

**MRSPTU M.Sc. (INFORMATION TECHNOLOGY) SYLLABUS  
2016 BATCH ONWARDS UPDATED ON 1.9.17.**

**Total Contact Hours = 27**

**Total Marks = 700**

**Total Credits = 23**

SEMESTER 1 <sup>st</sup>		Contact Hrs.			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
MITE1-101	Object Oriented Programming	3	1	0	40	60	100	4
MITE1-102	Internet and Web Technology	3	1	0	40	60	100	4
MITE1-103	Advanced Database Systems	3	1	0	40	60	100	4
MITE1-104	Object Oriented Programming Lab.	0	0	4	60	40	100	2
MITE1-105	Database Lab.	0	0	4	60	40	100	2
<b>Departmental Elective – I (Select any one)</b>		3	1	0	40	60	100	4
MITE1-156	Ethical Hacking							
MITE1-157	Intrusion Detection System							
MITE1-158	Adhoc and Sensor Networks							
<b>Open Elective – I</b>		3	0	0	40	60	100	3
<b>Total</b>		<b>15</b>	<b>4</b>	<b>8</b>	<b>320</b>	<b>380</b>	<b>700</b>	<b>23</b>

**Total Contact Hours = 26**

**Total Marks = 700**

**Total Credits = 23**

SEMESTER 2 <sup>nd</sup>		Contact Hrs.			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
MITE1-206	Advanced Software Engineering	3	1	0	40	60	100	4
MITE1-207	Relational Database Management System	3	1	0	40	60	100	4
MITE1-208	Object Oriented Analysis & Design	3	1	0	40	60	100	4
MHUM0-204	Business Communications	2	0	2	40	60	100	3
MITE1-209	RDBMS Lab	0	0	4	60	40	100	2
<b>Departmental Elective – II (Select any one)</b>		3	0	0	40	60	100	3
MITE1-259	Mobile Computing							
MITE1-260	Mobile Application Development							
MITE1-261	Real Time & Embedded Systems							
<b>Departmental Elective – III (Select any One)</b>		3	0	0	40	60	100	3
MITE1-262	Advance Operating System							
MITE1-263	Soft Computing							
MITE1-264	Artificial Intelligence							
<b>Total</b>		<b>17</b>	<b>3</b>	<b>6</b>	<b>300</b>	<b>400</b>	<b>700</b>	<b>23</b>

**MRSPTU M.Sc. (INFORMATION TECHNOLOGY) SYLLABUS  
2016 BATCH ONWARDS UPDATED ON 1.9.17.**

**Total Contact Hours = 29**

**Total Marks = 800**

**Total Credits = 24**

SEMESTER 3 <sup>rd</sup>		Contact Hrs.			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
MITE1-310	Computer Graphics	3	1	0	40	60	100	4
MITE1-311	Advanced Computer Networks	3	1	0	40	60	100	4
MITE1-312	Information Security	3	1	0	40	60	100	4
MITE1-313	Computer Graphics Lab.	0	0	4	60	40	100	2
MITE1-314	Computer Network Lab.	0	0	4	60	40	100	2
MITE1-315	Seminar	0	0	2	60	40	100	1
<b>Departmental Elective –IV (Select any one)</b>		3	1	0	40	60	100	4
MITE1-365	Big Data							
MITE1-366	Cloud Computing							
MITE1-367	Virtualization & Cloud Security							
<b>Open Elective – II</b>		3	0	0	40	60	100	3
<b>Total</b>		<b>15</b>	<b>4</b>	<b>10</b>	<b>360</b>	<b>420</b>	<b>800</b>	<b>24</b>

**Total Contact Hours = 32**

**Total Marks = 500**

**Total Credits = 20**

SEMESTER 4 <sup>th</sup>		Contact Hrs.			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
MITE1-416	Advanced Java Programming	3	1	0	40	60	100	4
MITE1-417	Theory of Computation	3	1	0	40	60	100	4
MITE1-418	Advanced Java Lab.	0	0	2	60	40	100	1
MITE1-419	Programming Lab.	0	0	2	60	40	100	1
MITE1-420	Project	0	0	20	60	40	100	10
<b>Total</b>		<b>6</b>	<b>2</b>	<b>24</b>	<b>260</b>	<b>240</b>	<b>500</b>	<b>20</b>

**Overall**

Semester	Marks	Credits
1 <sup>st</sup>	700	23
2 <sup>nd</sup>	700	23
3 <sup>rd</sup>	800	24
4 <sup>th</sup>	500	20
<b>Total</b>	<b>1400</b>	<b>90</b>

**MRSPTU M.Sc. (INFORMATION TECHNOLOGY) SYLLABUS  
2016 BATCH ONWARDS UPDATED ON 1.9.17.**

---

**OBJECT ORIENTED PROGRAMMING**

**Subject Code – MITE1- 101**

**L T P C  
3 1 0 4**

**Duration – 45 Hrs.**

**UNIT-I (12 Hrs.)**

**Object Oriented Programming Concepts:** Objects, Classes, Methods and Messages - Abstraction and Encapsulation, Inheritance - Abstract Classes, Polymorphism, Introduction To C++, Classes- Access Specifiers, Function and Data Members, Default Arguments - Function Overloading, Friend Functions- Const and Volatile Functions - Static Members - Objects - Pointers and Objects - Constant Objects - Nested Classes - Local Classes

**UNIT-II (11 Hrs.)**

Constructors - Default Constructor - Parameterized Constructors - Constructor with Dynamic Allocation - Copy Constructor - Destructors - Operator Overloading - Overloading Through Friend Functions - Overloading The Assignment Operator - Type Conversion - Explicit Constructor

**UNIT-III (10 Hrs.)**

Function and Class Templates - Exception Handling – Try Catch-Throw Paradigm - Exception Specification - Terminate and Unexpected Functions - Uncaught Exception.

**UNIT-IV (12 Hrs.)**

Inheritance - Public, Private and Protected Derivations - Multiple Inheritance - Virtual Base Class - Abstract Class - Composite Objects Runtime Polymorphism - Virtual Functions - Pure Virtual Functions - RTTI – Type id - Dynamic Casting - RTTI and Templates - Cross Casting - Down Casting, Streams and formatted I/O - I/O manipulators - file handling - random access - object serialization - namespaces - std namespace - ANSI String Objects - standard template library.

**INTERNET AND WEB TECHNOLOGY**

**Subject Code – MITE1-102**

**L T P C  
3 1 0 4**

**Duration – 45 Hrs.**

**UNIT-I (12 Hrs.)**

**Introduction:** Internet Protocol Model, Internet Addresses, IP Routing Concepts, Table Driven and Next Hop Routing, Other Routing Related Protocols, Internet Access Through PPP, SLIP, WWW, Web Servers, Browsers.

**UNIT-II (13 Hrs.)**

**Name Services and Configuration:** DNS, DHCP, X500 Directory Services, LDAP, Internet Security, Authentication and Encryption, Watermarks, Firewall, SSL, Digital Signatures. **Web Services:** Web Services, Evolution and Differences with Distributed Computing, XML, WSDL, SOAP, UDDI, Transactions, Business Process Execution Language for Web Services, WS-Security and The Web Services Security Specifications, WS-Reliable Messaging, WS-Policy, WS-Attachments. Web 2.0 Technologies: Introduction to Ajax, Ajax Design Basics, Javascript, Blogs, Wikis, RSS Feeds.

**UNIT-III (11 Hrs.)**

**Content Delivery and Preparation:** Introduction to WWW, TCP/IP, HTTP, FTP, UDP, N-Tier, Markup Languages VRML– HTML, DHTML, DNS, URL, Browsers, Platform for Web Services Development, MVC Design Pattern, .NET, J2EE Architecture, J2EE Components & Containers, Specification, Application Servers, Struts.

**MRSPTU M.Sc. (INFORMATION TECHNOLOGY) SYLLABUS  
2016 BATCH ONWARDS UPDATED ON 1.9.17.**

---

**UNIT-IV (10 Hrs.)**

**Dynamic Web Programming:** Java Applets, Java script, JSP, JSTL, ASP, PHP, Servlets, Servlet Life Cycle, C#, Component Technologies, Java Beans, CORBA, Introduction to EJBs, JDBC, Secure Electronic Transactions Over Web.

**Recommended Books**

1. E. Balagurusamy, 'Programming with Java', 4<sup>th</sup> Edn., Tata McGraw Hill Education, 2009.
2. E. Ladd and J. O'Donnell, 4<sup>th</sup> Edn., Platinum Edition Using XHTML XML and Java 2, Que Publishing, 2001.
3. P.J. Deitel,, H. Deitel, and A. Deitel, 'Internet and World Wide Web How to Program', 5<sup>th</sup> Edn., Pearson Education Limited, India, 2011.

**ADVANCED DATABASE SYSTEM**

**Subject Code – MITE1 - 103**

**L T P C  
3 1 0 4**

**Duration - 45 Hrs.**

**UNIT-I (12 Hrs.)**

**Parallel Databases:** Database System Architectures: Centralized and Client-Server Architectures – Server System Architectures – Parallel Systems- Distributed Systems – Parallel Databases: I/O Parallelism – Inter and Intra Query Parallelism – Inter and Intra Operation Parallelism – Case Studies.

**UNIT-II (13 Hrs.)**

**Object Oriented Database:** Object Oriented Databases – Introduction – Weakness of RDBMS – Object Oriented Concepts Storing Objects in Relational Databases – Next Generation Database Systems – Object Oriented Data models – OODBMS Perspectives – Persistence – Issues in OODBMS – Object Oriented Database Management System Manifesto – Advantages and Disadvantages of OODBMS – Object Oriented Database Design – OODBMS Standards and Systems – Object Management Group – Object Database Standard ODMG – Object Relational DBMS–Postgres - Comparison of ORDBMS and OODBMS.

**UNIT-III (11 Hrs.)**

**Web Database:** Web Technology and DBMS – Introduction – The Web – The Web as a Database Application Platform – Scripting languages – Common Gateway Interface – HTTP Cookies – Extending the Web Server – Java – Microsoft's Web Solution Platform– Oracle Internet Platform – Semi structured Data and XML – XML Related Technologies – XML Query Languages.

**UNIT-IV (10 Hrs.)**

**Intelligent Database:** Enhanced Data Models for Advanced Applications – Active Database Concepts and Triggers – Temporal Database Concepts – Deductive databases – Knowledge Databases. **Current Trends:** Mobile Database – Geographic Information Systems – Genome Data Management – Multimedia Database – Parallel Database – Spatial Databases - Database administration – Data Warehousing and Data Mining.

**Recommended Books**

1. Thomas M. Connolly, Carolyn E. Begg, 'Database Systems - A Practical Approach to Design, Implementation, and Management', 3<sup>rd</sup> Edn., Pearson Education, 2003.
2. Ramez Elmasri & Shamkant B. Navathe, 'Fundamentals of Database Systems', 4<sup>th</sup> Edn., Pearson Education, 2004.
3. Tamer Ozsu M., Patrick Ualduriel, 'Principles of Distributed Database Systems', 2<sup>nd</sup> Edn., Pearson Education, 2003.
4. C.S.R. Prabhu, 'Object Oriented Database Systems', PHI, 2003.

**MRSPTU M.Sc. (INFORMATION TECHNOLOGY) SYLLABUS  
2016 BATCH ONWARDS UPDATED ON 1.9.17.**

---

5. Peter Rob and Corlos Coronel, 'Database Systems – Design, Implementation and Management'.

**OBJECT ORIENTED PROGRAMMING LAB.**

**Subject Code- MITE1-104**

**L T P C  
0 0 4 2**

**EXPERIMENTS**

1. Classes and Objects- Write a program that uses a class where the member functions are defined inside a class.
2. Classes and Objects- Write a program that uses a class where the member functions are defined outside a class.
3. Classes and Objects- Write a program to demonstrate the use of static data members.
4. Classes and Objects- Write a program to demonstrate the use of const data members.
5. Constructors and Destructors- Write a program to demonstrate the use of zero argument and parameterized constructors
6. Constructors and Destructors- Write a program to demonstrate the use of dynamic constructor.
7. Constructors and Destructors- Write a program to demonstrate the use of explicit constructor.
8. Initializer Lists- Write a program to demonstrate the use of initializer list.
9. Operator Overloading- Write a program to demonstrate the overloading of increment and decrement operators.
10. Operator Overloading- Write a program to demonstrate the overloading of binary arithmetic operators.
11. Operator Overloading- Write a program to demonstrate the overloading of memory management operators.
12. Typecasting- Write a program to demonstrate the typecasting of basic type to class type.
13. Typecasting- Write a program to demonstrate the typecasting of class type to basic type.
14. Typecasting- Write a program to demonstrate the typecasting of class type to class type.
15. Inheritance- Write a program to demonstrate the multilevel inheritance

**DATABASE LAB.**

**Subject Code- MITE1-105**

**L T P C  
0 0 4 2**

**EXPERIMENTS**

1. Write the queries for Data Definition Language (DDL) in RDBMS.
2. Write the queries for Data Manipulation Language (DML) in RDBMS.
3. Write the queries for Data Control Language (DCL) in RDBMS.
4. Write SQL queries using logical operations (=,etc)
5. Write SQL queries using SQL operators
6. Write SQL query using character, number, date and group functions
7. Write SQL queries for relational algebra
8. Write SQL queries for extracting data from more than one table
9. Write SQL queries for sub queries, nested queries
10. Concepts for ROLL BACK, COMMIT & CHECK POINTS
11. Develop any GUI that performs the SQL operations like insert, delete, update and retrieval.

**MRSPTU M.Sc. (INFORMATION TECHNOLOGY) SYLLABUS  
2016 BATCH ONWARDS UPDATED ON 1.9.17.**

---

12. Case studies on normalization

**ETHICAL HACKING**

**Subject Code – MITE1 - 156**

**L T P C  
3 1 0 4**

**Duration – 45 Hrs.**

**UNIT-I (12 Hrs.)**

**Introduction:** To Ethical hacking: Terminology, Ethical hacking versus auditing, Nontechnical attacks, Network attacks, operating system attacks, Application attacks, Ethical hacking process, social engineering, physical security, Passwords.

**UNIT-II (12 Hrs.)**

**Hacking:** Hacking windows, Network hacking, Web hacking, Password hacking, Hardware hacking, Virtual Private Network hacking, Study of various attack: Input validation attacks, SQL injection attacks, Buffer overflow attacks, Privacy attacks, VoIP attacks.

**UNIT-III (10 Hrs.)**

**Hacking TCP/IP:** Checksums, IP spoofing, port scanning, DNS spoofing, DOS attacks: SYN attacks, Smurf attacks, UDP flooding, DDOS – Models.

**UNIT-IV (11 Hrs.)**

**Wireless Hacking:** Wireless footprint, Wireless scanning and enumeration, wireless network defense and counter measures, gaining access (hacking 802.11), WEP, WPA Web Hacking: Web server hacking, Web application hacking. Firewall Identification, Scanning Through firewalls, packet Filtering, Application Proxy Vulnerabilities, Denial of Service Attacks, Motivation of DoS Attackers, Types of DoS attacks, Generic Dos Attacks, UNIX and Windows DoS.

**Recommended Books**

1. A. Fadia, 'An Unofficial Guide to Ethical Hacking', 2<sup>nd</sup> Edn., MacMillan, 2010.
2. K. Beaver and McClure S., 'Hacking for Dummies', 3<sup>rd</sup> Edn., John Wiley & Sons, 2010.
3. Stuart McClure, Joel Scambray and Goerge Kurtz, 'Hacking Exposed Network Security Secrets & Solutions', 5<sup>th</sup> Edn., Tata Mc Graw Hill Publishers, 2010.

**INTRUSION DETECTION SYSTEM**

**Subject Code – MITE1-157**

**L T P C  
3 1 0 4**

**Duration – 45 Hrs.**

**UNIT-I (12 Hrs.)**

History of Intrusion Detection, Audit, Concept and Definition, Internal and External Threats to Data, Attacks, Need and Types of IDS, Information Sources Host Based Information Sources, Network Based Information Sources.

**UNIT-II (12 Hrs.)**

Intrusion Prevention Systems, Network Ids Protocol Based Ids, Hybrid Ids, Analysis Schemes, Thinking About Intrusion. A Model for Intrusion Analysis, Techniques Responses Requirement of Responses, Types of Responses Mapping Responses to Policy Vulnerability Analysis, Credential Analysis Non Credential Analysis.

**UNIT-III (10 Hrs.)**

Introduction to Snort, Snort Installation Scenarios, Installing Snort, Running Snort on Multiple Network Interfaces, Snort Command Line Options. Step-by-Step Procedure to Compile and Install Snort Location of Snort Files, Snort Modes Snort Alert Modes.

**MRSPTU M.Sc. (INFORMATION TECHNOLOGY) SYLLABUS  
2016 BATCH ONWARDS UPDATED ON 1.9.17.**

---

**UNIT-IV (11 Hrs.)**

Working with Snort Rules, Rule Headers, Rule Options, The Snort Configuration File etc. Plugins, Pre-processors and Output Modules, Using Snort with MySQL, Using ACID and Snort Snarf, Agent development for intrusion detection, Architecture models of Intrusion Detection and Intrusion Prevention Systems.

**Recommended Books**

1. Rafeeq Rehman 'Intrusion Detection with SNORT, Apache, MySQL, PHP and ACID', 1<sup>st</sup> Edn., Prentice Hall, **2003**.
2. Christopher Kruegel, Fredrik Valeur, Giovanni Vigna, 'Intrusion Detection and Correlation Challenges and Solutions', 1<sup>st</sup> Edn., Springer, **2005**.
3. Carl Endorf, Eugene Schultz and Jim Mellander, 'Intrusion Detection & Prevention', 1<sup>st</sup> Edn., Tata McGraw Hill, **2004**.
4. Stephen Northcutt, Judy Novak, 'Network Intrusion Detection', 3<sup>rd</sup> Edn., New Riders Publishing, **2002**.

**ADHOC AND SENSOR NETWORKS**

**Subject Code – MITE1-158**

**L T P C  
3 1 0 4**

**Duration – 45 Hrs.**

**UNIT-I (12 Hrs.)**

Introduction to Wireless Networks, Evolution of 3G Mobile Systems, Wireless LANs, Bluetooth, Scatternet, Piconet, Ad hoc Networks, Heterogeneity in Mobile Devices, Types of Ad hoc Mobile Communications, Types of Mobility, Challenges in Ad hoc Mobile Networks, Energy Management, Scalability, Addressing and Service Discovery, Deployment Considerations.

**UNIT-II (11 Hrs.)**

MAC protocols for Ad hoc Networks: Design issues, Classifications, Contention based protocols, MACAW, FAMA, BTMA, DBTMA, MACABI, Real-Time MAC protocol, Multichannel protocols, Power aware MAC, Routing protocols: Design issues, Table-driven protocols - DSDV, WRP, CGSR, On-Demand protocols - DSR, AODV, TORA, LAR, ABR, Zone Routing Protocol, Power Aware Routing protocols.

**UNIT-III (12 Hrs.)**

Multicast Routing, Preferred Link based Multicast, Mesh-based protocols, Core-Assisted Mesh protocol, Issues in Transport layer protocols, TCP over Ad hoc Networks, TCP Reno, Tahoe, Vegas, TCP SACK, Indirect TCP, Snooping TCP, Split-TCP, TCP-BuS, Quality of Service issues, MAC layer solutions, Network layer solutions, QoS framework for Ad hoc networks, INSIGNIA, INORA, SWAN. Wireless Sensor Networks, Unique constraints and challenges, Applications, Collaborative processing, Architecture, Data Dissemination, MAC protocols, S-MAC, IEEE 802.15.4 and ZigBee.

**UNIT-IV (12 Hrs.)**

Geographic, Energy-Aware Routing, Attribute-based routing, Directed Diffusion, Rumor Routing, Geographic Hash Tables -GHT, Data Gathering, PEGASIS, Location Discovery, Localization, Communication and Sensing Coverage, Topology Control, Time Synchronization, Sensor Taking and Control, Sensor Selection, IDSQ, Cluster Leader-based Protocol, Joint Routing and Information Aggregation, Sensor Network Databases, Challenges, In-Network Aggregation, TinyDB query processing, Data Centric Storage, Data Indices and Range Queries, Distributed Hierarchical Aggregation, Temporal Data, Platforms and Tools, Berkeley Motes, Programming Challenges, TinyOS, nesC, Tiny GALS, ns2 extensions, TOSSIM, Actuators.

**MRSPTU M.Sc. (INFORMATION TECHNOLOGY) SYLLABUS  
2016 BATCH ONWARDS UPDATED ON 1.9.17.**

---

**Recommended Books**

1. C. Siva Ram Murthy and B.S. Manoj, 'Ad Hoc Wireless Networks: Architectures and Protocols', Pearson Education, 2007.
2. C.K. Toh, 'Ad Hoc Mobile Wireless Networks: Protocols and Systems', Pearson Education, 2007.
3. Feng Zhao and Leonidas Guibas, 'Wireless Sensor Networks: An Information Processing Approach', Morgan Kaufman Publishers, 2007.
4. Jochen Schiller, 'Mobile Communications', Pearson Education, 2009.

**ADVANCED SOFTWARE ENGINEERING**

**Subject Code: MITE1-206**

**L T P C  
3 1 0 4**

**Duration: 45 Hrs.**

**UNIT-I (12 Hrs.)**

**Principles and Motivations:** History, Definitions; Engineering approaches to software development: Software development process models from the points of view of technical development and project management: waterfall, rapid prototyping, incremental development, spiral models, Agile Software Development, Emphasis on computer-assisted environments. Selection of appropriate development process.

**Software Development Methods:** Formal, semi-formal and informal methods; Requirements elicitation, requirements specification; Data, function, and event-based modelling; Some of the popular methodologies such as Yourdon's SAD, SSADM etc., CASE tools-classification, features, strengths and weaknesses; ICASE; CASE standards.

**UNIT-II (11 Hrs.)**

**Software Project Management:** Principles of software projects management; Organizational and team structure; Project planning; Project initiation and Project termination, Technical, quality, and management plans; Project control; Cost estimation methods: Function points and COCOMO.

**UNIT-III (12 Hrs.)**

**Software Quality Management:** Quality control, quality assurance and quality standards with emphasis on ISO 9000; Functions of software QA organization in a project; interactions with developers; Quality plans, quality assurance towards quality improvement; Role of independent verification & validation; Total quality management; SEI maturity model; Software metrics.

**UNIT-IV (10 Hrs.)**

**Configuration Management:** Need for configuration management; Configuration management functions and activities; Configuration management techniques; Examples and case studies.

**Software Testing Fundamentals:** Basic Terminology, Testing Techniques and strategies. Brief introduction to various standards related to Software Engineering.

**Recommended Books**

1. Roger Pressman, 'Software Engineering - A Practitioners Approach', McGraw Hill.
2. Ian Sommerville, 'Software Engineering', Addison-Wesley Publishing Company.
3. James F. Peter, 'Software Engineering - An Engineering Approach', John Wiley.
4. Pankaj Jalote, 'An Integrated Approach to Software Engineering', Narosa.



**MRSPTU M.Sc. (INFORMATION TECHNOLOGY) SYLLABUS  
2016 BATCH ONWARDS UPDATED ON 1.9.17.**

---

**RELATIONAL DATABASE MANAGEMENT SYSTEM**

**Subject Code: MITE1-207**

**L T P C  
3 1 0 4**

**Duration: 45 Hrs.**

**UNIT-I (13 Hrs.)**

**Introduction to Database Systems:** Database System Concepts and Architecture, Data Models, Data Independence, SQL: DDL, DML, DCL, Normalization: 1NF, 2NF, 3NF, BCNF, 4NF, 5NF. Query Processing and Optimization: Query Processing, Syntax Analyser, Query Decomposition, Query Optimization, Heuristic Query Optimization, Cost Estimation, Cost Functions for Select, Join, Query Evaluation Plans. Transaction Processing and Concurrency Control: Transaction Processing Concepts, Concurrency Control Techniques: Two-phase Locking, Timestamp Ordering, Multiversion, Validation, Multiple Granularity Locking.

**UNIT-II (10 Hrs.)**

**Object Oriented and Object Relational Databases:** Object Oriented Concepts, Object Oriented Data Model, Object Definition Language, Object Query Language, Object Relational Systems, SQL3, ORDBMS Design.

**UNIT-III (12 Hrs.)**

**Distributed Databases:** Distributed Database Concepts, Advantages and Disadvantages, Types of Distributed Database Systems, Data Fragmentation, Replication and Allocation Techniques for Distributed Database Design, Five Level Schema Architecture, Query Processing, Concurrency Control and Recovery in Distributed Databases. Backup and Recovery: Types of Database Failures, Types of Database Recovery, Recovery Techniques: Deferred Update, Immediate Update, Shadow Paging, Checkpoints, Buffer Management.

**UNIT-IV (10 Hrs.)**

**Introduction to Data Warehousing and Data Mining:** Introduction to OLAP, OLTP, Data Warehouse, Data Marts, Data Mining, Data Mining Process, Big Data. Enterprise Database Products: Enterprise Database Products, Familiarity with IBM DB2 Universal Database, Oracle, Microsoft SQL Server, MySQL, their features.

**Recommended Books**

1. Ramez Elmasri, Shamkant Navathe, 'Fundamentals of Database Systems', 5<sup>th</sup> Edn., Pearson Education, 2007.
2. Raghu Ramakrishnan, Johannes Gehrke, 'Database Management Systems', Tata McGraw-Hill.
3. C.J. Date, 'An Introduction to Database Systems', 8<sup>th</sup> Edn., Pearson Education.
4. Alexis Leon, Mathews Leon, 'Database Management Systems', Leon Press.
5. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, 'Database System Concepts', Tata McGraw Hill.
6. S.K. Singh, 'Database Systems Concepts, Design and Applications', Pearson Education.
7. Chris Eaton, Paul Zikopoulos, 'Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data'.

**OBJECT ORIENTED ANALYSIS AND DESIGN**

**Subject Code: MITE1-208**

**L T P C  
3 1 0 4**

**Duration: 45 Hrs.**

**UNIT-I (12 Hrs.)**

**Object Oriented Design and Modelling:** Object Oriented Fundamentals, Objects and object classes, object oriented design process, importance of modelling, principles of modelling,

**MRSPTU M.Sc. (INFORMATION TECHNOLOGY) SYLLABUS  
2016 BATCH ONWARDS UPDATED ON 1.9.17.**

---

object oriented modelling. Introduction to UML: Conceptual model of UML, building blocks of UML, Mechanisms in UML, architecture, software development life cycle.

**UNIT-II (12 Hrs.)**

Basic Structural Modelling Classes, relationships, common mechanisms, class and object diagrams. Advanced structural Modelling Advanced classes, advanced relationships, Interfaces types and roles, packages, instances and object diagrams. Collaboration Diagrams and Sequence Diagrams Terms, concepts and depicting a message in collaboration diagrams. Terms and concepts in sequence diagrams. Difference between collaboration and sequence. diagram. Depicting synchronous messages with/without priority call back mechanism.

**UNIT-III (11 Hrs.)**

Basic behavioural modelling Interactions, use cases, Use Case Diagrams, Interaction Diagrams and activity diagrams. Advanced behavioural modelling: Events and signals, state machines, process and threads, time and space, state chart diagrams.

**UNIT-IV (10 Hrs.)**

Architectural Modelling: Terms, Concepts, examples, Modelling techniques for component diagrams and deployment diagrams.

**Recommended Books**

1. Grady Booch, James Rumbough, Ivar Jacobson, 'The Unified Modelling Language User Guide', Pearson Education.
2. Ian Sommerville, 'Software Engineering', 6<sup>th</sup> Edn.
3. Meilir Page Jones, 'Fundamentals of Object Oriented Design in UML', Addison Wesley.

**BUSINESS COMMUNICATIONS**

**Subject Code: MHUM0-204**

**L T P C**

**Duration: 28 Hrs.**

**2 0 2 3**

**Course Objectives:** This course is designed to give students a comprehensive view of communication, its scope and importance in business, the role of communication in establishing a favourable image of the organization. The aim is to develop students' ability to communicate correctly and effectively on matters having relevance to day-to-day business operations. This course will make student conversant with fundamentals of communication, help them honing oral, written and non-verbal communication skills and to transform their communication abilities.

**UNIT- I (7 Hrs.)**

**Introduction to Communication:** Meaning, Process, Importance of Communication in Business, Types of Information, Formal and Informal Communication, Internal and External Communication. Approaches to Effective Communication, Essentials of Effective Business Communication (7Cs model).

**Written Communication:** Advantages and Disadvantages, Covering letter, Need, Functions and Kinds, Layout of Letter Writing, Types of Letter Writing: Persuasive Letters, Request Letters, Sales Letters, Complaints and Adjustments.

**UNIT –II (7 Hrs.)**

**Developing Reading Skills:** Identify the Purpose of Reading, Factors Effecting Reading, Course How to Think and Read, Developing Effective Reading Habits, Reading Tactics and Strategies: Training Eye and Training Mind (SQ3R).

**Developing Listening Skills:** Importance, Purpose of Listening, Art of Listening, Factors Affecting Listening, Components of Effective Listening, Process of Listening, Principles and Barriers to Listening, Activities to Improve Listening.

**MRSPTU M.Sc. (INFORMATION TECHNOLOGY) SYLLABUS  
2016 BATCH ONWARDS UPDATED ON 1.9.17.**

---

**UNIT- III (7 Hrs.)**

**Oral Communication:** Advantages and Disadvantages, Conversation as Communication, Art of Public Speaking, Group Communication Through Committees, Preparing and Holding Meetings, Overcoming Stage Fright, Ambiguity Avoidance.

**Departmental Communication:** Meaning, Need and Types: Interview Letters, Promotion Letters, Resignation Letters, Newsletters, Circulars, Agenda, Notice, Office Memorandums, Office Orders, Press Release.

**Report Writing:** Structure, Types, Formats, Drafting of Various Types of Report. Nonverbal – Features, Understanding of Body Language, Posture, Gestures. Influences on Communication: Social Influences, Culture and Communication, Few Guidelines for Better Multicultural Communication, Business Etiquettes and Communication.

**UNIT- IV (7 Hrs.)**

**Group Discussion:** Nature, Uses and Importance, Guidelines for GD Presentations: How to Make Effective Presentations, Four P's of Presentation, Structuring, Rehearsing and Delivery Methods.

**Resume Writing:** Planning, Organizing Contents, Layout, Guidelines for Good Resume. Interviews: Preparation Techniques, Frequently Asked Questions about How to Face an Interview Board, Proper Body Posture, projecting a Positive Image, Steps to Succeed In Interviews, Practice Mock Interview in Classrooms.

**The Case Method of Course:** Dimensions of a Case, Case Discussion, Usefulness of The Case Method, Training of Managers, Use The Case Method. Report Writing: Structure, Types, Formats, Preparations and Presentation.

**Course Outcomes:** After studying this course the students will enable to:

1. Know the dynamics of communication in the business world
2. Practice the different tools of communication
3. Enable them to speak effectively suited to the situation
4. Improve their competence in English

**Recommended Books**

1. Lesikar, Petit & Flately, 'Lesikar's Basic Business Communication', Tata McGraw Hill.
2. Raman Meenakshi, 'Prakash Singh, Business Communication', Oxford University Press.
3. Rizvi Ashraf, 'Effective Technical Communication', Tata McGraw Hill.
4. Krizan, Buddy, 'Merrier, Effective Business Communication', Cengage Course.
5. Diwan & Aggarwal, 'Business Communication', Excel.
6. Baugh, Frayer & Thomas, 'How to Write First Class Business Correspondence', Viva Book.
7. Taylor, English Conversion Practice', Tata McGraw Hill.
8. Devaraj, 'Executive Communication', Tata McGraw Hill.
9. Ober, 'Effective Bossiness Communication', Cengage Course.

**RDBMS LAB.**

**Subject Code: MITE1-209**

**L T P C**

**0 0 4 2**

1. Case studies on normalization
2. Study and usage of query optimization techniques
3. Study and usage of backup and recovery features of database management software
4. Server administration of any database management software
5. Study and usage of any object oriented or object relational database management software
6. Study and usage of open source data mining tool: Weka

**MRSPTU M.Sc. (INFORMATION TECHNOLOGY) SYLLABUS  
2016 BATCH ONWARDS UPDATED ON 1.9.17.**

7. Study of web databases 8. Development of a project by making use of tools studied above

**MOBILE COMPUTING**

**Subject Code: MITE1-259**

**L T P C  
3 0 0 3**

**Duration: 40 Hrs.**

**UNIT-I (10 Hrs.)**

**Introduction:** Mobile Communications, Mobile Computing – Paradigm, Promises/Novel Applications and Impediments and Architecture; Mobile and Handheld Devices, Limitations of Mobile and Handheld Devices. GSM – Services, System Architecture, Radio Interfaces, Protocols, Localization, Calling, Handover, Security, New Data Services, GPRS, CSHSD, DECT.

**UNIT-II (10 Hrs.)**

**(Wireless) Medium Access Control (MAC):** Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA, Wireless LAN/(IEEE 802.11)

**Mobile Network Layer:** IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunnelling and Encapsulation, Route Optimization, DHCP.

**UNIT-III (10 Hrs.)**

**Mobile Transport Layer:** Conventional TCP/IP Protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other Transport Layer Protocols for Mobile Networks.

**Database Issues:** Database Hoarding & Caching Techniques, Client- Server Computing & Adaptation, Transactional Models, Query processing, Data Recovery Process & QoS Issues.

**UNIT-IV (10 Hrs.)**

**Data Dissemination and Synchronization:** Communications Asymmetry, Classification of Data Delivery Mechanisms, Data Dissemination, Broadcast Models, Selective Tuning and Indexing Methods, Data Synchronization – Introduction, Software, and Protocols

**Mobile Ad hoc Networks (MANETs):** Introduction, Applications & Challenges of a MANET, Routing, Classification of Routing Algorithms, Algorithms such as DSR, AODV, DSDV, Mobile Agents, Service Discovery.

**Protocols and Platforms for Mobile Computing:** WAP, Bluetooth, XML, J2ME, JavaCard, PalmOS, Windows CE, SymbianOS, Linux for Mobile Devices, Android.

**Recommended Books**

1. Jochen Schiller, 'Mobile Communications', 2<sup>nd</sup> Edn., Addison Wesley, Pearson Education.
2. Raj Kamal, 'Mobile Computing', Oxford University Press, 2007.
3. Mazliza Othman, 'Principles of Mobile Computing and Communications', Auerbach Publications.
4. William Stallings, 'Wireless Communications and Networks', Prentice Hall, 2005.
5. M. Richharia, 'Mobile Satellite Communication: Principles and Trends', Pearson Education.

**MOBILE APPLICATION DEVELOPMENT**

**Subject Code: MITE1-260**

**L T P C  
3 0 0 3**

**Duration: 40 Hrs.**

**UNIT-I (09 Hrs.)**

**Introduction:** Mobile Development Importance, Survey of mobile based application development, Mobile myths, third party frameworks, Mobile Web Presence and Applications,

**MRSPTU M.Sc. (INFORMATION TECHNOLOGY) SYLLABUS  
2016 BATCH ONWARDS UPDATED ON 1.9.17.**

creating consumable web services for mobile, JSON, Debugging Web Services, Mobile Web Sites, Starting with Android mobile Applications.

**UNIT-II (11 Hrs.)**

**Mobile Web:** Introduction, WAP1, WAP2, Fragmentation Display, Input Methods, Browsers and Web Platforms, Tools for Mobile Web Development.

**Application Architectures and Designs:** Mobile Strategy, Navigation, Design and User Experience, WML, XHTML Mobile Basics, Mobile HTML5, CSS for Mobile, WCSS extensions, CSS3, CSS for mobile browsers, HTML5 Compatibility levels, Basics of Mobile **HTML5:** Document Head, Document Body, HTML5 Mobile Boilerplate, the Content, HTML5 Forms: Design, Elements, Attributes, Validation.

**UNIT-III (09 Hrs.)**

**Devices, Images, Multi-Media:** Device Detection, Client-side Detection, Server-side Detection, Device Interaction, Images, Video, Audio, Debugging and Performance, Content Delivery, Native and Installed Web Apps.

**UNIT-IV (11 Hrs.)**

**Advanced Tools & Techniques:** J2ME programming basics, HTML5 Script Extensions, Code Execution, Cloud based browsers, JS Debugging and profiling, Background Execution, Supported Technologies and API, Standard JavaScript Behaviour, Java Libraries, Mobile Libraries, UI Frameworks: Sencha Touch, JQueryMobile, Enyo, Montage, iUI, jQTouch, JavaScript Mobile UI Patterns.

**Advanced Applications:** Geolocation and Maps app, Online Apps, Storage, and Networks, Distribution and Social Web 2.0.

**Recommended Books**

1. Je McWherter, Scott Gowell, 'Professional Mobile Application Development', John Wiley & Sons.
2. Maximiliano Firtman, 'Programming the Mobile Web', 2<sup>nd</sup> Edn., Oreilly, 2013.
3. 'Digital Content': [http://en.wikibooks.org/wiki/Category: J2ME Programming](http://en.wikibooks.org/wiki/Category:J2ME_Programming).
4. 'Android Studio Development Essentials', Ref: <http://www.techotopia.com/>.

**REAL TIME & EMBEDDED SYSTEMS**

**Subject Code: MITE1-261**

**L T P C  
3 0 0 3**

**Duration: 40 Hrs.**

**UNIT-I (11 Hrs.)**

**Introduction to Embedded Systems:** Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems, Design cycle in the development phase for an embedded system, Use of software tools for development of an ES.

**UNIT-II (10 Hrs.)**

**Typical Embedded System:** Core of the Embedded System: General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS), Memory: ROM, RAM, Memory according to the type of Interface, Memory Shadowing, Memory selection for Embedded Systems, Sensors and Actuators, Communication Interface: On-board and External Communication Interfaces.

**UNIT-III (09 Hrs.)**

**Embedded Firmware:** Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware Design Approaches and Development Languages.

**MRSPTU M.Sc. (INFORMATION TECHNOLOGY) SYLLABUS  
2016 BATCH ONWARDS UPDATED ON 1.9.17.**

---

**UNIT-IV (10 Hrs.)**

**RTOS Based Embedded System Design:** Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling.

**Task Communication:** Shared Memory, Message Passing, Remote Procedure Call and Sockets, Task Synchronization: Task Communication/Synchronization Issues, Task Synchronization Techniques, Device Drivers, how to Choose an RTOS.

**Recommended Books**

1. K.V. Shibu, 'Introduction to Embedded Systems', McGraw Hill.
2. Raj Kamal, 'Embedded Systems', Tata McGraw Hill.
3. Frank Vahid, Tony Givargis, 'Embedded System Design', John Wiley.
4. Lyla, 'Embedded Systems', Pearson, 2013.
5. David E. Simon, 'An Embedded Software Primer', Pearson Education.

**ADVANCED OPERATING SYSTEM**

**Subject Code: MITE1-262**

**L T P C  
3 0 0 3**

**Duration: 40 Hrs.**

**UNIT-I (11 Hrs.)**

**Processes and Scheduling:** Process States and System Call Interface; Life Cycle of a Process; Process Dynamics; Scheduler: working and implementation; Linux Process States and System Calls; Process Groups, Sessions, Foreground and Background Processes.

**UNIT-II (09 Hrs.)**

**Interprocess Communication and Synchronisation:** Signals, Pipes and Named Pipes (FIFOs); Threads and pthread library; Mutexes and Condition Variables; Semaphores; Producer-Consumer Problem and Solutions using mutexes, condition variables and semaphores.

**UNIT-III (09 Hrs.)**

**Files and File Systems:** File and File Meta-data; File Naming Systems; File System Operations; File System Implementation; File System Structures; Booting an OS; File System Optimisation.

**UNIT-IV (11 Hrs.)**

**Devices and Device Drivers:** Devices and Types of Devices; Terminal, Disk, SCSI, Tape and CD devices; Unification of Files and Devices; Device Drivers: Concepts and Implementation Details.

**Resource Management and Security:** Resource Management Issues; Types of Resources; Integrated Resource Scheduling; Queuing Models of Scheduling; Protection of Resources – hardware, software, and attacks; Security Policies.

**Recommended Books**

1. Charles Crowley, 'Operating Systems: A Design-Oriented Approach', Tata McGraw Hill.
2. Richard Stevens, Stephen Rago, 'Advanced Programming in the Unix Environment', Addison-Wesley.
3. M. Maekawa and Arthur E. Oldehoeft and R.R. Oldehoeft, 'Operating Systems: Advanced Concepts', Benjamin Cummings.

**MRSPTU M.Sc. (INFORMATION TECHNOLOGY) SYLLABUS  
2016 BATCH ONWARDS UPDATED ON 1.9.17.**

---

**SOFT COMPUTING**

**Subject Code: MITE1-263**

**L T P C  
3 0 0 3**

**Duration: 40 Hrs.**

**UNIT-I (10 Hrs.)**

Introduction to Genetic Algorithm, Genetic Operators and Parameters, Genetic Algorithms in Problem Solving, Theoretical Foundations of Genetic Algorithms, Implementation Issues - systems

**UNIT-II (10 Hrs.)**

Neural Model and Network Architectures, Perceptron Course, Supervised Hebbian Course, Backpropagation, Associative Course, Competitive Networks, Hopfield Network, Computing with Neural Nets and applications of Neural Network.

**UNIT-III (10 Hrs.)**

Introduction to Fuzzy Sets, Operations on Fuzzy sets, Fuzzy Relations, Fuzzy Measures, Applications of Fuzzy Set Theory to different branches of Science and Engineering.

**UNIT-IV (10 Hrs.)**

Advanced Topics: Support Vector Machines, Evolutionary computation (EC)- Evolutionary algorithms, Harmony search, Swarm intelligence

**Recommended Books**

1. M. Mitchell, 'An Introduction to Genetic Algorithms', Prentice-Hall
2. D.E. Goldberg, 'Genetic Algorithms in Search, Optimization, and Machine Course', Addison Wesley.
3. S.V. Kartalopoulos, 'Understanding Neural Networks and Fuzzy Logic: Basic Concepts and Applications', IEEE Press – PHI.
4. S. Rajasekaran & G.A. Vijayalakshmi Pai, 'Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis & Applications', Prentice Hall India.
5. S.N. Sivanandam & S.N. Deepa, 'Principles of Soft Computing', Wiley India.

**ARTIFICIAL INTELLIGENCE**

**Subject Code: MITE1-264**

**L T P C  
3 0 0 3**

**Duration: 40 Hrs.**

**UNIT-I (10 Hrs.)**

**Introduction, Intelligent Agents Problem Solving:** Solving problems by searching, Informed search and exploration, constraint satisfaction problems, adversarial search.

**UNIT-II (10 Hrs.)**

**Knowledge and Reasoning:** Logical agents, first order logic, Inference in first order logic, knowledge representation. Planning; Planning and acting in real world.

**UNIT-III (10 Hrs.)**

**Uncertain Knowledge and Reasoning:** Uncertainty, Probabilistic Reasoning, Probabilistic Reasoning over time, Making Simple decisions.

**UNIT-IV (10 Hrs.)**

**Course:** Course from observations, knowledge in Course, Reinforcement Course. Communication, Perceiving and acting: Communication, Perception, Probabilistic language processing.

**Recommended Books**

1. E. Rich, 'Artificial Intelligence', McGraw Hill.
2. E. Charniak and D. McDermott, 'Introduction to Artificial Intelligence', Addison Wesley.

**MRSPTU M.Sc. (INFORMATION TECHNOLOGY) SYLLABUS  
2016 BATCH ONWARDS UPDATED ON 1.9.17.**

3. Stuart Russell, Peter Noving, 'Artificial Intelligence: A Modern Approach', Pearson Education.
4. George F. Luger, 'Artificial Intelligence', 4<sup>th</sup> Edn., Pearson Education.

**COMPUTER GRAPHICS**

**Subject Code: MITE1-310**

**L T P C  
3 1 0 4**

**Duration: 45 Hrs.**

**UNIT-I (12 Hrs.)**

Introduction to Active and Passive Graphics, Applications of Computer Graphics. Input devices: light pens, Graphic tablets, Joysticks, Trackball, Data Glove, Digitizers, Image scanner, Graphs and Types of Graphs. Video Display Devices-Refresh Cathode Ray Tube, Raster Scan displays, Random Scan displays, Architecture of Raster and Random Scan Monitors, Color CRT-monitors and Color generating techniques (Shadow Mask, Beam Penetration), Direct View Storage Tube, Flat-Panel Displays; 3-D Viewing Devices, Raster Scan Systems, Random Scan Systems, Graphics monitor and workstations, Color Models (RGB and CMY), Lookup Table.

**UNIT- II (10 Hrs.)**

Process and need of Scan Conversion, Scan conversion algorithms for Line, Circle and Ellipse, effect of scan conversion, Bresenham's algorithms for line and circle along with their derivations, Midpoint Circle Algorithm, Area filling techniques, flood fill techniques, character generation.

**UNIT-III (11 Hrs.)**

**2-Dimensional Graphics:** Cartesian and need of Homogeneous co-ordinate system, Geometric transformations (Translation, Scaling, Rotation, Reflection, Shearing), Two-dimensional viewing transformation and clipping (line, polygon and text), Cohen Sutherland, Sutherland Hodgeman and Liang Barsky algorithm for clipping. Introduction to 3-dimensional Graphics: Geometric Transformations (Translation, Scaling, Rotation, Reflection, Shearing), Mathematics of Projections (parallel & perspective). Introduction to 3-D viewing transformations and clipping.

**UNIT- IV (12 Hrs.)**

**Hidden Line and Surface Elimination Algorithms:** Z-buffer, Painters algorithm, scan-line, subdivision, Shading and Reflection: Diffuse reflection, Specular reflection, refracted light, Halftoning, Dithering techniques. Surface Rendering Methods: Constant Intensity method, Gouraud Shading, Phong Shading (Mash Band effect). Morphing of objects.

**Note:** Graphics Programming using C/C++ with introduction to Open GL.

**Recommended Books**

1. D. Hearn and M.P. Baker, 'Computer Graphics', PHI, New Delhi.
2. J.D. Foley, A.V. Dam, S.K. Feiner, J.F. Hughes, R.L Phillips, 'Computer Graphics'.
3. 'Principles & Practices', Pearson Education, 2007.
4. R.A. Plastock and G. Kalley, 'Computer Graphics', McGraw Hill, 1986.
5. F.S. Hill, 'Computer Graphics using Open GL', Pearson Education, 2003.

**ADVANCED COMPUTER NETWORKS**

**Subject Code: MITE1-311**

**L T P C  
3 1 0 4**

**Duration: 45 Hrs.**

**Course Objectives:** The objective of the course is to offer good understanding of the concepts of network security, wireless, Adhoc and various emerging network technologies.



**MRSPTU M.Sc. (INFORMATION TECHNOLOGY) SYLLABUS  
2016 BATCH ONWARDS UPDATED ON 1.9.17.**

---

**UNIT-I (11 Hrs.)**

**Network Security:** Fundamentals of network security, Basics of IPv6, IPsec: overview of IPsec, IP and IPv6, Authentication header (AH), Encapsulating Security Payload (ESP).  
**Internet Key Exchange (IKE):** History, Photuris, Simple Key-management for Internet protocols (SKIP), IKE phases, IKE encoding.

**UNIT-II (12 Hrs.)**

**Adhoc Networks:** Features, advantages and applications, Adhoc versus Cellular networks, Network architecture, Protocols: MAC protocols, Routing protocols, Technologies.  
**Wireless Communication Systems:** Evolution, examples of wireless communication systems, 2G Cellular networks, Evolution for 2.5G TDMA Standards, IS-95B for 2.5G CDMA.

**UNIT-III (10 Hrs.)**

**3G Wireless Networks:** Wireless local loop (WLL), Local Multipoint Distribution System (LMDS), Wireless local Area Networks (WLANs), Bluetooth and Personal Area Networks.

**UNIT-IV (12 Hrs.)**

**Wireless System Design:** Introduction, Frequency reuse, channel assignment strategies, handoff strategies, interference and system capacity, improving coverage and capacity in cellular systems.

**Recommended Books**

1. Theodore S. Rappaport, 'Wireless Communication: Principles and Practices', Pearson Education.
2. Charlie Kaufman, 'Radio Perlman, Mike Speciner, Network security', 2<sup>nd</sup> Edn., PHI.
3. Sunilkumar S. Manvi, Mahabaleshwar S. Kakkasageri, 'Wireless and Mobile Networks: Concepts and Protocols', Wiley India.
4. Michael A. Gallo & William M. Hancock, 'Computer Communications and Networking Technologies', Cengage Course / Thomson Brooks / Cole
5. S. Keshav, 'An Engineering Approach to Computer Networking', Pearson Education.
6. Mayank Dave, 'Computer Networks', Cengage Course.

**INFORMATION SECURITY**

**Subject Code: MITE1-312**

**L T P C  
3 1 0 4**

**Duration: 45 Hrs.**

**UNIT-I (11 Hrs.)**

Computer Security Concepts, Threats, Attacks, Assets, Security Functional Requirements, Security Architecture for Open Systems, Computer Security Trends, Computer Security Strategy Cryptographic Tools: Confidentiality with Symmetric Encryption, Message Authentication and Hash Functions, Public-Key Encryption, Digital Signatures and Key Management, Random and Pseudo Random Numbers, Practical Application: Encryption of Stored Data.

**UNIT-II (12 Hrs.)**

**User Authentication:** Means of Authentication, Password-Based Authentication, Token-Based Authentication, Biometric Authentication, Remote User Authentication, Security Issues for User Authentication, Practical Application: An Iris Biometric System.

**Access Control:** Access Control Principles, Subjects, Objects, and Access Rights, Discretionary Access Control Example: UNIX File Access Control, Role-Based Access Control.

**Database Security:** The Need for Database Security, Database Management Systems, Relational Databases, Database Access Control, Inference, Statistical Databases, Database Encryption, Cloud Security.

**MRSPTU M.Sc. (INFORMATION TECHNOLOGY) SYLLABUS  
2016 BATCH ONWARDS UPDATED ON 1.9.17.**

---

**UNIT-III (11 Hrs.)**

**Malicious Software:** Types of Malicious Software(Malware), Propagation–Infected Content–Viruses, Propagation–Vulnerability Exploit–Worms, Propagation–Social Engineering–SPAME-mail, Trojans, Payload–System Corruption, Payload–Attack Agent–Zombie, Bots, Payload– Information Theft– Keyloggers, Phishing, Spyware, Payload–Stealth–Backdoors, Rootkits

**Denial-of-Service Attacks:** Denial-of-Service Attacks, Flooding Attacks, Distributed Denial-of- Service Attacks, Application-Based Bandwidth Attacks, Reflector and Amplifier Attacks, Defenses Against Denial-of-Service Attacks, Responding to a Denial-of-Service Attack

**Software Security:** Software Security Issues, Handling Program Input, Writing Safe Program Code, Interacting with the Operating System and Other Programs, Handling Program Output

**UNIT-IV (12 Hrs.)**

**Operating System Security:** Introduction to Operating System Security, System Security Planning, Operating Systems Hardening, Application Security, Security Maintenance, Linux/Unix Security, Windows Security, Virtualization Security

**Trusted Computing and Multilevel Security:** The Bell-LaPadula Model for Computer Security, Other Formal Models for Computer Security, The Concept of Trusted Systems, Application of Multilevel Security, Trusted Computing and the Trusted Platform Module, Common Criteria for Information Technology Security Evaluation, Assurance and Evaluation

**IT Security Management and Risk Assessment:** IT Security Management, Organizational Context and Security Policy, Security Risk Assessment, Detailed Security Risk Analysis

**IT Security Controls, Plans and Procedures:** IT Security Management Implementation, Security Controls or Safeguards, IT Security Plan, Implementation of Controls, Implementation Follow-up.

**Recommended Books**

1. W. Stallings, 'Computer Security: Principles and Practice', Prentice Hall.
2. M. Stamp, 'Information Security: Principles and Practice', Wiley Publication.
3. M.E. Whitman and H.J. Mattord, 'Principles of Information Security', 4<sup>th</sup> Edn., Course Technology.
4. M. Bishop, 'Computer Security: Art and Science', Addison Wesley.
5. G. McGraw, 'Software Security: Building Security In', Addison Wesley.

**COMPUTER GRAPHICS LAB.**

**Subject Code: MITE1-313**

**L T P C**

**0 0 4 2**

**EXPERIMENTS**

1. To plot a point (pixel) on the screen.
2. To draw a straight line using DDA Algorithm.
3. To draw a straight line using Bresenham's Algorithm.
4. Implementation of mid-point circle generating Algorithm.
5. Implementation of ellipse generating Algorithm.
6. To translate an object with translation parameters in X and Y directions.
7. To scale an object with scaling factors along X and Y directions.
8. To rotate an object with a certain angle about origin.
9. Perform the rotation of an object with certain angle about an arbitrary point.
10. To perform composite transformations of an object.

**MRSPTU M.Sc. (INFORMATION TECHNOLOGY) SYLLABUS  
2016 BATCH ONWARDS UPDATED ON 1.9.17.**

---

11. To perform the reflection of an object about major axis.

**COMPUTER NETWORK LAB.**

**Subject Code: MITE1-314**

**L T P C  
0 0 4 2**

**EXPERIMENTS**

1. To configure the IP address for a computer connected to LAN and to configure network parameters of a web browser for the same computer.
2. To plan IPv6 address scheme for a local area network comprising of 'n' terminals.
3. To develop programs for implementing / simulating routing algorithms for Adhoc networks.
4. To install any one open source packet capture software like wireshark etc.
5. To configure Wireless Local Loop.
6. To plan Personal Area Network.
7. To configure WLAN.
8. To configure Adhoc networks.
9. To install and configure wireless access points.

**SEMINAR**

**Subject Code: MITE1-315**

**L T P C  
0 0 2 1**

Students are advised to give the seminar on the topic of the application related to project to be carried in the next semester.

**BIG DATA**

**Subject Code: MITE1-365**

**L T P C  
3 1 0 4**

**Duration: 45 Hrs.**

**UNIT-I (11 Hrs.)**

**Introduction to Big Data:** Introduction – distributed file system – Big Data and its importance, Four Vs, Drivers for Big data, Big data analytics, Big data applications. Algorithms using map reduce, Matrix-Vector Multiplication by Map Reduce.

**UNIT –II (12 Hrs.)**

**Introduction Hadoop:** Big Data – Apache Hadoop & Hadoop EcoSystem – Moving Data in and out of Hadoop – Understanding inputs and outputs of MapReduce - Data Serialization.

**Hadoop Architecture:** Hadoop Architecture, Hadoop Storage: HDFS, Common Hadoop Shell commands, Anatomy of File Write and Read., NameNode, Secondary NameNode, and DataNode, Hadoop MapReduce paradigm, Map and Reduce tasks, Job, Task trackers - Cluster Setup – SSH & Hadoop Configuration – HDFS Administering –Monitoring & Maintenance.

**UNIT-III (11 Hrs.)**

**Hadoop Ecosystem and Yarn:** Hadoop ecosystem components - Schedulers - Fair and Capacity, Hadoop 2.0 New Features NameNode High Availability, HDFS Federation, MRv2, YARN, Running MRv1 in YARN.

**UNIT-IV (11 Hrs.)**

**HIVE and HIVEQL, HBASE:** Hive Architecture and Installation, Comparison with Traditional Database, HiveQL - Querying Data - Sorting and Aggregating, Map Reduce

**MRSPTU M.Sc. (INFORMATION TECHNOLOGY) SYLLABUS  
2016 BATCH ONWARDS UPDATED ON 1.9.17.**

Scripts, Joins & Subqueries, HBase concepts Advanced Usage, Schema Design, Advance Indexing - PIG, Zookeeper - how it helps in monitoring a cluster, HBase uses Zookeeper and how to Build Applications with Zookeeper. Practical.

**Recommended Books**

1. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, 'Professional Hadoop Solutions', Wiley.
2. Chris Eaton, Dirk deroos et al., 'Understanding Big data', McGraw Hill.
3. Vignesh Prajapati, 'Big Data Analytics with R and Hadoop', Packet Publishing.
4. Tom Plunkett, Brian Macdonald et al, 'Oracle Big Data Handbook', Oracle Press.
5. Jy Liebowitz, 'Big Data and Business Analytics' CRC press.

**CLOUD COMPUTING**

**Subject Code: MITE1-366**

**L T P C  
3 1 0 4**

**Duration: 45 Hrs.**

**UNIT-I (12 Hrs.)**

**Introduction to Cloud Computing:** Definition, Characteristics, Components, Cloud provider, SAAS, PAAS, IAAS and Others, Organizational scenarios of clouds, Administering & Monitoring cloud services, benefits and limitations, Deploy application over cloud, Comparison among SAAS, PAAS, IAAS, Cloud computing platforms: Infrastructure as service: Amazon EC2, Platform as Service: Google App Engine, Microsoft Azure.

**UNIT-II (11 Hrs.)**

**Introduction to Cloud Technologies:** Study of Hypervisors, SOAP, REST, Compare SOAP and REST, Web services, AJAX and Mashups-Web services, Mashups: user interface services, Virtual machine technology, virtualization applications in enterprises, Pitfalls of virtualization, Multi-entity support, Multi-schema approach, Multi-tenance using cloud data stores, Data access control for enterprise applications.

**UNIT-III (12 Hrs.)**

**Data in the Cloud: Relational Databases, Cloud File Systems:** GFS and HDFS, BigTable, HBase and Dynamo, Map-Reduce and extensions: Parallel computing, the Map-Reduce model, Parallel efficiency of Map-Reduce, Relational operations using Map-Reduce, Introduction to cloud development, Monitoring in Cloud, A grid of clouds, Mobile Cloud Computing, Sky computing, Utility Computing, Elastic Computing.

**UNIT-IV (10 Hrs.)**

**Cloud Security:** Fundamentals, Vulnerability assessment tool for cloud, Privacy and Security in cloud, Cloud computing security architecture, Cloud computing security challenges, Issues in cloud computing, implementing real time application over cloud platform, Issues in Intercloud environments, QoS Issues in Cloud, Dependability, data migration, streaming in Cloud. Quality of Service (QoS) monitoring in a Cloud computing environment, Inter Cloud issues, load balancing, resource optimization.

**Recommended Books**

1. Antohy. T. Velte, et.al, 'Cloud Computing: A Practical Approach', McGraw Hill.
2. Judith Hurwitz, R. Bloor, M. Kanfman, F. Halper, 'Cloud Computing for Dummies', Wiley India Edition.
3. Tim Malhar, S. Kumaraswammy, S. Latif, 'Cloud Security & Privacy', SPD,O'Reilly.
4. Barrie Sosinsky, 'Cloud Computing Bible', Wiley India.
5. George Reese, 'Cloud Applications', O'Reilly Publication.
6. Ronald Krutz and Russell Dean Vines, 'Cloud Security', Wiley India.

**VIRTUALIZATION & CLOUD SECURITY**

**Subject Code: MITE1-367**

**L T P C  
3 1 0 4**

**Duration: 45 Hrs.**

**UNIT-I (11 Hrs.)**

**Security Concepts:** Confidentiality, privacy, integrity, authentication, non-repudiation, availability, access control, defence in depth, least privilege, how these concepts apply in the cloud, what these concepts mean and their importance in PaaS, IaaS and SaaS. e.g. User authentication in the cloud; Cryptographic Systems: Symmetric cryptography, stream ciphers, block ciphers, modes of operation, public-key cryptography, hashing, digital signatures, public-key infrastructures, key management, X.509 certificates, OpenSSL.

**UNIT-II (12 Hrs.)**

**Multi-tenancy Issues:** Isolation of users/VMs from each other. How the cloud provider can provide this; Virtualization System Security Issues: e.g. ESX and ESXi Security, ESX file system security, storage considerations, backup and recovery; Virtualization System Vulnerabilities: Management console vulnerabilities, management server vulnerabilities, administrative VM vulnerabilities, guest VM vulnerabilities, hypervisor vulnerabilities, hypervisor escape vulnerabilities, configuration issues, malware (botnets, etc.).

**UNIT-III (11 Hrs.)**

Virtualization System-Specific Attacks: Guest hopping, attacks on the VM (delete the VM, attack on the control of the VM, code or file injection into the virtualized file structure), VM migration attack, hyperjacking.

Technologies for Virtualization-Based Security Enhancement: IBM security virtual server protection, virtualization-based sandboxing; Storage Security: HIDPS, log management, Data Loss Prevention. Location of the Perimeter.

**UNIT-IV (10 Hrs.)**

Legal and Compliance Issues: Responsibility, ownership of data, right to penetration test, local law where data is held, examination of modern Security Standards (PCIDSS), how standards deal with cloud services and virtualization, compliance for the cloud provider vs. compliance for the customer.

**Recommended Books**

1. Tim Mather, Subra Kumaraswamy, Shahed Latif, 'Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance', O'Reilly Media Inc., 2009.
2. Ronald L. Krutz, Russell Dean Vines, 'Cloud Security'.
3. John Rittinghouse, James Ransome, 'Cloud Computing'.
4. J.R. ("Vic") Winkler, 'Securing the Cloud'.
5. Cloud Security Alliance: Security Guidance for Critical Areas of Focus in Cloud Computing, 2009

**ADVANCED JAVA PROGRAMMING**

**Subject Code: MITE1-416**

**L T P C  
3 1 0 4**

**Duration: 45 Hrs.**

**UNIT-I (11 Hrs.)**

Introduction to Multithreading and Concurrency in Java, Creating and managing threads in Java, Priority management, Thread synchronization, inter thread communication, Thread groups and Daemon threads, Concepts of concurrency, task scheduling, Callable

**MRSPTU M.Sc. (INFORMATION TECHNOLOGY) SYLLABUS  
2016 BATCH ONWARDS UPDATED ON 1.9.17.**

---

and Futures, Synchronizes, Semaphores, Concurrent collections, Atomic variables and Locks.

**UNIT-II (11 Hrs.)**

Understanding Input Output Streams, Basic concepts of Stream data, Input Stream hierarchy, Output Stream hierarchy, Understanding of various API's and methods used or streaming of data. Serialization and security in Serialization.

**UNIT-III (12 Hrs.)**

Introduction to Java Data Base Connectivity, Basic concept on Database Connectivity Drivers. Database interaction using Statement Interface, Result set Interface. Prepared Statements and Callable statements. Transaction management.

**UNIT-IV (11 Hrs.)**

Java Beans and Generics, Reflection API, Introduction to Java Bean, Java Beans in User Interface, Naming Convention, Importance of Bean Serialization. Introduction to generics, Importance of generics, Implementation of various types in Generics and Concept of Erasure. Annotations: Introduction to Annotations, build in Annotations, Annotation Inheritance, Creation of user defined Annotations and Advantages of Annotations.

**Recommended Books**

1. Bruce Eckel, 'Thinking in Java', Pearson Education.
2. Bruce Eckel, 'Head First Java', O'Reilly Media.

**THEORY OF COMPUTATION**

**Subject Code: MITE1-417**

**L T P C  
3 1 0 4**

**Duration: 45 Hrs.**

**Course Objectives:**

1. Understanding and development of theoretical models of computations and their analysis.
2. The models of computations include (i) Finite Automata (and Regular Languages), (ii) Push Down Automata (and Context-free Languages), (iii) Turing Machine (and their Languages)
3. The aim of analysis is to identify and prove the capabilities and limitations of particular models of Computations.

**UNIT-I (11 Hrs.)**

Introduction, Sets, Logic, Functions, Relations, Languages, Proofs Mathematical Induction, Strong Principle of Mathematical Induction, Recursive Definitions, Structural Induction, Regular Languages & Regular Expressions, Finite Automata (FA), Distinguishing Strings w.r.t. Language, Union, Intersection, & Compliment of Languages.

**UNIT-II (12 Hrs.)**

Non-deterministic Finite Automata (NFA), NFA with Null-Transitions, Kleene's Theorem, A Criterion for Regularity, Minimal Finite Automata, Pumping Lemma for Regular Languages. Introduction to Context-Free Grammar (CFG), Regular Grammars, Derivation (Parse) Trees & Ambiguities, An Unambiguous CFG for Algebraic Expressions, Simplified Forms & Chomsky Normal Forms.

**UNIT-III (11 Hrs.)**

Introduction to Push Down Automata (PDA), Deterministic PDA (DPDA), PDA corresponding to a Given CFG, CFG Corresponding to a Given PDA, Parsing The Pumping Lemma for CFG, Intersection & Complement of CFGs, Decision Problems Involving CFGs.

**MRSPTU M.Sc. (INFORMATION TECHNOLOGY) SYLLABUS  
2016 BATCH ONWARDS UPDATED ON 1.9.17.**

---

**UNIT-IV (11 Hrs.)**

Turing Machine (TM) Definition & Examples, Computing a Partial Function with a TM. Recursive Enumerable & Recursive Languages, Enumerating a Language, Context-Sensitive Languages & Chomsky Hierarchy.

**Recommended Books**

1. John C. Martin, 'Introduction to Languages and the Theory of Computation', Tata McGraw Hill, 2003
2. Harry Lewis & Christos H. Papadimitriou, 'Elements of the Theory of Computation', Prentice Hall of India.
3. Michael Sipser, 'Theory of Computation', Cengage Course, 2007.
4. Hopcroft, Motwani & Ullman, 'Introduction to Automata Theory, Languages, and Computation', Pearson Education, 2008.

**ADVANCED JAVA LAB.**

**Subject Code: MITE1-418**

**L T P C  
0 0 2 1**

**EXPERIMENTS**

Implementation of all the programs related to theory concepts studied in Advanced Java subject:

1. Interfaces.
2. Packages.
3. Exception handling.
4. Applet Programming.
5. AWT.
6. Event Handling.
7. I/O Handling.
8. Multithreading and concurrency
9. Input and Output streams
10. Java data base connectivity (JDBC)
11. Java Beans and Generics
12. Annotations.

**PROGRAMMING LAB.**

**Subject Code: MITE1-419**

**L T P C  
0 0 2 1**

In this lab students have to cover the technology related to the Project which he/she has undertaken. Lab activities for the learning of that technology.

**PROJECT**

**Subject Code: MITE1-420**

**L T P C  
0 0 20 10**

Students are advised to choose the project based on following technologies:

1. Web based application
2. DBMS based application
3. Android based application
4. Java based application

5. System application
6. Network / network security system development etc.

**MRSPTU**