Institute of Information Technology

**Proposed Syllabus for
Professional Masters in Information Technologies (PMIT)**

Syllabus for the
Professional Master in Information Technologies (PMIT)
2012 Onwards
Institute of Information Technology (IIT)
Jahangirnagar University

<u>**Overview of PMIT Program**</u>

- Duration of Program: Two Semester
- Duration of each Semester: 6 Months
- Structure of PMIT Program: 04 (Four) Compulsory Courses + 4 (Four) Elective Courses = 08 (Eight) Courses Theoretical courses+ 4 Credit Hours Project
- Total Credit Hours: 08x4+4 = 36 Credit Hours
- Class Time: Friday and/or Saturday

Semester 1 (Compulsory Courses)

Course Code	Course Title	Credit hours
PMIT-6101	Advanced Software Engineering	4.0
PMIT-6102	Advanced Database Systems	4.0
PMIT-6103	Advanced Networking and Internet Technologies	4.0
PMIT-6104	Information Systems and Cyber Laws	4.0

Semester 2 (Elective Courses)

Course Code	Course Title	Credit hours
PMIT-62××	Elective Course (Group A/B)	4.0
PMIT-62××	Elective Course (Group A/B)	4.0
PMIT-62××	Elective Course (Group C)	4.0
PMIT-62××	Elective Course (Group D)	4.0
PMIT-6200	Project (Group E)	4.0

List of Elective Courses

Group A

Course Code	Course Title	Credit hours
PMIT-6201	Computational Biology	4.0
PMIT-6202	Advanced Neuroinformatics	4.0
PMIT-6203	Health Informatics	4.0
PMIT-6204	Advanced Data Mining for Biological Data	4.0
PMIT-6205	Neuronal Information Discovery	4.0
PMIT-6206	Bio-Informatics	4.0
PMIT-6207	Modeling of Biological Systems	4.0
PMIT-6208	Advanced Artificial Intelligence and Neural Networks	4.0

Group B

Course Code	Course Title	Credit hours
PMIT-6209	Database Security	4.0
PMIT-6210	Distributed Computing	4.0
PMIT-6211	Data Mining & Knowledge Discovery	4.0
PMIT-6212	Management Information System	4.0
PMIT-6213	Information System Simulation and Modeling	4.0
PMIT-6214	Advanced Operating System	4.0
PMIT-6215	Information Retrieval	4.0
PMIT-6216	Distributed Databases	4.0

Group C

Course Code	Course Title	Credit hours
PMIT-6217	Wireless Networks and Mobile Computing	4.0
PMIT-6218	Multimedia Asset Management System	4.0
PMIT-6219	Network Security	4.0
PMIT-6220	Cellular Network Planning	4.0
PMIT-6221	Fiber Optic Communication	4.0
PMIT-6222	Advanced Digital Communication	4.0
PMIT-6223	Modeling of Data Networks	4.0
PMIT-6224	Telecommunication Network Management	4.0
PMIT-6225	Mobile Application Development	4.0

Group D

Course Code	Course Title	Credit hours
PMIT-6226	Information System Analysis and Design	4.0
PMIT-6227	Software Testing and Quality Assessment	4.0
PMIT-6228	Object Oriented Software Engineering	4.0
PMIT-6229	Information System Development Ethics	4.0
PMIT-6230	Advanced Data Structures and Algorithms	4.0
PMIT-6231	Advanced Web Technologies	4.0
PMIT-6232	Web Securities	4.0
PMIT-6233	E-commerce	4.0

Group E

Course Code	Course Title	Credit hours
PMIT-6200	Project	4.0

Prerequisite Courses:

Course Code	Course Title	Credit hours
IT 1101	Information Technology Fundamentals	4.0
IT 1103	Introduction to Programming Environment	4.0
IT 1201	Data Structures	4.0
IT 2205	Data Communication	4.0
IT 3101	Database Management System	4.0

IT 3103	Computer Network and Internet Technology	4.0
IT 3107	Operating System	4.0
IT 3109	Simulation and Modeling	4.0
IT 3201	Software Engineering	4.0
IT 3205	Web Technologies	4.0
IT 4105	Telecommunication Systems	4.0
IT 4101	Artificial Intelligences & Neural Networks	4.0

PMIT-6101: Advanced Software Engineering

Software Development Model: Waterfall Model, Spiral (Incremental) Model, the Unified Development Process, Best Practices. *The Universal Modeling Language*: UML, Domain and *Problem Modeling*: Summary, UML Overview, Use Cases, Object Model, Interaction Diagrams, *Sequence Diagrams, Collaboration Diagrams*: Packages, State Diagrams, Activities. *Mapping UML to Code:* The Unified Development Process- Model Dynamics, Architecture-Centric Process, Use Case Driven Process, Iterative and Incremental Process, *Workflows:* Project management Workflow, Inception Workflow, Requirements Workflow, Use cases and Requirements Specifications, Analysis Workflow, Design Workflow, Implementation Workflow, Iteration Workflow, Other Workflows

TEXT & REFERENCE BOOKS:
1. Craig Larman: Applying UML and Patterns, Prentice-Hall.
2. Terry Quatrani: Visual Modeling with Rational Rose 2000 and UML, Addison Wesley.
3. CT Arrington: Enterprise Java with UML, John Wiley.

PMIT-6102: Advanced Database Systems

Introduction: Distributed Data Processing, Distributed Databases System, promises of DDBS, Problem areas, *Overview of Relational DBMS*: Relational Databases Concepts, Normalization, Integrity rules, Relational data languages, *Distributed DBMS Architecture:* Architectural Models for Distributed DBMS, *Distributed Database Design:* Alternative Design Strategies, Distribution Design issues, Fragmentation, Allocation. *Query Processing and Decomposition:* Query processing Objectives, Characterization of query processors, layers of query of query processing, query decomposition. *Distributed query Optimization:* Query optimization, centralized query optimization, Distributed query optimization algorithms, *Transaction Management:* Properties of transaction, types of transactions, distributed concurrency control. Serialization, concurrency control Mechanism & Algorithms, Time stamped and Optimistic concurrency control Algorithms, Dead lock Management, *Distributed DBMS Reliability:* Reliability concepts and Measures, fault-tolerance in Distributed systems, failures in Distributed DBMS, local & Distributed Reliability Protocols, site failures and Network partitioning, *Parallel Database Systems*: Parallel Architecture, Parallel DBMS Techniques, Parallel exception problems, Parallel

Execution for Hierarchical architecture. *Distributed object Database Management Systems:* Fundamental object concepts and Models, Object Distributed Design, Architectural Issues, Object Management, Object query Processing.

TEXT & REFERENCE BOOKS:
1. Principles of Distributed Database Systems, 2/e, OZSU, Valduriez, Sridhar, Pearson.
2. Distributed Databases, Stefan Seri, Pelagatti Willipse, TMH.
3. Database System Concepts, 5/e, Korth, Silberschatz, Sudershan, TMH

PMIT-6103: Advanced Networking and Internet Technologies

Overview of networking and enabling technologies, Wireless LAN, Mobile networking, Multimedia networking, Internet multimedia protocols, voice over IP (VoIP), QoS for IP based networks, Directory Services, Future trends in networking and Internet technologies, System/Storage area network (SAN), Issues in switching, routing, and application API design for achieving high bandwidth/low latency communication, cut-through/store-and-forward/wormhole switching, high speed interconnect design, deadlock free routing and load balanced deadlock free routing, and case study, Internet inter-domain routing, BGP, BGP routing instability/slow convergence problems and solutions, BGP security problems and solutions, new inter-domain routing protocol proposals, *Internet security*: Detection and prevention of distributed denial of service (DDOS) attacks, IP traceback, techniques to deal with IP spoofing, intrusion detection, anti-spam, *Internet QoS and traffic engineering*: Issues in packet scheduling, routing, middle-ware support for QoS provision, MPLS, traffic engineering techniques, multi-path routing, *Internet traffic measurement and analysis:* Traffic distribution and workload models, topology characterization, self similarity, statistical multiplexing.

TEXT & REFERENCE BOOKS:
1. James F. F. Kurose and Keith W. Ross, "*Computer Networking: A Top-Down Approach Featuring the Internet*", 3nd edition, Addison Wesley; 3 edition (May 13, 2004)
2. Andrew Tanenbaum, Computer Networks Prentice Hall PTR; 4 edition (August 9, 2002)
3. Douglas E. Comer, "Internetworking with TCP/IP, Volume 1: Principles, Protocols, and Architectures", 4th edition, Prentice Hall, Feb 2000.

PMIT-6104: Information Systems and Cyber Laws

Introduction to Computer Technology & Programming ,Legal Dimensions in Cyber World, IT Acts and Cyber Crime, IT Act, Information Assurance & E-governance / Data Information & Cryptography , Identity & Access management, Security Audit, Process Management & Consultancy, Problems in cyberspace, aspect of academics, technologists, businesspeople, regulators, and social entrepreneurs, The structure of ITA-2000, Key provisions, Offences, Adjudication, Some Cyber Crime Cases, Information Security, Authentication, Passwords, Digital Signatures, Concept of Virtual Property, Trademarks, Copyrights, Patents, Data Protection Laws, Requirements of a Website, E-Marketing, E-Advertising, Online Payment Collection System, CyLawCom, Techno-Legal Audit of System Security, Impact of Non Compliance on Organizational Quality.

TEXT & REFERENCE BOOKS:
1. Jonathan Rosenoer, "Cyber Law: The Law of the internet."
2. Pavan Duggal, "cyberlaw- the indian perspective" 2009 edition with it act amendments 2008.
3. Cyber Law and Cyber Security in Developing and Emerging Economies by Zeinab Karake-Shalhoub, Lubna Al Qasimi, 2nd edition. 2010.

PMIT-6201: Computational Biology

Introduction to Computational Genomics, A Spectrum of Computing Issues, Programming and Languages, Operating Systems, Computer Architecture, Computer Networks, Algorithms, Data Structures, Databases, Bio-Computing Technologies, Introduction to UNIX, Introduction to Perl, Introduction to BioPerl, *Sequence similarity:* local and global alignment, brute-force approach, Needleman-Wunsch algorithm, global alignment, Smith-Waterman algorithm and their complexity analysis, *Multiple sequence alignment(MSA):* dynamic-programming solution for MSA, center star method, *Genome rearrangement:* genome rearrangement problem, 4-approximation algorithm, 2-approximation algorithm, *Phylogeny reconstruction:* Different parsimony problems, Fitch's algorithm, approximation algorithm for the large parsimony problem ultrametric tree UPGMA, Genome Modeling, Gene Prediction Concepts and Techniques, Coding, non-coding, Intron/Exon Boundaries, Promoters, TF Binding sites, UTR Indentification, Hidden Markov Models and Domain Finding, Protein Structure Prediction and Analysis, Map Building Methods, Linkage Analysis Algorithms, Tools and Applications, Micro-Arrays and Expression Analysis Methods, Pathway Elucidation Techniques and Tools.

TEXT & REFERENCE BOOKS:
1. Bioinformatics For Dummies, 2nd Edition, Jean-Michel Claverie, Cedric Notredame.
2. Algorithms in Bioinformatics: A practical Introduction, Wing-Kin Sung
3. Richard Durbin, S. Eddy, A. Krogh, G. Mitchison. Biological Sequence Analysis: Probabilistic Models of Proteins and Nucleic Acids; Cambridge University Press, 1998. ISBN: 0521629713.
4. Warren J. Ewens, Gregory R. Grant. Statistical Methods in Bioinformatics : An Introduction (Statistics for Biology and Health); Springer, 2005. ISBN: 0387400826.

PMIT-6202: Advanced Neuroinformatics

Data and metadata types in neurosciences, Elements of database design, Representation of neuroscience data and metadata in database formats, *Introduction in mapping of neuroanatomical data (I):* gene expression data, and neurons, Neuroinformatic databases for gene expression data and developmental databases, Introduction in cytoarchitecture and cytology, *Neuroinformatic databases for neurons and neural components:* Senselab and CoCoDat, *Introduction in mapping of neuroanatomical data (II):* brain regions, and fiber tracts, Introduction in brain regions and major fiber tracts of the mammalian central nervous system, *Neuroinformatic databases for brain regions and neuroanatomical connections:*

CoCoMac and Temporal Lobe, *Data mining*: Principles and main techniques, *Neuroinformatic databases for brain regions and neuroanatomical connections*: BAMS, Neuroinformatics systems for literature and experimental data management, Neuroscholar, *Neural models repositories*: Brain Operating Principles Database (BODB), Senselab, Brain imaging databases, Allen Brain Institute Databases, and Nesys, BrainMap and Brede databases.

TEXT & REFERENCE BOOKS:
1. Michael A. Arbib, and Jeffrey S. Grethe, Computing the Brain: A Guide to Neuroinformatics, San Diego: Academic Press, 2001.
2. Stephen H. Koslow, Michael F. Huerta, Neuroinformatics: An Overview of the Human Brain Project, New Jersey: Lawrence Erlbaum Associates Inc., 1997.
3. Eric R. Kandel, James H. Schwartz, and Thomas M. Jessel, Principles of Neural Science, 4th Ed., New York: McGraw-Hill, 2000.

PMIT-6203: Health Informatics

HealthCare Information Systems: Health Care Information Systems, Strategic Planning, Selecting a Health Care Information System, System Implementation and Maintenance, Information Systems Training, Information Security and Confidentiality, System Integration, and Interoperability, The Electronic Health Record, Regulatory and Accreditation Issues, *Foundations of Healthcare Informatics*: Major Theories Supporting Health Care Informatics (System Theory), Computer, Information Health Care Informatics Literacy, Supporting Administrative Decision Making, Supporting Clinical Decision Making. System *Analysis/System Planning*: System Planning, Applications for HealthCare Information Systems, Strategic and Tactical Planning for Health Care Information Systems, Work Flow Analysis, *The Impact ofInformatics on the Socio-cultural Environment of Health Care/Work Systems*: The Impact of HealthCare Informatics on the Organization, The Implications of Information Technology for Research, *Using Technology To deliver Health Care Education*: Technological Approaches to Communication, Technology and Distributed Education.

TEXT & REFERENCE BOOKS:
1. Sheila P. Englebardt, Ramona Nelson, Ramona Nelson. Health Care Informatics: An Interdisciplinary Approach. Mosby, Nov 2001, ISBN: 0323014232.
2. Atler Steven. Information Systems: Foundation of E-business (4th ed.). ISBN: 10: 0130617733 and/or 13: 978-0130617736

PMIT-6204: Advanced Data Mining for Biological Data

Introduction to Data mining: Classification, Clustering, Data Warehousing, Applications of Data Mining, *Data Bases*: Nucleic Acid Sequences, Genomes, Protein Sequence and Structures, *Bibliographic Access to Molecular Biology Data Bases*: Entrez, Sequence Retrieval System (SRS), Protein Identification Resource (PIR), *Grid-based clustering*: A statistical information grid approach, clustering by wavelet analysis, clustering high-dimensional space, *Clustering high-dimensional data*: subspace clustering, frequent pattern-based clustering, clustering by wavelet analysis, *Advanced outlier analysis*: Statistical-based

outlier detection, distance-based outlier detection, deviation-based outlier detection, analysis of local outliers, *Collaborative Filtering*: Mining DNA, RNA, and *proteins*: Mining motif patterns, searching homology in large databases, phylogenetic and functional prediction, *Mining gene expression data*: clustering gene expression, e.g., gene regulatory net-works, classifying gene expression, e.g., for disease-sensitive gene discovery, Mining mass spectrometry data, Mining and integrating knowledge from biomedical literature, Mining inter-domain associations.

TEXT & REFERENCE BOOKS:
1. Biological Data Mining, Stefano Lonardi, Jake Y. Cheng, Chapman & Hall/CRC, 2010
2. Date, C.J. An Introduction to Database Systems, Vol I & II. Addison Wesley.
3. Baxevanis, A. and Ouellette, F.B.F (Editors) 1998 Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins. John Wiley and Sons, New York.

PMIT-6205: Neuronal Information Discovery
Random variables and stochastic processes in Neuronal Signals: Random variables, Moments and Cumulates, Multivariate distributions, *Statistical independence and stochastic processes*: Examples of biomedical signal processing Probabilistic estimation, Linear discriminants - detection of motor activity from MEG, Harmonic analysis - estimation of hart rate in ECG, Auto-regressive model - estimation of the spectrum of cognitive processes in EEG, Matched and Wiener filter - filtering in EMG, Independent components analysis - analysis of EEG signals for signal source localization.

TEXT & REFERENCE BOOKS:
1. Eugene N. Bruce, Biomedical Signal Processing and Signal Modeling, John Wiley & Sons, 2000.
2. Steven Kay, Fundamentals of Statistical Signal Processing, Prentice Hall, 1998.
3. Monson H. Hayes, Statistical Digital Signal Processing and Modeling, John Wiley & Sons, 1996.

PMIT-6206: Bio-Informatics
Introduction to Bioinformatics, Algorithm basics, Overview of Genbank, Introduction to programming with perl, Introduction to statistics using R, Sequence comparison, Pairwise sequence alignment, Pairwise sequence alignment: scoring matrix & local alignment, Sequence database searching, Multiple sequence alignment, Motif & HMM, Phylogeny, Sequencing techniques & genome assembly, Gene finding, Genome comparison & Genome variation, RNA folding & non-coding RNA finding, Protein bioinformatics & structural bioinformatics, Function annotation, Biological pathways & networks, Microarray & clustering algorithm, Mass spectrometry in proteomics, RNA-Seq, R Basics,

TEXT & REFERENCE BOOKS:
1. Bio Informatics Computing, Bryan Bergeron, PHI, 2003.
2. Introduction to Bio Informatics, Attwood, Smith, Longman, 1999.

3. Bio Informatics Methods and Applications, Rastogi, Mendiratta, Rastogi, PHI

PMIT-6207: Modeling of Biological Systems

Protein Secondary Structure Prediction Methods: Statistical Methods of Chou and Fasman, Garnier-Osguthorpe-Robson, Stereochemical Method of Lim and Neural Network Method, etc, Fold Recognition and Threading Methods Profiles, Motifs – Regular Expressions, Position Specific Scoring Matrices Repeat Finding and pattern Recognition. Classification of *Three Dimensional Structures of Proteins*: Prediction of Structural Classes, Motifs, Folds and Domains, Classification of Three Dimensional Structures in Brookhaven Protein Data Bank (HSSP, SCOP, FSSP, CATH), Protein Structure Prediction: Structural Alignment Methods, Homology Modeling, Dynamical Programming, Molecular Simulation, Rational Drug design and Docking.

TEXT & REFERENCE BOOKS:
1. Wilkins, M.R., Williams, K.L., Appel, R.D., Hochstrasser, D.F. (Editors) 1997 Proteome Research: New Frontiers in Functional Genomics. Springer Verlag Berlin Heidelberg.
2. Baxevanis, A.D. and Francis Ouellette, B.F. 2004 Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins. Second Edition, Wiley.
3. Graur, D. and Li, W-H. 2000 Fundamentals of Molecular Evolution. Sinauer Ass., USA.
   4. Tisdall, D., 2003 Mastering Perl for Bioinformatics. O'Reilly.

PMIT-6208: Advanced Artificial Intelligence and Neural Network

Introduction: AI Basics, Problem reduction, Constraint satisfaction, Means-Ends Analysis. *Game Playing:* Minimax search procedure, adding alpha-beta cutoffs, additional refinements, Iterative deepening, *Statistical Reasoning:* Probability and Bayes theorem, Certainty factors and Rules based systems, Bayesian Networks, Dempster Shafer theorem. *Knowledge Representation:* Theorem proving using Predicate logic, Resolution, Natural Deduction, Knowledge representation using Rules, Forward versus Backward Reasoning, Matching, *Control Artificial Knowledge Structures:* Semantic Networks, Frames, Conceptual Dependency diagrams, *Scripts Planning:* Components of planning system, goal stack planning, nonlinear planning using constraint posting, Hierarchical planning. *Reactive systems Natural Language Processing*: NLP, Syntactic processing, Semantic analysis, Discourse and Pragmatic processing, Statistical NLP, Spell checking. *Learning*: Rote learning, learning by taking advice, learning in problem solving, Learning from examples, NN learning and Genetic learning, *Genetic Algorithms*: Genetic Algorithms, Termination parameters, Ant Algorithms, *Fuzzy Set Theory*: Classical & Fuzzy set theory, Interval Arithmetics, *Operations on Fuzzy sets Fuzzy Logic Theory*: Classical logic theory, Boolean Logic, Multivalued Logics, *Applications of Fuzzy Logic*: PQE – Decision Making Investment – Examples Fuzzy Rule base and Fuzzy Modeling: If-Then Rules, *Fuzzy Modeling*: System modeling, Static fuzzy systems, Parameter Identification. *Fuzzy Control Systems:* PLC, closed loop, fuzzy controllers, examples, Fuzzy PID controllers – type1 and type 2.

TEXT & REFERENCE BOOKS:
1. Intelligence, 3/e, E.Rich, K.Knight, TMH.

2. Introduction to Fuzzy Systems, G Chen, Trung Tat Pham, Chapman & Hall/CRC, 2009.
3. Artificial Intelligence, A Modern Approach, 2/e, Stuart Russel, Peter Norvig, PHI/PEA.

PMIT-6209: Database Security

Introduction to database security, Database Issues in Trust Management and Trust Negotiation, Authenticated Index Structures for Outsourced Databases, Managing and Querying Encrypted Data, Security in Data Warehouses and OLAP Systems, Security for Workflow Systems, Geospatial Database Security, Security *Re-engineering for Databases*: Concepts and Techniques, Database Watermarking for Copyright Protection, Database Watermarking: A Systematic View, Trustworthy Records Retention, Damage Quarantine and Recovery in Data Processing Systems.

TEXT & REFERENCE BOOKS:
1. M. Gertz, and S. Jajodia, Handbook of Database Security- Application and Trends, 2008, Springer.
2. Silvana Castano, Database Security, ACM Press
3. Alfred Basta and Melissa Zgola, Database Security, Information Security Professionals, 2011

PMIT-6210: Distributed Computing

Introduction to distributed programming: Anatomy of a Distributed Application, Requirements for Developing Distributed Applications, *Introduction to sockets programming:* Sockets and Streams, URLs, URL Connections, and Content Handlers, The Class Loader. *Distributing Objects:* Features of Distributed Object Systems, Distributed Object Schemes for Java, CORBA, Java RMI, RMI vs. CORBA. *Threads:* Thread and Runnable, Making a Thread, Managing Threads at Runtime, Networked Threads. *Security:* Security Issues and Concerns, The java.security Package, Identities and Access Control, Keys: Public, Private, and Secret, Digital Signatures, Data Encryption, Cryptographic Algorithm. *Message-Passing Systems:* Message Processing, Fixed Protocols, Adaptable Protocols, Message Passing with Java Events. *Remote Objects Databases:* JDBC, Remote Database Applications, Multi-Database Applications, *RMI:* Structure of RMI, Implementing the Basic Objects, The Rest of the Server, The Client Application The RMI Registry Examining the Registry, Limitations of the RMI Registry, Security Issues, The Context Interface, Mechanics of a Remote Method Call, Distributed Garbage Collection, RMI's Logging Facilities, Other JVM Parameters. *Service Oriented Architecture:* Introduction, Defining SOA, Identifying Service Candidates, Modeling Services, Making a Service Composable, Selecting a Pilot Project, Establishing Governance, *Introduction to Web Services:* Introduction, Using Publicly Available Web Services to Test Against, Installing Metro, Installing Oracle Web-Logic, Creating and Deploying the Simplest Web Service, Creating and Deploying a Service to Web-Logic.

TEXT & REFERENCE BOOKS:
1. Java Distributed Computing, Jim Farley, O'Reilly.
2. Java RMI Designing and Building,The Basics of RMI Applications, William Grosso,

O'Reilly.
3. Java SOA Cookbook SOA Implementation Recipes, Tips, Techniques, Eben Hewitt, O'Reilly, 2009.

PMIT-6211: Data Mining and Knowledge Discovery

Introduction to Data Mining: Types of Data, Data Quality, Data Processing, Measures of Similarity and Dissimilarity, *Exploring Data*: Data Set, Summary Statistics, Visualization, OLAP and multi-dimensional data Analysis, *Classification:* Basic Concepts, Decision Trees, and model evaluation: General approach for solving a classification problem, Decision Tree induction, *Model over fitting*: Due to presence of noise, due to lack of representation samples, Evaluating the performance of classifier, *Classification-Alternative techniques:* Nearest Neighborhood classifier, Bayesian Classifier, *Support Vector Machines*: Linear SVM, Separable and Non Separable case, *Association Analysis:* Problem Definition, Frequent Item-set generation, Rule generation, compact representation of frequent item sets, FP-Growth Algorithms, Handling categorical, continuous attributes, concept hierarchy, sequential, sub-graph patterns. *Clustering:* Overview, K-means, Agglomerative Hierarchical clustering, DBSCAN. *Cluster Evaluation:* Overview, Unsupervised Cluster evaluation using cohesion and separation, using the proximity matrix, Scalable clustering algorithms, *Web Data mining:* Introduction, Web terminology and characteristics, web content mining, web usage mining, web structure mining, *Search Engines*: Characteristics, Functionality, Architecture, Ranking of web pages, Enterprise search.

TEXT & REFERENCE BOOKS:
1. Introduction to Data Mining, Pang-Ning Tan, Michael Steinbach, Vipin Kumar, PEA.
2. Introduction to Data Mining with Case Studies, GK Gupta , Prentice Hall.
3. Data Mining: Introductory and Advanced Topics, Margaret H Dunham, PEA, 2008.

PMIT-6212: Management Information Systems

Introduction: Information Systems in Global Business Today, *Global E-Business*: How Businesses Use Information Systems, Ethical and Social Issues in Information Systems, Securing Information Systems, Telecommunications, the Internet and Wireless Technology, *E-Commerce*: Digital Markets, Digital Goods, Building Systems, Enhancing Decision Making, Structure project work through assignment of roles (e.g., project manager, systems analyst, programmer, and software version manager) and use of project work breakdown structure for task management, Manage responsibility on diverse teams through peer review and task accountability arrived at through consensus methods, Assess software, hardware and networking requirements of information system applications accounting for limited funds and/or manpower, Address issues of information system access, training and confidentiality.

TEXT & REFERENCE BOOKS:
1. Laudon, Kenneth C., and Laudon, Jane P., Management Information Systems-Managing Digital Firm, Tenth Edition, Prentice Hall, 2007.
2. Microsoft Access 2000 Step by Step, Catapault, Inc. 1999.
3. Barron and Lyskawa, Microsoft FrontPage 98 Illustrated Standard Edition, Course

Technology. 1998.

PMIT-6213: Information System Simulation and Modeling

Emulation Basics: Handling Stepped and Event-based Time in Simulations, Discrete versus Continuous Modelling, Numerical Techniques, Sources and Propagation of Error, Dynamical, *Finite State and Complex Model Simulations*: Graph or Network Transitions Based Simulations, Actor Based Simulations, Mesh Based Simulations, Hybrid Simulation, *Converting to Parallel and Distributed Simulations:* Partitioning the Data, Partitioning the Algorithms, Handling Inter-partition Dependencies, *Probability and Statistics for Simulations and Analysis:* Introduction to Queues and Random Noise, Random Variants Generation, Sensitivity Analysis, *Simulations Results Analysis and Viewing Tools: Display Forms*: Tables, Graphs, and Multidimensional Visualization, Terminals, X and MS Windows, and Web Interfaces, Validation of Model Results.

TEXT & REFERENCE BOOKS:
1. Gary Chartrand, Introductory Graph Theory, Dover, 1977, ISBN 0-486-24775-9
2. Press, Teukolsky, Vetterling, Flannery, Numerical Recipes in C, Campbridge, 2th edition 1992, ISBN 0-521-43108-5
3. Averill M. Law, Simulation Modelling & Analysis, McGraw Hill, 4th edition 2007, ISBN 978-0-07-298843-7

PMIT-6214 Advanced Operating System

Processes Threads: Introduction to Threads, Threads in Distributed Systems. *Clients:* User Interfaces, Client-Side Software for Distribution Transparency. *Servers:* General Design Issues, Object Servers. *Locating Mobile Entities:* Naming versus Locating Entities, Simple Solutions, Home-Based Approaches, and Hierarchical Approaches, *Removing Unreferenced Entities:* The Problem of Unreferenced Objects, Reference Counting, Reference Listing, Identifying Unreachable Entities, *Synchronization:* Clock synchronization, logical clocks, global state, election algorithms, mutual exclusion, distributed transactions. *Consistency and Replication:* Data-Centric Consistency Models, Client-Centric Consistency Models, Distribution Protocols, Consistency Protocols, And *Examples*: Orca and Causally-Consistent Lazy Replication. *Fault Tolerance:* Process Resilience, Reliable Client-Server Communication, Reliable Group Communication, Distributed Commit, Recovery, *Distributed Object-Based Systems:* CORBA, Distributed Com, Globe and Comparison of CORBA, DCOM, and Globe, *Distributed File Systems:* Sun Network File System, Coda File System, Plan~9, XFS and SFS, Scalable Security, Comparison of Distributed File Systems. *Distributed Document-Based Systems and Coordination-Based Systems: Distributed Document-Based Systems*: The World Wide Web, Lotus Notes, Comparison of WWW and Lotus Notes, *Distributed Coordination-Based Systems:* Introduction to Coordination Models, TIB/Rendezvous, JINI, Comparison of TIB/Rendezvous and JINI.

TEXT & REFERENCE BOOKS:
1. Distributed Systems, Principles and Paradigms, 2/e, Tanenbaum, M Van Steen, PHI.
2. Advanced concepts in Operating Systems, Mukesh Singhal, Niranjan G. Shivaratri, TMH,

2005.
3. Distributed Operating Systems and Algorithm Analysis, Chow, Johnson, PEA.

PMIT-6215 Information Retrieval

Introduction to Information storage and retrieval systems: Domain Analysis of IR systems, IR and other types of Information Systems, IR System Evaluation, *Introduction to Data structures and algorithms related to Information Retrieval*: Basic Concepts, Data structures, Algorithms, *Inverted Files:* Introduction, Structures used in Inverted Files, Building an Inverted file using a sorted array, Modifications to the Basic Techniques, *Signature Files:* Introduction, Concepts of Signature files, Compression, Vertical Partitioning, Horizontal Partitioning. *New Indices for Text:* PAT Trees and PAT Arrays: Introduction, PAT Tree structure, Algorithms on the PAT Trees, Building PAT Trees as PATRICA Trees, PAT representation as Arrays. *Lexical Analysis and Stop-lists:* Introduction, Lexical Analysis, Stop-lists, *thesaurus Construction:* Introduction, Features of Thesauri, Thesaurus Construction, Thesaurus construction from Texts, Merging existing Thesauri. *String Searching Algorithms:* Introduction, Preliminaries, the Naive Algorithm, the Knutt – Morris - Pratt Algorithm, the Boyer-Moore Algorithm, the Shift-Or Algorithm, the Karp-Rabin Algorithm.

TEXT & REFERENCE BOOKS:
1. Modern Information Retrieval,Ricardo Baeza-Yates, Neto, PEA,2007.
2. Information Storage and Retrieval Systems: Theory and Implementation, Kowalski, Gerald, Mark Academic Press, 2000.
3. Information Retrieval: Algorithms and Heuristics, Grossman, Ophir Frieder, 2/e, Springer, 2004.

PMIT-6216: Distributed Databases

Introduction: Features of distributed databases, features of Centralized databases, level of distributed transparency Reference Architecture, types of Data Fragmentation, distribution Transparency, Access primitives, and Integrity constraints, *Distributed Database Design:* A frame work, the design of database fragmentation, the allocation of fragments, *Query Processing:* Translation of global queries into fragment queries, query optimization, *Distributed Transaction Management:* A framework, transaction atomicity, 2-phase commit, *Concurrency control*: Foundations, distributed deadlocks, timestamps, *Reliability:* Basic concepts, commit protocols, consistent view of Network, Detection and Resolution of Inconsistencies, check points and cold restart, *Commercial Systems:* Tranclem's ENCOMPASS Distributed database systems, IBM's Inter system communication, feature of distributed ingress and Oracle. *Heterogeneous databases:* General problems – brief study of multi base.

TEXT & REFERENCE BOOKS:
1. Distributed Database systems Principles and Systems, Ceri S. Pelagatti. G, MGH.
2. Principles of Distributed Database Systems, 2/e, M. Tamer Ozsu, Sridhar, PEA.
3. Database system Concepts, 5/e,Silberschatz, F.Korth, Sundrashan,MGH,2006.

PMIT-6217: Wireless Networks and Mobile Computing

Introduction to Mobile and Wireless Landscape: Definition of Mobile and Wireless, Components of Wireless Environment, Challenges, Infrastructure and Ad-hoc Network, IEEE 802.11, HIPERLAN, Bluetooth. *Global System for Mobile Communications (GSM):* GSM Architecture, GSM Entities, Call Routing in GSM, PLMN Interfaces, GSM Addresses and Identifiers, Network Aspects in GSM, GSM Frequency Allocation, Authentication and Security. *Mobile Network Layer:* Mobile IP (Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations), Dynamic Host Configuration Protocol (DHCP), *Mobile Ad-hoc networks*: Routing, destination Sequence Distance Vector, Dynamic Source Routing, *Mobile Transport Layer*: Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission/time-out freezing, Selective retransmission, Transaction oriented TCP, *Broadcast Systems*: Overview, Cyclical repetition of data, Digital audio broadcasting: Multimedia object transfer protocol, *Digital video broadcasting*: DVB data broadcasting, DVB for high-speed internet access, Convergence of broadcasting and mobile communications, Protocols and Tools, Wireless Language and Content, Mobile and Wireless Security.

TEXT & REFERENCE BOOKS:
1. Mobile Communications, 2/e, Jochen Schiller, PEA, 2008.
2. Mobile and Wireless Design Essentials, Martyn Mallick, Wiley, 2008.
3. Mobile Computing, Asoke K Talukder, et al,, MGH, 2008.

PMIT-6218: Multimedia Asset Management System

Fundamental concepts in Text and Image: Multimedia and hypermedia, world wide web, overview of multimedia software tools. Graphics and image data representation graphics/image data types, file formats, Color in image and video: color science, color models in images, color models in video. *Fundamental Concepts in Cideo and Digital Audio:* Types of video signals, analog video, digital video, digitization of sound, MIDI, quantization and transmission of audio. *Application Development:* An OOP Application Frame work, Using Components with ActionScript MovieClip Subclasses, *Multimedia Data Compression: Lossless compression algorithm*: Run-Length Coding, Variable Length Coding, Dictionary Based Coding, Arithmetic Coding, Lossless Image Compression, *Lossy compression algorithm*: Quantization, Transform Coding, Wavelet-Based Coding, Embedded Zerotree of Wavelet Coefficients Set Partitioning in Hierarchical Trees (SPIHT), *Basic Video Compression Techniques:* Introduction to video compression, video compression based on motion compensation, search for motion vectors, MPEG, Basic Audio Compression Techniques. *Multimedia Networks:* Basics of Multimedia Networks, *Multimedia Network Communications and Applications*: Quality of Multimedia Data Transmission, Multimedia over IP, Multimedia over ATM Networks, Transport of MPEG-4, Media-on-Demand (MOD).

TEXT & REFERENCE BOOKS:

1. Fundamentals of Multimedia , Ze-Nian Li , Mark S. Drew, PHI/PEA.
2. Essentials ActionScript 2.0, Colin Moock, SPD O,REILLY.
3. Digital Multimedia, Nigel chapman & jenny chapman, Wiley-Dreamtech.

PMIT-6219: Network Security

Introduction to Network Security: Attacks, services, Security, A model of Inter network Security, Steganography, One time PADS, *Basic and ESOTERIC Cryptographic Protocols:* Key Exchange, Authentication, Formal Analysis of Authentication and key Exchange Protocols, Multiple & Public Key Cryptography, Secret Splitting & Sharing Secure elections, Secure multiparty, Communication, Digital Cash. *Crypto Graphic Algorithms (Block Cipher):* RC2, GOST, CAST, BLOW FISH, SAFEER, RC5, NEWDES, CRAB, Theory of Block Cipher design, *Key Management:* Key lengths, Generating Keys, Transferring, Verification, Updating, Storing, Backup, Compromised, Lifetime of, Destroying Keys, Public key Management. *Digital Signature Algorithms:* Digital Signature, DSA, DSA variants, Gost, Discrete Lagorithm, One – Schnorr – Shamir digital Signatures, Esign, Cellular Automata, *Mails and Security:* Web Security Web Security requirements, Secure Sockets Layer and Transport Layer Security, Secure Electronic Transaction, *Viruses and Threats:* Intruders, Viruses, Worms and Firewalls Intruders, Viruses and Related Threats, Firewall Design Principles, Trusted Systems.

TEXT & REFERENCE BOOKS:
1. Applied Cryptography, 7/e, Bruce SCHNEIER John Wiley & Sons Inc.
2. Cryptography and Network Security, William Stallings, PHI.
3. Introduction to cryptography with coding Theory, 7/e, Wade Trappe, C. Washington, PEA.

PMIT-6220: Cellular Network Planning

Introduction: Objectives of Radio Network Planning, Grade of Service, System Specification, Equipment Specifications, Available Frequency Band, Service Area Topography, Traffic Distribution, Existing Infrastructure, Phases of The Planning Procedure. *Radio Network Definition including Capacity planning:* Starting Points and Objectives, Frequency Reuse, Prediction of Offered Traffic, Propagation Analysis and Coverage Planning: Starting Points and Goals of Coverage Planning, Multipath Propagation: Path Loss, Hata Model, Walfish-Ikegami Model, Path Loss Corrections, Slow and Fast Fading, Connection Between Coverage and Quality of Service, *Radio Link Power Budget*: Antenna Feeder Loss, Antenna Gain, Application Example, *Frequency Allocation:* Starting Points and Objectives, Regular Frequency Reuse Patterns, Methods Applied in Frequency Planning: Interference Levels, Minimum Reuse Distances, Adjacent Channel Interference Avoidance, *Application Example*: Simple Frequency Planning Method Using Regular Reuse Patterns, Advanced Frequency Planning Method Using Pairwise Interference Analysis, *Cellular Network Planning Tools:* Digital Maps, Capacity Planning in Radio Network Definition, *Propagation Analysis and Coverage Planning*: Hata Model and Walfish-Ikegami Model, Morphography, Antenna Height and Topography Corrections, Frequency Allocation, Route

Calculations: Comparison of Predicted and Measured Data, Simulation of Calls Along Routes, *Cellular Network Measurement*: NMS/X, TIM and SAM of Nemo Technologies.

TEXT & REFERENCE BOOKS:
1. Ajay R. Mishra, Fundamentals of Cellular Network Planning and Optimisation: 2G/2.5G/3G … Evolution to 4G, Wiley, 2004
2. Ajay R. Mishra, Advanced Cellular Network Planning and Optimisation: 2G/2.5G/3G... Evolution to 4G, John Wiley, 2007.
3. *Md. Imdadul Islam and Liton Jude Rozaio, "Telecommunications Traffic and Network Planning"*

PMIT-6221: Fiber Optic Communication

Overview of Optical Fiber Communication: Introduction, single mode fiber, cutoff wave length, mode filed diameter. *Optical Fibers:* fiber materials, photonic crystal, fiber optic cables specialty fibers. *Transmission characteristics of optical FIBERS:* Introduction, Attenuation, absorption, scattering losses, bending loss, dispersion, Intra modal dispersion, Inter modal dispersion. *Optical Sources and Detectors:* Introduction, LED's, LASER diodes, Photo detectors, Photo detector noise, Response time, double hetero junction structure, Photo diodes, comparison of photo detectors, *Fiber Couplers and Connectors:* Introduction, fiber alignment and joint loss, single mode fiber joints, fiber splices, fiber connectors and fiber couplers. *Optical Receiver:* Introduction, Optical Receiver Operation, eye diagrams, coherent detection, burst mode receiver operation, Analog receivers. *Analog and Digital Links:* Analog links – Introduction, overview of analog links, CNR, multichannel transmission techniques, RF over fiber, key link parameters, Radio over fiber links, microwave photonics, *WDM Concepts and Components:* WDM concepts, overview of WDM operation principles, WDM standards, Mach-Zehender interferometer, multiplexer, Isolators and circulators, direct thin film filters, active optical components, MEMS technology, optical drop multiplexers, polarization controllers, chromatic dispersion compensators, tunable light sources, *Optical Amplifiers and NETWORKS:* optical amplifiers, basic applications and types, semiconductor optical amplifiers, EDFA. *Optical Networks*: Introduction, SONET / SDH, Optical Interfaces, SONET/SDH rings, High – speed light – waveguides.

TEXT & REFERENCE BOOKS:
1. Optical Fiber Communication, Gerd Keiser, 4th Ed., MGH, 2008.
2. Optical Fiber Communications, John M. Senior, Pearson Education. 3rd Ed., 2007.
3. Fiber optic communication, Joseph C Palais: 4th Edition, Pearson Education.

PMIT-6222: Advanced Digital Communication

Digital Modulation Techniques: QPSK, DPSK, FQPSK, QAM, M-QAM, OFDM, Optimum Receiver for Signals Corrupted by AWGN, Performance of the Optimum Receiver for Memory-less Modulation, Optimum Receiver for CPM Signals, Optimum Receiver for Signals with Random Phase in AWGN Channel, *Coding Techniques:* Convolutional Codes, Hamming Distance Measures for Convolutional Codes, Various Good Codes, Maximum Likelihood Decoding of Convolutional codes, Error Probability with Maximum Likelihood Decoding of Convolutional Codes, Sequential Decoding and Feedback Decoding, Trellis

Coding with Expanded Signal Sets for Band-limited Channels, Viterbi decoding. *Communication through band limited linear filter channels:* Optimum receiver for channels with ISI and AWGN, Linear equalization, Decision-feedback equalization, reduced complexity ML detectors, Iterative equalization and decoding-Turbo equalization, *Adaptive equalization:* Adaptive linear equalizer, adaptive decision feedback equalizer, adaptive equalization of Trellis- coded signals, Recursive least squares algorithms for adaptive equalization, self recovering (blind) equalization. *Spread Spectrum Signals for Digital Communication:* Model of Spread Spectrum Digital Communication System, Direct Sequence Spread Spectrum Signals, Frequency-Hopped Spread Spectrum Signals, CDMA, time-hopping SS, Synchronization of SS systems, *Digital Communication through fading multi-path channels:* Characterization of fading multi-path channels, channel model, frequency-Nonselective, slowly fading channel.

TEXT & REFERENCE BOOKS:
1. John G. Proakis, "Digital Communications," 4th edition, McGraw Hill, 2001.
2. Stephen G. Wilson, "Digital Modulation and Coding," Pearson Education (Asia) Pte. Ltd, 2003.
3. Kamilo Feher," Wireless Digital Communications: Modulation and Spread Spectrum Applications," Prentice-Hall of India, 2004.

PMIT-6223: Modeling of Data Networks

Delay Models in Data Networks: Queuing Models, M/M/1, M/M/m, M/M/∞, M/M/m/m and other Markov System, M/G/1 System, Networks of Transmission Lines, Time Reversibility, Networks of Queues. *Multi-access Communication:* Slotted Multi-access and the Aloha System, Splitting Algorithms, Carrier Sensing, Multi-access Reservations, Packet Radio Networks. *Routing in Data Networks:* Introduction, Network Algorithms and Shortest Path Routing, broadcasting. *Routing Information:* Coping with Link Failures, Flow models, Optimal Routing, and Topological Design, Characterization of Optimal Routing, Feasible Direction Methods for Optimal Routing, Projection Methods for Optimum Routing and Routing in the Codex Network. *Flow Control:* Introduction, Window Flow Control, Rate Control Schemes, Overview of Flow Control in Practice, Rate Adjustment Algorithms.

TEXT & REFERENCE BOOKS:
1. Dimitri Bertsekas and Robert Gallager, "Data Networks," 2nd edition, Prentice Hall of India, 2003.
2. William Stallings, "High-Speed Networks and Internets," Pearson Education (Asia) Pte. Ltd, 2004.
3. J. Walrand and P. Varaya,"High Performance Communication Networks," 2nd edition, Harcourt India Pte. Ltd. & Morgan Kaufman, 2000.

PMIT-6224: Telecommunication Network Management

Introduction: Network management standards, network management model, organization model, information model abstract syntax notation 1 (ASN.1), encoding structure, macros, functional model, *Network management application functional requirements:* Configuration

management, fault management, performance management, security management, accounting management, common management, report management, polity based management, service level management. *Telecommunication management network (TMN) architecture:* Terminology, functional architecture, information architecture, physical architecture, TNN cube, TMN and OSI. *Common management information service element (CMISE):* CMISE model, service definitions, errors, scooping and filtering features, synchronization, functional units, association services, common management information protocol (CMIP) specification. *Information Modeling for TMN:* Rationale for information modeling, management information model, object oriented modeling paradigm, structure of management information, managed object class definition, management information base (MIB). *Simple network management protocol (SNMP):* SNMPv1, SNMPv2 communication model, functional model, SNMPv3, MIB security, remote monitoring (RMON) SMI and MIB, RMQN1 and RMON2, *Network management examples:* ATM integrated local management interface, ATM MIB, ATM digital exchange interface management, ADSL configuration management, performance management. *Network management tools:* Network statistics management, *network management system, management platform case studies*: OPENVIEW, ALMAP.

TEXT & REFERENCE BOOKS:
1. Network Management: Principles and Practice - Mani Subramanian, Addison Wesley, Pearson Education Asia publication.
2. Fundamentals of Telecommunication Network Management - Lakshmi Raman IEEE Communication Society.
3. Telecommunication Network Management: Technologies and Implementations - Airdarous Salah, Plevyak Thomas. Prentice Hall

PMIT-6225: Mobile Application Development

Introduction to Mobile Computing, Android Development Environment, *Factors in Developing Mobile Applications:* Mobile Software Engineering, Frameworks and Tools, Generic UI Development, Android User, VUIs and Mobile Apps, Text-to-Speech Techniques, Designing the Right UI, Multichannel and Multimodal UIs, *Intents and Services*: Android Intents and Services, Characteristics of Mobile Applications, Successful Mobile Development, *Storing and Retrieving Data*: Synchronization and Replication of Mobile Data, Getting the Model Right, Android Storing and Retrieving Data, Working with a Content Provider, *Communications Via Network and the Web*: State Machine, Correct Communications Model, Android Networking and Web, *Telephony*: Deciding Scope of an App, Wireless Connectivity and Mobile Apps, Android Telephony, *Notifications and Alarms*: Performance, Performance and Memory Management, Android Notifications and Alarms, *Graphics*: Performance and Multithreading, Graphics and UI Performance, Android Graphics, *Multimedia*: Mobile Agents and Peer-to-Peer Architecture, Android Multimedia, *Location*: Mobility and Location Based Services, Android, *Putting It All Together*: Packaging and Deploying, Performance Best Practices, Android Field Service App, *Security and Hacking*: Active Transactions, Hacking Android.

TEXT & REFERENCE BOOKS:

1. The Design of Everyday Things, Norman, Basic Books, 2002
2. Beginning iPhone 3 Development: Exploring the iPhone SDK by Jeff LaMarche, and David Mark, Apress, July 21, 2009, 978-1430224594
3. iPhone SDK Development, by Bill Dudney & Chris Adamson.

PMIT-6226: Information System Analysis and Design

Introduction: Definition of system, Approaches to system development, System Life Cycle, Installing visible analyst, Project Management, Teaming of groups, *CASETOOL*: Using VISIBLE ANALYST for Data flow diagram, the survey phase, Information gathering and interviewing, *Tools of structured analysis:* data flow diagrams (DFD), Events and Data Stores, Entity Relationship Diagram, Data dictionary, Process specification, RMO, evaluating alternatives for requirement, *The object-oriented approach to requirements:* Class diagram, Use cases and activity diagrams, Structured Design, Transform Analysis, Using visible analyst to create structure chart, *Qualities of a good Design:* programming simplicity and system morphology, coupling, cohesion.

TEXT & REFERENCE BOOKS:

1. Systems Analysis & Design in a Changing World by Satzinger, Jackson, and Burd, Course Technology 2008, 5th edition, ISBN: 1-4239-0228-9
2. Modern Structured Analysis by Yourdon, Prentice Hall 1989, ISBN 0-13-598624-9,
3. Practical Guide to Structured Systems Design by Page-Jones, Prentice-Hall 1988, ISBN: 0-13-690769-5.

PMIT-6227: Software Testing and Quality Assessment

Introduction to Software Testing: Testing Definition, Why Testing,Testing Process Overview, V-Model, Verification and Validation Definition, Test Coverage, *Test Levels*: Unit Test, Smoke Test, Integration Test, System Test, User Acceptance Test – UAT, Test Types, Static vs. Dynamic Test, Regression Test, Performance Test, Security Test, Others, *Test Team* : Career Path and Test Engineer Capabilities, Team/Development Collaboration and Conflicts, Communication Skills, *Writing Testable Requirements: Types of Requirements*: Business Requirements, System Requirements, Technical Requirements, Customer Early Involvement, Requirements Modeling, Requirements Traceability, Requirements Documentation, Requirements Validation, *Test Techniques*: Static Test Review- Dynamic Testing, Test Coverage, *Test Design Techniques*: White vs. Black Box Test Techniques, Boundary Value, Equivalence Partitioning, Decision Tables, Cause Effect, Network Graphing, Guess Testing, Structure Testing, Procedure (Scenario) testing, *Test Design and Defect Tracking*: Test Case, Design- Identify Scenarios, Identify test cases, Document Test procedure, *Review Procedure Defect Tracking*: Standards, Process, Defect Types, Defect Severity, Defect Priority
Test Process, Test Management and Measurement

TEXT & REFERENCE BOOKS:
1. Software Testing and Continuous Quality Improvement, by W. Lewis (2000)
2. Software Testing in the Real World, by E. Kit (1995)
3. Managing the Testing Process, by R. Black (2002)

PMIT-6228: Object Oriented Software Engineering

Introduction to Classical Software Engineering: Historical, Economic and Maintenance aspects. Introduction to OO Paradigm, Different phases in structured paradigm and OO Paradigm. Software Process and different life cycle models and corresponding strengths and weaknesses, *Planning and Estimation:* Estimation of Duration and Cost – COCOMO components of software, Project Management plan – one case Study, *Tools for Step-wised Refinement*: Cost -Benefit analysis, Introduction to software metrics and CASE tools, Taxonomy and scope of CASE tools, Introduction to testing, with focus on Utility, Reliability, Robustness, Performance, *Correctness, Modules to Objects*: Cohesion and Coupling, Data Encapsulation and Information hiding aspects of Objects. Inheritance, polymorphism and Dynamic Binding aspects, Cohesion and coupling of objects, Reusability, Portability and Interoperability aspects, *Requirement Phase*: Rapid Prototyping method, Specification phase -Specification Document-Formal methods of developing specification document-Examples of other semi -formal methods of using Finite-State-Machines, Petri nets and E-Language, *Analysis phase:* Use case Modeling -Class Modeling -Dynamic Modeling, Testing during OO Analysis, *Design phase:* Data oriented design – Object Oriented design – Formal techniques for detailed design, One case study, Challenges in design phase, *IIM Phases*: Implementation, Integration and maintenance phases-OOSE aspects in these phases.

TEXT & REFERENCE BOOKS:
1. Object oriented and Classical Software Engineering, 7/e, Stephen R. Schach, TMH
2. Object oriented and classical software Engineering, Timothy Lethbridge, Robert Laganiere, TMH.
3. Object-Oriented Software Engineering: Using Uml, Patterns, and Java by Bernd Bruegge, Allen H. Dutoit, 2010.

PMIT-6229: Information System Development Ethics

Privacy and personal information, Encryption and interception of communications, Can we trust the computer?, Freedom of speech in cyberspace, Intellectual property, Computer crime, Computers and work, Broader issues on the impact and control of computers, Professional ethics and responsibilities, *Fraud*: Conditions for Fraud, Assessing the Risk of Fraud, Corporate Governance Oversight to Reduce Fraud, Responding to the Risk of Fraud, Specific Fraud Risk Areas, Responsibilities When Fraud is Suspected. *Nature of Systems Development:* Creation of alternatives, Systems Analysis, System Design, Systems Implementation, Systems Evaluation. *Controls:* Enterprise Risk Managment, Controls and Exposures, Common Exposures, examples, Fraud and White-collar Crime, Forensic Accounting, Seriousness of Fraud, Computer Processing and Exposures, Control Objectives and Transaction Cycles.

TEXT & REFERENCE BOOKS:
1. Gary Pollice, Book review: A Gift of Fire, 2nd edition.
2. Ethical Issues of Information Systems by Ali Salehnia.
3. Information Ethics: Privacy and Intellectual Property By Lee Freeman, A. Graham Peace

PMIT-6230: Advanced Data Structures and Algorithms

C++ Class Overview, Class Definition, Objects, Class Members, Access Control, Class Scope, Constructors and destructors, parameter passing methods, Inline functions, static class members, this pointer, friend functions, dynamic memory allocation and de-allocation (new and delete),exception handling, Function Overloading, Operator Overloading, Generic Programming- Function and class templates, Inheritance basics, base and derived classes, inheritance types, base class access control, runtime polymorphism using virtual functions, abstract classes, streams I/O, Algorithms, performance analysis-time complexity and space complexity,O-notation, Omega notation and Theta notation, Review of basic data structures - he list ADT, stack ADT, queue ADT, implementation using template classes in C++, sparse matrix representation, Deletion and searching, hash table representation, hash functions, collision resolution-separate chaining, open addressing-linear probing, quadratic probing, double hashing, rehashing, extendible hashing, comparison of hashing and skip lists. Priority Queues, External Sorting, Balanced search trees, Red –Black trees and Splay Trees, B-Tree of order m, Divide and Conquer methods, General method (Greedy), Minimum cost spanning trees, Job sequencing with deadlines, General method (Dynamic Programming),Optimal binary search trees, 0/1 knapsack problem, Ordering Matrix Multiplications

TEXT & REFERENCE BOOKS:
1. Data Structures and Algorithm Analysis in C++, Mark Allen Weiss, Pearson Education, second edition.
2. Data structures, Algorithms and Applications in C++,S.Sahni,University press (India) pvt ltd, 2nd edition, Orient Longman pvt.ltd.
3. Data structures and Algorithms in C++, Michael T.Goodrich, R.Tamassia and D.Mount, Seventh Edition Wiley student edition, John Wiley and Sons.

PMIT-6231: Advanced Web Technologies

Introduction to advanced web technology, XML processing, RDF processing, Taxonomies and ontologies for advanced web applications, Ontology modeling, Languages for representing ontologies on the web, Rules and inferences, Web services, Design and modelling of web services, Technologies for implementing web services, Current applications of advanced web technologies;Basics of the World Wide Web, Hypertext MarkUp Language I, Hypertext MarkUp Language II, Cascading Style Sheets (CSS), XML - eXtensible MarkUp Language, XML - eXtensible MarkUp Language II, Document Object

Model (DOM), HTTP Protocol, Web Servers, Web Performance, Forms and CGI (Common GateWay Interface), CGI Scripts and Perl, Client-Side Programming – JavaScript, Client-Side Programming - JavaScript II, Server-Side Programming: Java Servlets and Java Server Pages, AJAX Programming, *XML Technologies*: XSL, XML Schemas, Web Services, SOAP, Search Engines and Google, The Web and Security.

TEXT & REFERENCE BOOKS:
1. Grigoris Antoniou and Frank van Harmelen, "Semantic Web Primer", MIT Press
2. Web Technologies: Concepts, Methodologies, Tools, and Applications by Arthur Tatnall, vol: 1-4, 2009
3. Web Technologies by Uttam Kumar Roy, Oxford University Press, Nov 1, 2010.

PMIT-6232: Web securities

Elements of Information and Web Security, Legal, Ethical, and Professional Issues in Information Security: Security and its history, NSTISSC Security Model, Information system components, Balancing security with access, Security implementation, System and Security, Development Life Cycles, Law and Ethics, Ethics and Codes of Ethics, *Need for Security:* Business needs, Threats, Attacks, Top ten security vulnerabilities, Secure software development. *Risk Management:* Risk identification, Quantitative and qualitative risk control, Risk assessment, Risk control strategies and selection. *Security Planning:* Security policy, standards and practices, Information security blueprint, Security education, training and awareness, Continuity strategies, *Security Technology:* Firewalls and VPN, and Intrusion Detection and Access Control, *Physical design:* Firewalls, Protecting remote connections, Intrusion detection and prevention systems, Honey pots, honey nets and padded cell systems, Scanning and analysis tools, access control devices. *Cryptography:* Cryptography Foundations, Cipher methods, Cryptographic algorithms, tools and Protocols for secure communications. *Physical Security and Implementing Information Security and Security and Personnel, and Information Security Maintenance:* Positioning and staffing, Information security professional credentials, Employment policies and practices, Security for nonemployees, Internal control strategies, Privacy and security of personnel data, Security management models, Maintenance model, Digital forensics.

TEXT & REFERENCE BOOKS:
1. Principles of Information Security, Michael E. Whitman (Author), Herbert J. Mattor
2. Web Security by Amrit Tiwana, 2nd edition
3. Web Security, Privacy and Commerce By Simson Garfinkel, Gene Spafford, 2nd edition

PMIT-6233: E-Commerce

Overview of E-Commerce, B2C Individuals Online, B2C E-Commerce, B2C E-Commerce, Personalization & Customization, Online Communities, The New Economy - Economics of the Web, E-Commerce Business Models - how to make money on the Internet, B2B Overview, B2B Customer Support, B2B Supply Chain Management, B2B Other, Internet Marketing Plans, Organizing & Implementing Internet Marketing Plans, Traffic, Brand Building & IMC, Traffic, Brand Building & IMC, Pricing, Privacy, Security, Legal and

Taxation Issues, Privacy, Security, Legal and Taxation Issues, Globalization of E-Commerce, Careers, Future Prospects & Personal Web Sites, Careers and Future Prospects.

TEXT & REFERENCE BOOKS:
1. Principles of Internet Marketing by Ward Hanson, SouthWestern Publishing, 2000
2. E-Commerce By J. Botha, revised edition, 2004
3. E-Commerce By Pankaj, 1st edition, 2010