Appendix - B

GONDWANA UNIVERSITY, GADCHIROLI

Two Years Post Graduate Degree Program in the Faculty of Engineering and Technology
Course and Examination Scheme with Credit Grade System (2012-13)
I - Semester M. Tech. (Computer Science and Engineering)

Course Code	Course Title	Teaching Scheme				Examination Scheme									
		Hours per week				Theory Course						Laboratory Course			
		L	T	P	No. of Credits	Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks Internal Assessment MSE	Max. Marks Internal Assessment IE	Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks
906	Advanced Computer Architecture	3	1	0	4	3	70	10	20	100	50	--	--	--	--
907	Advances in Operating System Design	3	1	0	4	3	70	10	20	100	50	--	--	--	--
908	Object Oriented Software Engineering	3	1	0	4	3	70	10	20	100	50	--	--	--	--
909	Elective-I 1. Client-Server Computing 2. Dataware housing and Data Mining 3. Neural Network & Fuzzy System 4. Wireless Communication & Networks 5. Soft Computing	3	1	0	4	3	70	10	20	100	50	--	--	--	--
	Laboratory														
910	Computer System-I	0	0	4	4	--	--	--	--	--	--	50	50	100	50
	Total	**12**	**4**	**4**	**20**	**--**	**--**			**400**	**--**	**--**	**--**	**100**	**--**
	Semester Total				**20**	**500**									

Appendix - B

Two Years Post Graduate Degree Program in the Faculty of Engineering and Technology
Course and Examination Scheme with Credit Grade System (2012-13)

II - Semester M. Tech. (Computer Science and Engineering)

Course Code	Course Title	Teaching Scheme				Examination Scheme									
		Hours per week			No. of Credits	Theory Course						Laboratory Course			
		L	T	P		Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks Internal Assessment MSE	Max. Marks Internal Assessment IE	Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks
1006	Advances in Algorithms	3	1	0	4	3	70	10	20	100	50	--	--	--	--
1007	Advanced Databases	3	1	0	4	3	70	10	20	100	50	--	--	--	--
1008	Advanced Digital Image Processing	3	1	0	4	3	70	10	20	100	50	--	--	--	--
1009	Elective - II 1. Pattern Recognition 2. Real Time Operating System 3. Cloud Computing 4. Network Security & Cryptography	3	1	0	4	3	70	10	20	100	50	--	--	--	--
Laboratory															
1010	Computer System -II	0	0	4	4	--	--	--	--	--	--	50	50	100	50
	Total	**12**	**4**	**4**	**20**	**--**	**--**			**400**	**--**	**--**	**--**	**100**	**--**
	Semester Total				**20**	**500**									

Appendix - B

Two Years Post Graduate Degree Program in the Faculty of Engineering and Technology
Course and Examination Scheme with Credit Grade System (2012-13)

III - Semester M. Tech. (Computer Science and Engineering)

Course Code	Course Title	Teaching Scheme				Examination Scheme									
		Hours per week			No. of Credits	Theory Course						Laboratory Course			
		L	T	P		Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks Internal Assessment MSE	Max. Marks Internal Assessment IE	Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks
1104	Self Study -I	0	4	0	4	3	70	10	20	100	50	--	--	--	--
1105	Negotiated Studies	0	4	0	4	--	--	--	100	100	50	--	--	--	--
1106	Grand Seminar	0	4	0	4	--	--	--	100	100	50	--	--	--	--
Laboratory															
1107	Pre -Dissertation	0	0	8	8	--	--	--	--	--	--	200	-	200	100
Total		**0**	**12**	**8**	**20**	**--**	**--**	**--**	**--**	**300**	**--**	**--**	**--**	**200**	**--**
Semester Total					**20**	**500**									

IV - Semester M. Tech. (Computer Science and Engineering)

Course Code	Course Title	Teaching Scheme				Examination Scheme									
		Hours per week			No. of Credits	Theory Course						Laboratory Course			
		L	T	P		Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks Internal Assessment MSE	Max. Marks Internal Assessment IE	Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks
Laboratory															
1202	Final Dissertation	0	0	20	20	--	--	--	--	--	--	250	250	500	250
Total		**0**	**0**	**20**	**20**	**--**	**--**	--	--	--	**--**	**250**	**250**	**500**	**--**
Semester Total					**20**	**500**									

GONDWANA UNIVERSITY, GADCHIROLI

Name of the Program: **I Semester M. Tech. (Computer Science & Engineering)**
Course Code: **906**
Course Title: **Advanced Computer Architecture**

Course Scheme					Examination Scheme				
Lecture	Tutorial	Practical	Periods per week	Credits	Duration of Paper, Hrs	MSE	IE	ESE	Total
04	-	-	04	04	03	10	20	70	100

Contents

Fundamentals of Computer design- Technology trends- cost- measuring and reporting performance quantitative principles of computer design

Instruction set principles and examples- classifying instruction set- memory addressing- type and size of operands- addressing modes for signal processing-operations in the instruction set instructions for control flow- encoding an instruction set.- the role of compiler

Instruction level parallelism (ILP) - over coming data hazards- reducing branch costs –high performance instruction delivery- hardware based speculation- limitation of ILP

ILP software approach- compiler techniques- static branch protection- VLIW approach- H.W support for more ILP at compile time- H.W verses S.W solutions

Memory hierarchy design- cache performance- reducing cache misses penalty and miss rate – virtual memory- protection and examples of VM.

Multiprocessors and thread level parallelism- symmetric shared memory architectures- distributed shared memory- Synchronization- multi threading.

Storage systems- Types – Buses - RAID- errors and failures- bench marking a storage device designing a I/O system.

Inter connection networks and clusters- interconnection network media – practical issues in interconnecting networks- examples – clusters- designing a cluster

Text Book:

1. Computer Architecture - A quantitative approach, 3rd edition John, L. Hennessy & David A. Patterson Morgan Kufmann (An Imprint of Elsevier)

References:

1. "Computer Architecture and parallel Processing" by Kai Hwang and A.Briggs, International Edition, McGraw-Hill.
2. Advanced Computer Architectures, by Dezso Sima, Terence Fountain, Peter Kacsuk, Pearson Publications.

Name of the Program: **I Semester M. Tech. (Computer Science & Engineering)**
Course Code: **907**
Course Title: **Advances in Operating System Design**

Course Scheme					Examination Scheme				
Lecture	Tutorial	Practical	Periods per week	Credits	Duration of Paper, Hrs	MSE	IE	ESE	Total
04	-	-	04	04	03	10	20	70	100

Contents
Theory and implementation aspects of distribute operating system. Process synchronization in multiprocessing / multiprogramming system. Inter-process communication and co-ordination in large distributed systems. Distributed resource management. Fundamentals of real time operating systems. Case studies, Information management in distributed systems, security, integrity and concurrency problems. Fault tolerance issues. OS issue, related to the internet, intranets, pervasive computing, embedded systems, mobile systems and wireless networks. Case studies of contemporary operating systems.

References:

1. Advanced Concepts in Operating Systems by Mukesh Singhal and Niranjan G. Shivratri, A McGraw Hill Publications.
2. Charles Crowley, "Operating Systems - A Design Oriented approach", McGraw Hill 1997.

Name of the Program: **I Semester M. Tech. (Computer Science & Engineering)**
Course Code: **908**
Course Title: **Object Oriented Software Engineering**

Course Scheme					Examination Scheme				
Lecture	Tutorial	Practical	Periods per week	Credits	Duration of Paper, Hrs	MSE	IE	ESE	Total
04	-	-	04	04	03	10	20	70	100

Contents
Introduction to Software Engineering: Software Engineering Development, Software Life Cycle Models, Standards for developing life cycle models. Object Methodologies and Requirement Elicitation: Introduction to Object Oriented Methodology, Overview of Requirements Elicitation, Requirements Model-Action & Use cases, Requirements Elicitation Activities, Managing Requirements Elicitation. Architecture: Introduction, System development is model building, model architecture, requirements model, analysis model, the design model, the implementation model, test model. Modeling with UML, Basic building blocks of UML, a conceptual model of UML, basic structural modeling, UML- diagrams System Analysis and Design: Analysis model- dynamic modeling and testing-system design: design concepts and activities- Design models-Block design-Testing. Testing Object Oriented Systems: Introduction-Testing activities and techniques, The testing process-Managing Testing-State based Testing and Data Flow Testing for Classes-Case Studies.

References:

1. Stephen R. Scach "Classical and Object Oriented Software Engineering. With UML and Java", 4th edition, Tata McGraw Hill, 2001.
2. Ivar Jacobson and Magnus Christenson "Object Oriented Software Engineering: A use case driven approach", Addison Wesley 1992.
3. Bernd Bruegge and Alen H. Dutoit, "Object Oriented Software Engineering", 2nd edition Pearson Education 2004.
4. Timothy C. Lethbrige and Robert Laganiere, "Object Oriented Software Engineering: Practical Software Development using UML and Java", Tata McGraw Hill 2004.

Name of the Program: **I Semester M. Tech. (Computer Science & Engineering)**
Course Code: **909**
Course Title: **Client-Server Computing (Elective I)**

Course Scheme					Examination Scheme				
Lecture	Tutorial	Practical	Periods per week	Credits	Duration of Paper, Hrs	MSE	IE	ESE	Total
04	-	-	04	04	03	10	20	70	100

CONTENTS

Introduction To Client/Server

Necessity for Client/Server computing – Components of Client/Server – Benefits of Client/Server - Client/Server models – Planning for Client/Server – Technical planning.

Migrating To Client/Server

Impact of Client/Server – Hardware – Technology – Software – Database management system – Data warehousing.

Networking

The basics – System and Network management – middleware – communication – essential techniques.

Case Tools

Using CASE Tools – Benefits of CASE – Other functions – Workflow – Database Design – Object Oriented Development.

Application Development

Events – Domain – Application Models – GUI Development – Upgrading to Client/Server – Performance tuning and Optimization.

References:

1. Jenkins et al., "Client/Server Unleased" Techmedia, SAMS Publishing 2001
2. Roger Fournier, A Methodology for Client/Server and Web Application Development, Prentice Hall 1999.
3. David Ruble, Practical Analysis & Design for Client/Server & GUI Systems, Prentice Hall 1997.

Name of the Program: **I Semester M. Tech. (Computer Science & Engineering)**
Course Code: **909**
Course Title: **Data ware Housing & Data Mining (Elective I)**

Course Scheme					Examination Scheme				
Lecture	Tutorial	Practical	Periods per week	Credits	Duration of Paper, Hrs	MSE	IE	ESE	Total
04	-	-	04	04	03	10	20	70	100

Contents

Data Mining & Data Warehousing : Introduction to data mining, data Warehousing , Introduction to KDD process, Classifications and algorithms, Data mining tasks, Machine Learning- Basic-Concept, Data Warehouse Architecture , Data modeling.

Data marts & olap: Data Mart Designing, data mart builder, Data Mart Discovery, On-line analytical processing, OLTP VS. DW Environment.

Relationship of data mining and data warehousing : Application of Data Mining, Application of Data Ware

housing, A relation between Data Mining and Data Warehousing according to need of business.

Statistical analysis and cluster analysis: What is statistics? Difference between statistics and data mining, Histograms, Statistic for predictions, clustering for clarity, Hierarchical and Non-Hierarchical clusters, Choosing classics.

Neural networks & mining complex: What are neural Networks? Where to use these Networks?
Benefits and features of Networks, Rule Induction, various mining complexities.

Next generation of informatics mining & knowledge discovery: Business Intelligence and Information Mining, Text mining, Knowledge Management, Benefits and Products of Text Mining, Customer Relationship Management in the e-Business World.

Books and References:

1. Data Mining by Pieter Adriaans
2. Data mining Technology for Marketing, Sales and Customer Support By Michel Berry.
3. Data Warehousing & Data Mining for Telecommunication By Rob Maltison
4. Distributed Data Warehousing using Web Technology By R. A. Moeller.
5. Building Data Mining Application for CRM By Alex Berson

Name of the Program: **I Semester M. Tech. (Computer Science & Engineering)**
Course Code: **909**
Course Title: **Neural Network & Fuzzy System (Elective I)**

Course Scheme					Examination Scheme				
Lecture	Tutorial	Practical	Periods per week	Credits	Duration of Paper, Hrs	MSE	IE	ESE	Total
04	-	-	04	04	03	10	20	70	100

Contents

Introduction to Biological Neural Networks: Neuron physiology, Neuronal diversity, specification of the brain, the eye's Neural Network.
Artificial Neural Network Concepts: Neural attributes, Modeling learning in ANN, characteristics of ANN, ANN topologies, learning algorithm, the stability-plasticity dilemma.
Neural Network Paradigm: MeCulloch-Pitts, Model, the perception, Winner-Take-All learning Algorithm, Back-propagation learning algorithm. Adaptive Resonance (ART) paradigm, Hopfield Model, Competitive learning Model \, Memory-type Paradigm, Linear Associative Memory, Real-Time Models, LVQ, SOM, Probabilistic Neural Network.
Introduction to Fuzzy sets: Fuzzy set theory Vs Probability Theory, classical set theory, properties of Fuzzy sets, Operation on Fuzzy sets. Fuzzy relations, Operations of Fuzzy relation, the extension principle.
Fuzzy Arithmatic, Approximate reasoning: Introduction, linguistic variables, Fuzzy proposition, Fuzzy if-then rules.
Representing a set Rules: Mamdani Versus Godel, properties of a set of Rules.
Fuzzy Knowledge base Control, Fuzzy Networks, Applications of Fuzzy logic & Neural Networks, Fuzzy Neural Networks.

Text Books:

1. Introduction to Artificial Neural Systems - J.M.Zurada, Jaico Publishers
2. Artificial Neural Networks - Dr. B. Yagananarayana, 1999, PHI, New Delhi

References:

1. Elements of Artificial Neural Networks - Kishan Mehrotra, Chelkuri K. Mohan, Sanjay Ranka, Penram International Publications.
2. Artificial Neural Network – Simon Haykin, 2nd ed., Pearson Education

3.Introduction to Neural Networks Using MATLAB 6.0 - S.N. Shivanandam, S. Sumati, S. N. Deepa, TMH, New Delhi.
4. Fundamentals of Neural Networks by Laurene Fausett.

Name of the Program: **I Semester M. Tech. (Computer Science & Engineering)**
Course Code: **909**
Course Title: **Wireless Communication & Networks (Elective I)**

Course Scheme					Examination Scheme				
Lecture	Tutorial	Practical	Periods per week	Credits	Duration of Paper, Hrs	MSE	IE	ESE	Total
04	-	-	04	04	03	10	20	70	100

Contents

Wireless Communications & System Fundamentals: Introduction to wireless communications systems, examples, comparisons & trends. Cellular concepts of frequency reuse, strategies, interference & system capacity, trucking & grade of service, improving coverage & capacity in cellular systems.

Multiple Access Techniques For Wireless Communication:
FDMA, TDMA, SSMA (FHMA/CDMA/Hybrid techniques), SDMA technique (AS applicable to wireless communications).Packet radio access-protocols, CSMA protocols ,reservation protocols ,capture effect in packet radio , capacity of cellular systems .

Wireless Networking: Introduction, differences in wireless & fixed telephone networks, traffic routing in wireless networks –circuit switching, packet switching X.25 protocol.

Wireless data services – cellular digital packet data (CDPD), advanced radio data information systems, RAM mobile data (RMD). Common channel signaling (CCS), ISDN-Broad band ISDN & ATM, Signaling System no 7(SS7)-protocols, network services part, user part, signaling traffic, services & performance.

Mobile IP and Wireless Application Protocol: Mobile IP Operation of mobile IP, Co-located address, Registration, Tunneling, WAP Architecture, overview, WML scripts, WAP service, WAP session protocol, wireless transaction, Wireless datagram protocol.

Wireless Lan Technology: Infrared LANs, Spread spectrum LANs, Narrow bank microwave LANs, IEEE 802 protocol Architecture, IEEE802 architecture and services, 802.11 medium access control, 802.11 physical layer.

Blue Tooth: Overview, Radio specification, Base band specification, Links manager specification, Logical link control and adaptation protocol. Introduction to WLL Technology.

Text books:
1. Wireless Communication and Networking – William Stallings, PHI, 2003.
2. Wireless Communications, Principles, Practice – Theodore, S. Rappaport, PHI, 2nd Edn., 2002.
3. Principles of Wireless Networks – Kaveh Pah Laven and P. Krishna Murthy, Pearson
4. Wireless Communication Networks, By Vijay Garg, Professor, ECE, Uni. Of Illinois, Chicago, USA, Elsevier publications, Education, 2002.
Reference:
1. Wireless Digital Communications – Kamilo Feher, PHI, 1999

Name of the Program: **I Semester M. Tech. (Computer Science & Engineering)**
Course Code: **909**
Course Title: **Soft Computing (Elective I)**

Course Scheme					Examination Scheme				
Lecture	Tutorial	Practical	Periods per week	Credits	Duration of Paper, Hrs	MSE	IE	ESE	Total
04	-	-	04	04	03	10	20	70	100

Contents
Artificial Neural Networks Basic concepts - Single layer perception - Multilayer Perception - Supervised and Unsupervised learning - Back propagation networks - Kohnen's self organizing networks - Hopfield network.. **Fuzzy Systems** Fuzzy sets and Fuzzy reasoning - Fuzzy matrices - Fuzzy functions - Decomposition - Fuzzy automata and languages - Fuzzy control methods - Fuzzy decision making. **Neuro - Fuzzy Modeling** Adaptive networks based Fuzzy interface systems - Classification and Regression Trees - Data clustering algorithms - Rule based structure identification - Neuro-Fuzzy controls - Simulated annealing Evolutionary computation. **Genetic Algorithms** Survival of the Fittest - Fitness Computations - Cross over - Mutation -Reproduction - Rank method - Rankspace method **Soft computing and Conventional AI** AI search algorithm - Predicate calculus - Rules of interference – Semantic networks - Frames - Objects - Hybrid models - Applications.

References

1. Jang J.S.R., Sun C.T. and Mizutani E, "Neuro - Fuzzy and Soft computing", Pearson Education 2003.
2. Timothy J.Ross, "Fuzzy Logic with Engineering Applications", McGraw Hill, 1997.
3. Laurene Fausett, "Fundamentals of Neural Networks", Pearson Education, 2003.
4. George J. Klir and Bo Yuan, "Fuzzy sets and Fuzzy Logic", Prentice Hall, USA 1995.
5. Nih J.Nelsson, "Artificial Intelligence - A New Synthesis", Harcourt Asia Ltd., 1998.
6. D.E. Goldberg, "Genetic Algorithms: Search, Optimization and Machine Learning", Addison Wesley,N.Y, 1989.

Name of the Program: **I Semester M. Tech. (Computer Science & Engineering)**
Course Code: **910**
Course Title: **Computer System – I Lab.**

Course Scheme					Examination Scheme		
Lecture	Tutorial	Practical	Periods per week	Credits	TW	POE	Total
-	-	04	04	04	50	50	100

Contents
Student is expected to perform at least eight Experiments/Practical's based on the prescribed syllabus of all the theory courses of first semester.

Name of the Program: **II Semester M. Tech. (Computer Science & Engineering)**
Course Code: **1006**
Course Title: **Advances in Algorithms**

Course Scheme					Examination Scheme				
Lecture	Tutorial	Practical	Periods per week	Credits	Duration of Paper, Hrs	MSE	IE	ESE	Total
04	-	-	04	04	03	10	20	70	100

Contents
Algorithmic paradigms: Dynamic Programming, Greedy, Branch-and-Bound, Asymptotic complexity, Amortized analysis, Graph Algorithms, Shortest paths, Flow networks, NP-completeness, Approximation algorithms, Randomized algorithms, Linear programming, Special topics, Geometric algorithms (range searching, convex hulls, segment intersections, closest pairs), Numerical algorithms (integer, matrix and polynomial multiplication, FFT, extended Euclid's algorithm, modular exponentiation, primarily testing, cryptographic computations), Internet algorithms (text pattern matching, tries, information retrieval, data compression, Web caching).

References:

1. Introduction to Algorithms by Thomas H Coremen, Charles E Leiserson, Ronald L Rivest and Clifford Stein, Second edition, PHI, 2002.
2. Algorithm Design by Jon Kleinberg, Tremblay and Eva Tardos, Addison Wesley.

Name of the Program: **II Semester M. Tech. (Computer Science & Engineering)**
Course Code: **1007**
Course Title: **Advanced Databases**

Course Scheme					Examination Scheme				
Lecture	Tutorial	Practical	Periods per week	Credits	Duration of Paper, Hrs	MSE	IE	ESE	Total
04	-	-	04	04	03	10	20	70	100

Contents
Database Management: Relational Data Model – SQL – Database Design – Entity Relationship Model – Relational Normalization – Embedded SQL – Dynamic SQL – JDBC – ODBC. **Advanced Databases**: Object Databases – Conceptual Object Data Model – XML and Web Data – XML Schema – Distributed Data bases – OLAP and Data Mining – ROLAP and MOLAP **Query And Transaction Processing:** Query Processing Basics – Heuristic Optimization – Cost Size Estimation – Models of Transactions– Architecture – Transaction Processing in a Centralized and Distributed System – TP Monitor. **Implementing And Isolation**: Schedules – Concurrency Control – Objects and Semantic Commutativity – Locking – Crash –Abort and Media Failure – Recovery – Atomic Termination – Distributed Deadlock – Global Serialization – Replicated Databases – Distributed Transactions in Real World. **Database Design Issues**: Security – Encryption – Digital Signatures – Authorization – Authenticated RPC – Integrity –Consistency – Database Tuning – Optimization and Research Issues.

Text Books:

1. Philip M. Lewis, Arthur Bernstein, Michael Kifer, "Databases and Transaction
2. Processing An Application Oriented Approach", Addison, Wesley, 2002.

References:

1. R.Elmasri and S.B. Navathe, "Fundamentals of Database Systems", 3rd Edition,Addison Wesley, 2004.
2. Abraham Silberschatz, Henry F. Korth, S. Sudharsan, "Database System Concepts", 4th Edition., Tata McGraw Hill, 2004.
3. Raghu Ramakrishnan & Johannes Gehrke, "Database Management Systems", 3rd Edition, TMH, 2003.

Name of the Program: **II Semester M. Tech. (Computer Science & Engineering)**
Course Code: **1008**
Course Title: **Advanced Digital Image Processing**

Course Scheme					Examination Scheme				
Lecture	Tutorial	Practical	Periods per week	Credits	Duration of Paper, Hrs	MSE	IE	ESE	Total
04	-	-	04	04	03	10	20	70	100

Contents

Image Enhancement in the Spatial Domain: Spatial and Frequency methods, Basic Gray Level Transformations, Histogram Equalization, Histogram Processing, Local Enhancement, Image Subtraction, Image Averaging, Basics of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters.

Transforms: Introduction to the Fourier, Transformation, Discrete Fourier Transformation, Fast Fourier Transformation, Fourier Properties, 2D FT, inverse Fourier transform, Wavelet transform and multi resolution processing.

Image Enhancement in the frequency Domain: Filtering in the Frequency Domain, Correspondence between Filtering in the Spatial and Frequency Domain, Smoothing Frequency-Domain Filters, Sharpening Frequency-Domain Filters, Homomorphic Filtering, Implementation.

Image Compression: Image compression models, lossy & loss less compression, image compression standards.

Image Restoration, Color Image Processing,

Morphological Image Processing: Preliminaries, Dilation and Erosion, Opening and Closing, hit-or-miss Transformation, Some Basic Morphological Algorithms, Extension to Gray-Scale Images.

Image Segmentation: Point Detection, Line Detection, Edge Detection, Gradient Operator, Edge Linking and Boundary Detection, Thresholding, Region-oriented Segmentation.

Representation: Chain Codes, Polygonal Approximations, Signatures, Boundary Segments, Skeleton of a Region.

Description: Boundary Descriptors, Shape Numbers, Fourier Descriptors, Regional Descriptors, Simple Descriptors, Topological Descriptors.

Object Recognition: Recognition based on decision theoretical methods, structural methods.

Reference Books:

1. Rafael C. Gonzalez and Richard E. Woods, "Digital Image Processing", 2nd edition, Prentice Hall, 2002.
1. A K Jain , " Fundamentals of Digital Image Processing", Prentice Hall.
2. W K Pratt , "Digital Image Processing" 3rd Edition , John Wiley and Sons, New York
3. Chanda , Mazumdar , " Digital Image Processing" , Prentice Hall, India.

Name of the Program: **II Semester M. Tech. (Computer Science & Engineering)**
Course Code: **1009**
Course Title: **Pattern Recognition (Elective II)**

Course Scheme					Examination Scheme				
Lecture	Tutorial	Practical	Periods per week	Credits	Duration of Paper, Hrs	MSE	IE	ESE	Total
04	-	-	04	04	03	10	20	70	100

Contents

Introduction : Examples; The nature of statistical pattern recognition; Three learning paradigms; The sub-problems of pattern recognition; The basic structure of a pattern recognition system; Comparing classifiers.

Learning – Parametric Approaches: Basic statistical issues; Sources of classification error; Bias and variance; Three approaches to classification: density estimation, regression and discriminant analysis; Empirical error criteria; Optimization methods; Failure of MLE.

Parametric Discriminant Functions: Linear and quadratic discriminants; Shrinkage; Logistic Classification; Generalized Liner classifiers; Perceptrons; Maximum Margin, Error Correcting Codes.

Error Assessment: Sample error and true error; Error rate estimation; Confidence intervals, Resampling methods; Regularization; Model selection, Minimum description length; Comparing classifiers.

Nonparametric Classification; Histograms rules; Nearest neighbor method, Kernel approaches, Local polynomial fitting; Flexible metrics, Automatic Kernels methods.

Feature Extraction: Optimal features; Optimal liner transformations; Liner and nonlinear principal components; Feature subset selection.

References

1. Pattern Recognition principles by Julus T. Tou and Rafel C. Gonzalez, Addision –Wesley Publishing Company.
2. Pattern Recognition and Image Analysis by Earl Gose, Richard Johnsonbaugh, Prentice Hall of India Private Limited, 1999.

Name of the Program: **II Semester M. Tech. (Computer Science & Engineering)**
Course Code: **1009**
Course Title: **Real Time Operating System (Elective II)**

Course Scheme					Examination Scheme				
Lecture	Tutorial	Practical	Periods per week	Credits	Duration of Paper, Hrs	MSE	IE	ESE	Total
04	-	-	04	04	03	10	20	70	100

Contents

Introduction to real time system, embedded systems and reactive systems. Hard and Soft Real Time Systems, Handing real time, Specification and Modeling, Design methods, Real Time operating systems, Validation and Verification, Real time Process and Applications, Distributed Real Time Systems.

References

1. Raj Kamal, "Embedded Systems - Architecture, Programming and Design" Tata McGraw Hill, 2006.
2. Herma K., "Real Time Systems – Design for distributed Embedded Applications", Kluwer Academic, 1997.
3. C.M. Krishna, Kang, G. Shin, "Real Time Systems", McGraw Hill, 1997.
4. Raymond J. A. Bhur, Donald L. Bailey, "An Introduction to Real Time Systems", PHI 1999.

Name of the Program: **II Semester M. Tech. (Computer Science & Engineering)**
Course Code: **1009**
Course Title: **Cloud Computing (Elective II)**

Course Scheme					Examination Scheme				
Lecture	Tutorial	Practical	Periods per week	Credits	Duration of Paper, Hrs	MSE	IE	ESE	Total
04	-	-	04	04	03	10	20	70	100

Contents

Introduction to Cloud Computing, The Evolution of Cloud Computing, Hardware Evolution, Internet Software Evolution, Server Virtualization, Web Services Deliver from the Cloud, Communication-as-a-Service, Infrastructure-as-a-Service, Monitoring-as-a-Service, Platform-as-a-Service, Software-as-a-Service, Building Cloud Network

Federation in the Cloud, Presence in the Cloud, Privacy and its Relation to Cloud-Based Information Systems, Security in the Cloud, Common Standards in the Cloud, End-User Access to the Cloud Computing

Introduction, Advancing towards a Utility Model, Evolving IT infrastructure, Evolving Software Applications, Continuum of Utilities, Standards and Working Groups, Standards Bodies and Working Groups, Service Oriented Architecture, Business Process Execution Language, Interoperability Standards for Data Center Management, Utility Computing Technology, Virtualization, Hyper Threading, Blade Servers, Automated Provisioning, Policy Based Automation, Application Management, Evaluating Utility Management Technology, Virtual Test and development Environment, Data Center Challenges and Solutions, Automating the Data Center

Software Utility Application Architecture, Characteristics of an SaaS, Software Utility Applications, Cost Versus Value, Software Application Services Framework, Common Enablers, Conceptual view to Reality, Business Profits, - Implementing Database Systems for Multitenant Architecture

Other Design Considerations - Design of a Web Services Metering Interface – Application Monitoring Implementation - A Design for an Update and Notification Policy - Transforming to Software as a Service - Application Transformation Program - Business Model Scenarios - Virtual Services for Organizations - The Future.

References:

1. John W. Rittinghouse and james F. Ransome, "Cloud Computing Implementation, Management and Security", 2010, CRC Press, Taylor & Francis Group, Boca Raton London New York. [Unit -11 and Unit II]
2. Alfredo Mendoza, "Utility Computing Technologies, Standards, and Strategies", Artech House INC, 2007. [Unit -11I to Unit V]
3. Bunker and Darren Thomson, "Delivering Utility Computing", 2006, John Wiley & Sons Ltd.
4. George Reese, "Cloud Application Architectures", O'reilly Publications, 2009.

Name of the Program: **II Semester M. Tech. (Computer Science & Engineering)**
Course Code: **1009**
Course Title: **Network Security & Cryptography (Elective II)**

Course Scheme					Examination Scheme				
Lecture	Tutorial	Practical	Periods per week	Credits	Duration of Paper, Hrs	MSE	IE	ESE	Total
04	-	-	04	04	03	10	20	70	100

Contents

Introduction:
Attacks, Services and Mechanisms, Security attacks, Security services, A Model for Internetwork security. Classical Techniques: Conventional Encryption model, Steganography, Classical Encryption Techniques.

Modern Techniques:
Simplified DES, Block Cipher Principles, Data Encryption standard, Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles and Modes of operations. Algorithms: Triple DES, International Data Encryption algorithm, Blowfish, RC5, CAST-128, RC2, Characteristics of Advanced Symmetric block cifers.

Conventional Encryption:
Placement of Encryption function, Traffic confidentiality, Key distribution, Random Number Generation. Public Key Cryptography: Principles, RSA Algorithm, Key Management, Diffie-Hellman Key exchange, Elliptic Curve Cryptograpy.

Number theory:
Prime and Relatively prime numbers, Modular arithmetic, Fermat's and Euler's theorems, Testing for primality, Euclid's Algorithm, the Chinese remainder theorem, Discrete logarithms. Message authentication and Hash functions: Authentication requirements and functions, Message Authentication, Hash functions, Security of Hash functions and MACs.

Hash and Mac Algorithms: MD File, Message digest Algorithm, Secure Hash Algorithm, RIPEMD-160, HMAC. Digital signatures and Authentication protocols: Digital signatures, Authentication Protocols, Digital signature standards. **Authentication Applications:** Kerberos, X.509 directory Authentication service. Electronic Mail Security: Pretty Good Privacy, S/MIME. **IP Security:** Overview, Architecture, Authentication, Encapsulating Security Payload, Combining security Associations, Key Management. Web Security: Web Security requirements, Secure sockets layer and Transport layer security, Secure Electronic Transaction.

Reference Books:

1. Embedding system building blocks, Labrosse, via CMP publishers.
2. Embedded Systems, Raj Kamal, TMH.
3. Micro Controllers, Ajay V Deshmukhi, TMH.
4. Embedded System Design, Frank Vahid, Tony Givargis, John Wiley.
5. Microcontrollers, Raj kamal, Pearson Education.

Name of the Program: **II Semester M. Tech. (Computer Science & Engineering)**
Course Code: **1010**
Course Title: **Computer System – II Lab.**

Course Scheme					Examination Scheme		
Lecture	Tutorial	Practical	Periods per week	Credits	TW	POE	Total
-	-	04	04	04	50	50	100

Contents
Student is expected to perform at least eight Experiments/Practical's based on the prescribed syllabus of all the theory courses of second semester.

Name of the Program: **III Semester M. Tech. (Computer Science & Engineering)**
Course Code: **1104**
Course Title: **Self Study**

Course Scheme					Examination Scheme				
Lecture	Tutorial	Practical	Periods per week	Credits	Duration of Paper, Hrs	MSE	IE	ESE	Total
--	04	-	04	04	03	10	20	70	100

Contents
Instruction level parallelism (ILP), over coming data hazards, reducing branch costs, high performance instruction delivery, hardware based speculation, limitation of ILP. Memory hierarchy design, cache performance, reducing cache misses penalty and miss rate, virtual memory, protection and examples of VM. Process synchronization in multi-processing / multi-programming system, Inter-process communication and co-ordination in large distributed systems. Object oriented software Architecture: Introduction, System development is model building, model architecture, requirements model, analysis model, the design model, the implementation model, test model.

References:

1. "Computer Architecture and parallel Processing" Kai Hwang and A. Briggs International Edition McGraw-Hill.
2. Advanced Concepts in Operating Systems- Mukesh Singhal and Niranjan G. Shivratri, McGraw Hill Publications.

3. Timothy C. Lethbrige and Robert Laganiere, "Object Oriented Software Engineering: Practical Software Development using UML and Java", Tata McGraw Hill 2004.

Name of the Program: **III Semester M. Tech. (Computer Science & Engineering)**
Course Code: **1105**
Course Title: **Negotiated Studies**

Course Scheme					Examination Scheme				
Lecture	Tutorial	Practical	Periods per week	Credits	Duration of Paper, Hrs	MSE	IE	ESE	Total
-	04	-	04	04	-	-	100	-	100

Contents

Student is expected to select a subject of study as per the guidelines stated below.

1. The subject should be a good published research paper from a leading National/International Journal of the relevant discipline.
2. Student should prepare a review article based on selected topic by referring research paper & should also give presentation on it.
3. Note that, the topic shall be different from the one intended for the dissertation work during Third & Fourth Semester.

The evaluation for this course will be on the basis of submitted Report, Seminar & Viva-Voce.

Name of the Program: **III Semester M. Tech. (Computer Science & Engineering)**
Course Code: **1106**
Course Title: **Grand Seminar**

Course Scheme					Examination Scheme				
Lecture	Tutorial	Practical	Periods per week	Credits	Duration of Paper, Hrs	MSE	IE	ESE	Total
--	04	-	04	04	--	--	100	--	100

Contents

- Admitted candidates are required to deliver a seminar on any topic based on all courses of Second Semester of the program
- Further that the selected topic will be other than topic/area of study selected for the Dissertation during third and fourth semester.

Name of the Program: **III Semester M. Tech. (Computer Science & Engineering)**
Course Code: **1107**
Course Title: **Pre Dissertation**

Course Scheme					Examination Scheme		
Lecture	Tutorial	Practical	Periods per week	Credits	TW	POE	Total
--	--	8	8	8	200	--	200

Contents
Student is expected to choose the topic of his dissertation. The scope of proposed study must be in the relevant discipline/area. Student is expected to carry out the following. 1. Identification of proposed Topic/Area of Study for the Dissertation 2. Literature Review related to proposed topic 3. Formulation of Scope & Methodology for the proposed study. 4. Formulation of Hypothesis for the selected study. 5. Preliminary Dissertation Student should prepare & submit a Pre-Dissertation report covering the above mentioned tasks. Evaluation will be on the basis of Brief Report on Dissertation Study undertaken on specified date at the end of semester, Seminar & Viva-Voce.

Name of the Program: **IV Semester M. Tech. (Computer Science & Engineering)**
Course Code: **1202**
Course Title: **FINAL DISSERTATION**

Course Scheme					Examination Scheme		
Lecture	Tutorial	Practical	Periods per Week	Credits	TW	POE	Total
-	-	20	20	20	250	250	500

Contents
Student is expected to carry out further work on the topic of his dissertation selected in Third Semester. For completion of the selected Dissertation study, the given student is to undertake various activities like System Analysis, System Modeling, System Design and Testing. The student has to deliver a pre-submission seminar on the specified schedule before final submission of the study report in the specified format. The student is also expected to write and register at least two research papers on his/her study undertaken in refereed journals and conferences. Evaluation for this component will be on the basis of submitted Report, Seminar & Viva-Voce.