analysis:**

Definition, Information Process, Source of information, Types of information, Attributes of Information, Human as information processor, Techniques for assessing information requirements, Levels of information requirement..

**UNIT IV: Sales Budgeting & Financial Account:**

Introduction to market segmentation, Segmenting the consumer market, Product, Sales Routine, General Ledger, Profit and loss account, Balance sheet, Trial balance, Account receivables and Account payable.

**UNIT V: Manufacturing:**

Bill of Material, Capacity requirement planning-Long term, Short term planning, Material requirement planning, Production planning, Material procurement-Purchase requisition, Scrutiny, Collect Quotation from vendor, Vendor analysis and selection of them, Order preparation, Follow up, Receiving and inspection, Storage and record keeping, Invoicing and payment.

**UNIT VI: Human Resources:**

Employee database, Recruitment, Employee Appraisal, Employee Training, Leave accounting.

**Reference Books:**

- 1) **Management Information System** – By Rajlaxmi kendurkar, Vision publication, Pune.
- 2) **Management Information System** - By Dr. Milind oka, Everest publishing house, ISBN - 8176600210



**Swami Ramanand Teerth Marathwada University, Nanded**  
**Choice Based Course Credit System (distribution and details of CBCS System)**  
**M.Sc. (CM) First Year (Two Semester)**

**M.Sc. CM-201**

**RDBMS AND Oracle PL/SQL**

**(4 Credits)**

**UNIT I: Introduction and Basic Concepts**

Structure of DBMS, Advantages & Disadvantages of DBMS, **Relational Database** :*Attribute & Domains, Tuple , relations and their schemes*, **Relational Algebra**: *Basic Operations, additional relational algebraic Operations*, **Relational Calculus**: *Tuple Calculus, Domain Calculus*, Introduction to data constraints, Types of data constraints, Integrity rules

**UNIT II: Introductions to Tools to Oracle**

Introduction to SQL, DDL, DML commands, Data types, LOB Data type, CLOB, BLOB, BFILE SQL \*Plus, Checking the SQLPLUS Environment, Oracle & Client - Server Technology, Create Table, Alter Table, Drop Table, Insert, Update, Delete with 'where' clause Commands, Select command with all Options. SQL Queries and Function, Database views, Operation and Operator Arithmetic, Comparison, Logical

**UNIT III: Numbers and SQL Functions**

Oracle Dual Table, Query Expression Operators, Union, Minus Operator Precedence

**Character functions** - *initcap, lower, upper, trim, translate, length, Char*,

**Date functions** - *Sys\_date, now\_time, next\_date, Add\_months, Last\_day, months\_Between*

**Numeric functions** - *round, trunk, abs, cell, cos, exp, floor*,

**Conversion functions** - *To\_Char, To\_date, To\_number-*

**Group Functions** - *Avg, max, min, sum, count. , Group by Clause, Having Clause, Expression Set operations Sub queries.*

**UNIT IV: Introduction to PL/SQL**

Structure of PL/SQL Block, Condition logic, Loops, Exception Handling, Database Triggers, Introduction to Cursor & Locks PL/SQL Forms, Reports

**UNIT V: Transactions**

Transaction Concept, Transaction State, ACID Properties of Database Implementations of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability

**UNIT VI: Security & Database Triggers**

Creating User, Working with Privileges (System Level Privileges, Object Level Privileges), Granting Privileges, Revoking Privileges, Working With Roles (Study of default roles, Creating roles), Granting and Revoking roles



**Swami Ramanand Teerth Marathwada University, Nanded**  
**Choice Based Course Credit System (distribution and details of CBCS System)**  
**M.Sc. (CM) First Year (Two Semester)**

---

**Reference Books -**

1. Oracle by Ivan N. Bayross, BPB Publications (December 1, 2010), ISBN- 817656964
2. Understanding oracle by James T. Perry , Joseph G. Lateer, Sybex Inc, 1989, ISBN- 0895885344
3. Oracle Database Pl/Sql Programming By Scott Urman, Tata McGraw-Hill Education, 2004, ISBN=0070597790.
4. Oracle 9i: The Complete Reference Edition First By Kevin Loney, George Koch, McGraw-Hill Companies, 2002, ISBN-: 9780072225211





**Swami Ramanand Teerth Marathwada University, Nanded**  
**Choice Based Course Credit System (distribution and details of CBCS System)**  
**M.Sc. (CM) First Year (Two Semester)**

**M.Sc. CM-202**

**Programming in C++**

**(4 Credits)**

**Unit I: Introduction to OOP's**

Introduction to OOP's, Object oriented programming, Basic concept of OOP's, Benefits of OOP's, Tokens, keywords, Identifiers and constants, Basic data types, Operators in C++, Operator precedence and associativity, Structure of C++ programming Type casting, Control Structure Sequential, Branching, Looping .

**Unit II: Functions, Class, objects in C++**

Function, Function prototype, Call by value, Call by reference, Inline function , Default arguments, Function overloading, Specifying a class and object, Nesting of member function, Memory allocation for objects, Visibility modes, Static data member and member function, Friend functions, Pointer to member, Pointer to object.

**Unit III: Constructor and destructor**

Constructor, Types of constructor, Default constructor, Parameterized constructor, Copy constructor, Dynamic constructor, Destructor, operator overloading and type conversions, Concept of operator overloading, Unary and binary operator overloading, Rules for overloading, Type conversions Basic to class, Class to basic ,Class to class

**Unit IV: Inheritance and Polymorphism**

Concept of inheritance, Types of inheritance, Polymorphism ,Virtual base class, Pointer to derived class, Virtual functions, Rules for virtual functions, Pure virtual functions,

**Unit V: C++ I/O system**

C++ streams, Stream classes, Unformatted I/O, Overloading <<, Formatted console I/O operations, User define manipulator, Classes for file stream operations, Opening and closing a file, Sequential and Random access, Error Handling During file operations, Command line arguments,

**Unit VI: Templates & string manipulation**

Class Templates, Class templates with multiple Parameters, Function templates, Function templates with multiple parameters, Basic of Exception Handling, Exception handling mechanism, Creating string objects, Manipulating string objects, Relational operations, String Characteristics, Accessing characters in string.

**Reference Books:-**

1. The C++ Complete Reference - By Herbert Schildt, Tata McGraw-Hill Education, 2003, ISBN- 9780070532465



**Swami Ramanand Teerth Marathwada University, Nanded**  
**Choice Based Course Credit System (distribution and details of CBCS System)**  
**M.Sc. (CM) First Year (Two Semester)**

---

2. Object-Oriented Programming with C++ - By E- Balagurusamy, Tata McGraw-Hill Education, 2008, ISBN- 9780070669079
3. Let us C++ - By Yashwant Kanetkar, Galgotia Publications, ISBN- 9788175153929



**Swami Ramanand Teerth Marathwada University, Nanded**  
**Choice Based Course Credit System (distribution and details of CBCS System)**  
**M.Sc. (CM) First Year (Two Semester)**

**M.Sc. CM-203**

**Software Engineering**

**(4 Credits)**

**UNIT I: The Product & Process**

The Evolving Role of Software, Software Characteristics, Applications of Computer Software, The Software Myths, Software Engineering – A layered Technology, Software Process Model, The Capability Maturity Model Integration (CMMI) , The Waterfall Model , Prototyping Model, Spiral Model, Fourth generation techniques

**UNIT II: Management Concepts**

Management Spectrum, The People, The Product, The Process, The Project, Players, Leaders & software team, Software scope

**UNIT III: Software process and Project Metrics**

Measures Metrics and Indicators, Metrics in the process and project domains  
Software Measurement:-  
- Size-Oriented Metrics  
- Function-Oriented Metrics  
- Extended Function Point Metrics

**UNIT IV: Software Project Planning**

Observations on Estimating, Project Planning Objectives, Software Scope, Resources, Software Project Estimation

**UNIT V: Risk Analysis and & Software Quality Assurance**

Software Risks, Risk Identification, Risk Projection, Quality Concepts, Software Quality Assurance, Software Reviews, Formal Technical Reviews

**UNIT VI: Software Testing Technique & Strategies**

Software Testing Fundamentals, White Box Testing, Basic Path Testing, Control Structure Testing, Black Box Testing, A Strategic Approach to Software Testing, Unit Testing, Integration Testing, Top-down Integration, Bottom-up Integration, Validation Testing, System Testing

**References Book -**

1. Software Engineering: A Practitioner's Approach, 7<sup>th</sup> Edition, Roger S. Pressman, McGraw-Hill, 2010 ISBN- 9780071267823.



**Swami Ramanand Teerth Marathwada University, Nanded**  
**Choice Based Course Credit System (distribution and details of CBCS System)**  
**M.Sc. (CM) First Year (Two Semester)**

**M.Sc. CM-204**

**Programming with Visual Basic 6.0**

**(4 Credits)**

**UNIT I: INTRODUCTION TO VISUAL BASIC-**

Event Driven Programming, Understanding VB Environment, Project explorer, Properties window, Tool Box, Form Lay Out window, Property Pages, Saving and printing pages, Running application, Code window, Naming conventions, Variables( All data types) , Scope (Global/local/static) , Constants

**UNIT II: VISUAL BASIC CONTROLS-**

Label controls, Textbox controls, Command controls, Picture Box, Image Box, Frame controls, Checkbox controls, Option Box controls, List Box controls, Combo Box, Directory, File, Drive List Box controls , Formatting controls, Control Array, Tab Order

**UNIT III: WORKING WITH FUNCTION AND CONTROL STATEMENTS**

String function, Mathematical function, Date function, Data type conversion function, If and IF-else statements, Select case statements, Do statements, For statements, Exit statements

**UNIT IV: DIALOG BOXES AND MENUS**

MSG Box, Input box, Common dialog box, Creating Menus, Adding code to menus, Other common controls (MS windows common controls 6.0, 3.6.0)

**UNIT V: ACCESSING DATA**

Reading and writing files, Data from wizard, Data control, Data grid control, DB combo box, DB List Box, SQL queries in VB, JET DAO, ADO, Error Handling

**UNIT VI: ACTIVE X CONTROL AND WINDOWS API**

Creating your own Active X control, Adding active X Control to project, Introduction to Windows API, DLL,s, Declare statements, Calling API Routine, Reports.

**Reference Books: -**

1. Mastering Visual Basic 6 – By Evangelos Petroustos, Wiley, 1998, SBN- 9780782122725
2. Programming with Visual Basic 6.0, By M Azam, Vikas Publishing House Pvt Ltd, 2001 ISBN-9788125909323
3. Peter Norton's Guide to Visual Basic 6, By Peter Norton, Michael Groh, 5<sup>th</sup> Edition, Sams, 1998, ISBN- 9780672310546
4. Visual Basic 6 Complete Guide, Greg M. Perry, Apogeo Editore, 1998, ISBN 9788873034568



**Swami Ramanand Teerth Marathwada University, Nanded**  
**Choice Based Course Credit System (distribution and details of CBCS System)**  
**M.Sc. (CM) First Year (Two Semester)**

**M.Sc. CM-205 (Elective -1)                      Next Generation Networks                      (4 Credits)**

**UNIT I: Converged Services for Next Generation Networks**

GSM/UMTS Network protocols: SS7 and Standard basics, Supplementary Services: UMTS procedures. Intelligent Network: IN principles, CAMEL, Services: what are the challenges? , Integration, deployment issues.

**UNIT II: Introduction to Next Generation Networks**

IMS: the convergence. NGN architecture, NGN control architectures and protocols, Multi-access to the services: 3G, Wi-Fi, DSL, Cable. TISPAN, SIP, Service architectures, Transition of networks (PSTN, IP-based) to NGN, Ipv6-based NGN, MEGACO, H.248, P2P systems, P2P SIP, Social Networks: Web-NGN convergence, Telco 2.0, IPTV, RCS. UMTS standardized on at 3GPP: Standardization process and principles in ETSI and 3GPP, Functionalities standardized in UMTS from Release 99 to Release 9. Latest 3GPP updates: what happened in 2010?

**UNIT III: Wireless Access and Transport Technologies**

RAN architecture : Radio Access Network Architecture for GSM, GPRS and UMTS, network devices, interfaces and protocols , QoS definition and management in GPRS and UMTS, Access methods and radio resource management in mobile networks, mainly for: TDMA systems

**UNIT IV: CDMA systems and OFDMA systems.**

Scheduling issues for GPRS, UMTS and WiMAX : downlink, uplink Physical to logical channel mapping: for GSM , for UMTS Procedure and protocol used for resource allocation ,PDP Context and TBF allocation.

**UNIT V: WPAN, WLAN, WMAN and Broadcast technologies**

WLAN, WPAN, WMAN, DVB-H: Introduction ,WiFi: Standards, performance, usage and applications, new evolutions ,WiMAX, DVB-H :Usage and standard, Security :Basics, architectures, algorithms, Bluetooth: Standard, performance, usage and applications , Zigbee, UWB: Standards and usage, Service discovery in wireless Networks (jxta, UPnP,...) , Security in Wireless Networks: PANs, LANs and cellular Wireless Networks Simulation (tools and methods)

**UNIT VI: Optimization: Theory and Network applications**

Graph algorithms, linear programming basics, Introduction to Integer programming, Traffic engineering, Network topology calculus, Network optimal routing and dimensioning, Frequency assignment, Pricing, Game theory.



**Swami Ramanand Teerth Marathwada University, Nanded**  
**Choice Based Course Credit System (distribution and details of CBCS System)**  
**M.Sc. (CM) First Year (Two Semester)**

---

**Reference Books:**

1. Next Generation Network Services: Technologies & Strategies by Neill Wilkinson, Publication, Edition: 1, ISBN: 978-0-471-48667-1
2. Next Generation Networks: Perspectives and Potentials by Jingming Li Salina, Pascal Salina, Publisher: John Wiley & Sons, 2008, ISBN=0470724471
3. Next-Generation Network Services: By Robert Wood, Published Nov 1, 2005 by Cisco Press. Part of the Networking Technology series ISBN-13: 978-1-58705-159-3
4. Best Practices for Implementing Next Generation Networks (NGN) in the Asia and Pacific Region, International Telecommunication Union, Telecommunication Development Bureau, June 2012.



**Swami Ramanand Teerth Marathwada University, Nanded**  
**Choice Based Course Credit System (distribution and details of CBCS System)**  
**M.Sc. (CM) First Year (Two Semester)**

**M.Sc. CM-205 (Elective -2)**

**ADHOC and Sensor Networks**

**(4 Credits)**

**UNIT I: Ad Hoc Wireless Networks**

Introduction. Issues in Ad Hoc Wireless Networks. Ad Hoc Wireless Internet.

**MAC Protocols for Ad Hoc Wireless Networks:**

Introduction, Issues in Designing a MAC Protocol for Ad Hoc Wireless Networks. Design Goals of a MAC Protocol for Ad Hoc Wireless Networks. Classifications of MAC Protocols. Contention-Based Protocols. Contention-Based Protocols with Reservation Mechanisms. Contention-Based MAC Protocols with Scheduling Mechanisms. MAC Protocols in Directional Antennas. Other MAC Protocols

**UNIT II: Routing Protocols for Ad Hoc Wireless Networks:**

Introduction to Routing algorithm, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks. Classifications of Routing Protocols. Table-Driven Routing Protocols. On-Demand Routing Protocols. Hybrid Routing Protocols. Routing Protocols with Efficient Flooding Mechanisms. Hierarchical Routing Protocols. Power-Aware Routing Protocols.

**UNIT III: Transport Layer and Security Protocols for Ad Hoc Wireless Networks:**

Introduction. Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks. Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks. Classification of Transport Layer Solutions. TCP Over Ad Hoc Wireless Networks. Other Transport Layer Protocols for Ad Hoc Wireless Networks. Security in Ad Hoc Wireless Networks. Network Security Requirements. Issues and Challenges in Security Provisioning. Network Security Attacks. Key Management. Secure Routing in Ad Hoc Wireless Networks.

**UNIT IV: Wireless Sensor Networks:**

Introduction. Sensor Network Architecture. Data Dissemination. Data Gathering. MAC Protocols for Sensor Networks. Location Discovery. Quality of a Sensor Network. Evolving Standards. Other Issues.

**UNIT V: Hybrid wireless Networks:**

Introduction. Next-Generation Hybrid Wireless Architectures. Routing in Hybrid Wireless Networks. Pricing in Multi-Hop Wireless Networks. Power Control Schemes in Hybrid Wireless Networks. Load Balancing in Hybrid Wireless Networks.



**Swami Ramanand Teerth Marathwada University, Nanded**  
**Choice Based Course Credit System (distribution and details of CBCS System)**  
**M.Sc. (CM) First Year (Two Semester)**

---

**UNIT VI: Wireless Geolocation Systems:**

Introduction. What is wireless Geolocation? Wireless Geolocation System Architecture. Technologies for Wireless Geolocation. Geolocation Standards for E-911 Services. Performance Measures for Geolocation Systems. Questions. Problems.

**Recent Advances in Wireless Networks:**

Introduction. Ultra-Wide-Band Radio Communication. Wireless Fidelity Systems. Optical Wireless Networks. The Multimode 802.11 -IEEE 802.11a/b/g. The Meghadoot Architecture, introduction to vehicular sensor networks.

**Reference Books**

1. Toh, C. K., Ad hoc Mobile Wireless Networks Protocols and Systems, Prentice Hall, PTR, (2001) 3rd Edition, ISBN-0132442043
2. Principles of Wireless Networks, - A united approach - Pahlavan, Kaveh., Krishnamoorthy, Prashant., Pearson Education, (2002) 2nd ed. ISBN-13: 9780130930033
3. Wang X. and Poor H.V., Wireless Communication Systems, Pearson education, (2004) 3rd ed.
4. Mobile Communications, 2 Edition, Jochen Schiller, Pearson Education India, 2008 ISBN-9788131724262
5. Carlos De Moraes Cordeiro and Dharam P Agrawal, "Adhoc and Sensor Networks- Theory & Applications", 2nd Ed, Cambridge Univ Press India Ltd





**Swami Ramanand Teerth Marathwada University, Nanded**  
**Choice Based Course Credit System (distribution and details of CBCS System)**  
**M.Sc. (CM) First Year (Two Semester)**

**M.Sc. CM-205 (Elective -3) System and Network Administration (4 Credits)**

**UNIT I: System Hardware**

PC and Server Hardware Architecture, Operating System Administration: UNIX, Windows, MAC OS.

**Centralization and Decentralization:** Centralized Authentication, Active Directories; LDAP;  
**Storage:** RAID, Storage Area Network (SAN), Direct Attached Storage (DAS), Network Attached Storage (NAS); Data Integrity Backup and Recovery.

**UNIT II: System Configuration**

Cloning, Monitoring and administering them; workstations, server, Data center, Data Center Management: Administering, Surveillance, Access Control, High Performance Computing, Virtualization and Cloud Computing.

**UNIT III: Network Administration:**

**Network administrator** (definition and functions), Network Planning, Routine system maintenance

**Computer Networks:** OSI & TCP/IP Model, clean architecture;

**UNIT IV: Switching & Routing**

Layer 2 & Layer 3 switching; Routing; VLAN; Cisco L2 and L3 Switch Configuration; DHCP Configuration; IPv6, Wireless LAN: 802.11 a/b/g/n/ac WiFi; Access Point and Wireless Router configuration.

**UNIT V: Internet Architecture**

ISP Architecture; DNS Resolution; Content Mirroring, Internet Applications: DNS, Web, Mail, Proxy, NTP; **Perimeter Security:** Firewall, UTM,

**UNIT VI: Network Security**

LAN and WLAN Security issues; IP Spoofing; Dictionary Attack; DoS and DDoS Attack; Rogue/Misconfigured/External APs; Network Troubleshooting: ping, traceroute, nslookup, dig, tcpdump; Network Monitoring: SNMP; MRTG.



**Swami Ramanand Teerth Marathwada University, Nanded**  
**Choice Based Course Credit System (distribution and details of CBCS System)**  
**M.Sc. (CM) First Year (Two Semester)**

---

**References Books:**

- [1] Thomas A Limoli, Christina J. Hogan , Strata R. Chalup " Theory and Practise of System and Network administration " Addison-Wesley Professional; 2 edition 2007
- [2] Subramaniam Mani, Subramanian " Network Management: Principles and Practice" Pearson Education India, 2006
- [3] Evi Nemeth, Garth Snyder, Trent R. Hein , Ben Whaley "UNIX and Linux System Administration Handbook" (4th Edition), 2010
- [4] Craig Hunt, "TCP/IP Network Administration" "O'Reilly Media, Inc.", 2002