GOVT. COLLEGE OF ENGINEERING AND CERAMIC TECHNOLOGY

DEPARTMENT OF INFORMATION TECHNOLOGY

SYLLABUS FOR MASTER OF TECHNOLOGY (M.TECH.) DEGREE

IN

INFORMATION TECHNOLOGY

1ST SEMESTER

THEORY

Sl no	Paper Code	Paper	CONTACT PERIODS / WEEK			TOTAL HOURS (hrs)	Credit
			L	T	P		
1.	PGIT 101	Advanced Engineering Mathematics	3	1		4	4
2.	PGIT 102	Advanced Computer Architecture	3	1		4	4
3.	PGIT 103	Computer Network	3	1		4	4
4. Elective I	PGIT 104A	Internet & Web Technology	3	1		4	4
	PGIT 104B	Advanced Topics in Software Engineering					
	PGIT 104C	Distributed and Parallel Algorithms					
5. Elective II	PGIT 105A	Digital Signal Processing	3	1		4	4
	PGIT 105B	Pattern Recognition					
	PGIT 105C	VLSI Design					
Total			15	05	0	20	20

SESSIONAL

Sl no	Paper Code	Paper	CONTACT PERIODS / WEEK			TOTAL HOURS (hrs)	Credit
			L	T	P		
1.	PGIT 101L	IT Lab I			3	3	2
2.	PGIT 102L	Seminar I			3	3	2
3. Elective Lab I	PGIT 104AL	Web Technology Lab					
	PGIT 104BL	Software Engineering Lab					
	PGIT 104CL	Algorithms Lab			3	3	2
Total			0	0	9	9	6
Total of Semester			15	05	09	29	26

2ND SEMESTER

THEORY

Sl no	Paper Code	Paper	CONTACT PERIODS / WEEK			TOTAL HOURS (hrs)	Credit
			L	T	P		
1.	PGIT 201	Advanced Database Management System	3	1		4	4
2.	PGIT 202	Advanced Operating System	3	1		4	4
3.	PGIT 203	Information and Coding Theory	3	1		4	4
4. Elective III	PGIT 204A	Image and video Processing	3	1		4	4
	PGIT 204B	Embedded System					
	PGIT 204C	Soft Computing					
5. Elective IV	PGIT 205A	Mobile Computing	3	1		4	4
	PGIT 205B	Wireless and Sensor Network					
	PGIT 205C	Natural Language Processing					
Total			15	05	0	20	20

SESSIONAL

Sl no	Paper Code	Paper	CONTACT PERIODS / WEEK			TOTAL HOURS (hrs)	Credit
			L	T	P		
1.	PGIT 201L	IT Lab II			3	3	2
2.	PGIT 202L	Seminar II			3	3	2
3.	PGIT 203L	Comprehensive viva-voce			-	-	4
4. Elective Lab II	PGIT 204AL	Image & video processing Lab			3	3	2
	PGIT 204BL	Embedded System Lab.					
	PGIT 204CL	Soft Computing Lab.					
Total			0	0	9	9	10
Total of Semester			15	05	09	29	30

3RD SEMESTER

THEORY

Sl no	Paper Code	Paper	CONTACT PERIODS / WEEK			TOTAL HOURS (hrs)	Credit
			L	T	P		
1.	PGIT 301	Project Management	4	0		4	4
2. Elective V	PGIT 302A	Cluster and Grid Computing	3	1		4	4
	PGIT 302B	Information & System Security	3	1		4	4
	PGIT 302C	Remote Sensing and GIS	3	1		4	4
	PGIT 302D	Data Warehousing and Data Mining	3	1		4	4
Total			07	01	0	8	8

SESSIONAL

Sl no	Paper Code	Paper	CONTACT PERIODS / WEEK			TOTAL HOURS (hrs)	Credit
			L	T	P		
1.	PGIT 301L	Dissertation (Part –I)			20	20	14
Total			0	0	20	20	14
Total of Semester			07	01	20	28	22

4th SEMESTER

SESSIONAL

Sl no	Paper Code	Paper	CONTACT PERIODS / WEEK			TOTAL HOURS (hrs)	Credit
			L	T	P		
1.	PGIT 401L	Dissertation (Part -II)			24	24	22
Total			0	0	24	24	22
Total of Semester			0	0	24	24	22

1ST SEMESTER

ADVANCED ENGINEERING MATHEMATICS (PGIT 101)
Contact: 4L
Credit: 4
Allocated Hrs: 40L

Module I: [12L]
Integral Transform:
Fourier Series and Transform: Periodic functions, Trigonometric functions, Trigonometric Series, Fourier series, Dirichlet conditions, Euler formula for Fourier coefficients, Even and Odd functions, Half range series expansion, Parseval 's formula. [4 L]
Fourier transform, Properties of Fourier transform, Fourier sine and cosine transform, Convolution theorem, First Fourier transform. [4 L]
Z- Transform: Sequence, Representation of sequence, Basic operations on sequences, Z-transforms, Properties of Z-transforms, Change of scale, Shifting property, Inverse Z-transform, Solution of difference equation , Region of convergence. [4L]

Module II: [10L]
Advanced Linear Algebra:
Vector / Linear Space: Definitions and examples, Subspace, Union and intersection of subspaces, Linear sum of two subspaces, Linear combination, independence and dependence, Linear span, Generators of vector space, Finite dimensional vector space, Replacement Theorem, Extension theorem, Statement of the result that any two bases of a finite dimensional vector space have same number of elements. Dimension of a vector space, Extraction of basis, formation of basis with special emphasis on R^n ($n \leq 3$),
Eigenvalue and eigenvectors of matrices, Caley Hamilton Theorem, Simple properties of eigenvalues and eigenvectors- for symmetric and general matrices, Diagonalisation.[10L]

Module III: [11L]
Counting Technique: Permutations, Combinations, Binomial Coefficients, Pigeon-hole principle, Principles of inclusion and exclusions. [3L]
Recurrence Relation: Formulation, modeling, of different counting problems in terms of recurrence relation, Solution of Linear recurrence relations with constant coefficients (upto second order) by 1) iterative method, 2) characteristic roots method, 3) generating functions method. [5L]
Stochastic Process: Review of probability, Random variable, Random process, Random walk, Brownian motion, Markov process. [3L]

Module IV: [7L]
Fuzzy sets: Introduction, crispness, vagueness, fuzziness, uncertainty. Basic definitions and examples, basic set theoretic operations – union, intersection, complementation and their simple properties. [3L]
Soft sets: Introduction, Definition with examples, Soft set as generalization of fuzzy set, complement, null soft set, Absolute soft set, definition of general binary operation, union, intersection, simple properties – De Morgan's law, soft point, soft function and soft inverse function, simple properties. [4L]

Suggested reading:

1) Loknath Debnath – Integral transforms and their Applications.
2) B. Chakraborty and M. K. Sen – Discrete mathematics.
3) Koshy – Discrete Mathematics and Application
4) Jyoti Medhi – Stochastic Process
5) S. K. Mapa -Abstract and Linear Algebra
6) Zimmermann - Fuzzy Set Theory
7) Soft Set Theory – P.K.Maji et. al. – Compu. Math. Appl. 45(2003) 555-562.

Advanced Computer Architecture [PGIT 102]
Contact: 4L
Credit: 4
Allocated Hrs: 36L

Module 1 [12L] :
Introduction to High Performance Computing: Overview, Pipeline vs Parallel Processing. Taxonomy of Parallel Architectures : 1) SISD, 2) SIMD, 3) MIMD, 4) MISD. Pipeline Processing : Pipeline Performance, design of arithmetic pipelines Pipeline hazards – structural hazards, data hazards, control hazards & their solutions Pipeline scheduling Theory: Greedy pipeline scheduling algorithm – Static and Dynamic Pipelining.

Module 2 [6L] :
RISC architecture, RISC VS CISC, VLIW architecture Vector and Array Processors, Super-scalar machines,Distributed computing architectures, Data flow architectures.

Module 3 [4L] :
Interfacing : Peripheral interfacing, Interfacing a microprocessor with memory and various I/O controllers.

Module 4 [6L] :
Advanced Memory Technology : SRAM, SDRAM, Flash memory, Dual port memory, Cache memory. Memory interleaving.

Module 5 [4L] :
Introduction to FPGA and Reconfigurable architecture.

Module 6 [4L] :
Case Studies: Ultra Sparc, Power PC, Intel ARM Processor and topics from the current literature as self study and presentation by the students.

Books :
[1] M. R. Bhujade, "Parallel Computing", Newage International Pvt. Ltd., 1995.
[2] Stallings William, "Computer organization and architecture, designing for performance", Prentice Hall of India, 1997
[3] J. L. Hennessy and D. A. Patterson, "Computer architecture: a quantitative approach", Harcourt Asia, Singapore 1996
[4] Hwang and Briggs, “Computer Architecture and Parallel Processing”, TMH.
[5] Hayes, “Computer Architecture and Organization”, McGraw-Hill.

References :
[1] Hwang, “Advanced Computer Architecture”, McGraw-Hill.
[2] Kain, “Advanced Computer Architecture: a system Design approach”, PHI.
[3] Flynn, “Computer Architecture”, New Age

Computer Network (PGIT 103)
Contact: 4L
Credit: 4
Allocated Hrs: 36L

Introduction [5]
Computer networks, Internetworking and the Internet, Protocol layers and services; Overview of underlying Technologies (PPP, Multiple Access, Ethernet, ATM, FDDI, ADSL).

Module I [9]

Network layer services, IP Datagram, Fragmentation, Reassembly, Addressing (Classful, CIDR, VLSM, NAT) and Routing (DVR, LS, Hierarchical, Multidestination), Interior and Exterior Routing Protocol: RIP, OSPF, BGP.

Module II [7]
Transport layer services, Connectionless and connection-oriented services, Transport Layer Protocols: UDP, TCP, TCP TAHOE, TCP Reno TCP New Reno; Congestion control: General principles, Congestion Prevention Policies, CHOKE PACKET, RED, ECN, ELN, ELN-ACK.

Module III [6]
Wireless LAN: Introduction, Infrastructure and ad-hoc Network, IEEE 802.11 System architecture, Ad-hoc network routing concepts (AODV, DSDV, DSR); Bluetooth: Architecture; Mobility in Network: Mobile IP; Mobile transport Layer: Classical TCP improvements concepts.

Module IV [4]
Network Security: Overview, TLS/SSL, IPSEC, FIREWALL, VPN, VLAN.

Module V [5]
Delay and Performance: Basic Queuing Models, Arrival Processes, Service time Queuing System, Clarification M/M/1 Queue and basic multiplexer model, Performance measures and Little's result, The M/G/1 model, Erlang Formula and M/M/c/c system priority queue.
Network Management: Network Management Overview, SNMP, Management Information Base, RMON.

References:

1. James F. Kuross, Keith W. Ross, "Computer Networking, A Top-Down Approach Featuring the Internet", Third Edition, Addison Wesley, 2004.
2. Behrouz A. Forouzan, "Data Communications and Networking", 4th Edition, Tata McGraw-Hill.
3. Behrouz A. Forouzan, "TCP/IP Protocol Suite", 2nd Edition, Tata McGraw-Hill.
4. Andrew S. Tanenbaum, "Computer Networks", Sixth Edition, 2003, PHI Learning.
5. A Leon-Garcia, Indra Widjaja, "Communication Networks" 2nd Edition, McGraw-Hill.
6. J. Schiller, "Mobile Communication" 2nd Edition, Pearson Education.

INTERNET AND WEB TECHNOLOGY (PGIT 104A)
Contact: 4L
Credit: 4
Allocated Hrs: 40L

Internet Principles [4]
Client Server Model, Internet Architecture, Protocol, Internet IP address, Domain Name, Internet Services, Email, World Wide Web, Internet Security

Javascript [4]
Introduction to Java Script, Objects in Java Script, Dynamic HTML with Java Script

XML [5]
Document, Document Type Definition, XML Schema, Document Object Model, Presenting XML, Using XML Parsers: DOM and SAX

Java Beans [4]
Introduction to Java Beans, Naming Patterns for Bean Properties, Simple Properties, Indexed Properties, Bound Properties, Constrained Properties, Bean Info Classes, JavaBeans Persistence, Customizers

Servlets [5]

Introduction to Servlets, Lifecycle of a Servlet, The Servelet API, The javax.servelet Package, Reading Servelet parameters, Reading Initialization parameters, The javax.servelet HTTP package, Handling Http Request & Responses, Cookie creation, Contents of a Cookie, Sessions, Session tracking with servlet, Security Issues

Java Server Pages [5]
The Anatomy of a JSP Page, JSP Life Cycle, JSP Architechture, JSP Elements, Directives, Action Elements, Objects, Generating Dynamic Content, Requests and Users Passing Control, Data between Pages, Sharing Session and Application Data – Memory Usage Considerations

Database Access [4]
JDBC Driver Types, JDBC Configuration, Structured Query Language, Executing SQL Statements, Query Execution, Introduction to Struts Framework

EJB [5]
EJB Architechture, Session Bean, Entity Bean, Message Driven Bean, Writing Enterprise Bean

Distributed Objects [4]
Client and Server, Stubs and Parameter Marshalling, RMI Programming Model, Parameters and Return Values in Remote Methods, Remote Object Activation, Web Services and JAX-WS

Reference Books:

1. Beginning J2EE 1.4 by K. Mukhar and L.Weaver, SPD
2. Java Server Programming for Professioals, I. Bayross and S.Shah, Shroff Publishers
3. Core Java II – Advanced Features by Horstmann and Cornell, Sun Microsystems

Advanced Topics in Software Engineering (PGIT 104B)
Contact: 4L
Credit: 4
Allocated Hrs: 36L

Module I
Overview of Information System, Business System Concept, System Development Life Cycle, SRS design, Waterfall Model, Spiral Model, Feasibility Analysis, Cost- Benefit Analysis, COCOMO model.

Module II
Fundamental issues of Software Design, Coupling & Cohesion, Top-Down and Bottom-Up design; Decision tree, decision table and structured English; Functional vs. Object- Oriented approach.

Module III
Object oriented Programming, Unified modeling language (UML), User Interface design, Software coding standards, Software Testing – Levels of Testing, Black-box & White-box testing, Test case generation, Validation & Verification, Alpha & Beta testing.

Module IV
Software quality, quality factors, Software quality assurance, Total Quality Management(TQM), Software reliability, Software availability, hazards, MTTF, MTBF; SEI CMM & ISO, PSP & Six sigma.

Module V
Software Project Management – Project Scheduling, Staffing, Software Configuration Management, Project Monitoring, Risk Management, Software maintenance, Software reuse, Client-Server Software development.

References:

1. R.G. Pressman : Software Engineering,TMH
2. Behforooz, Software Engineering Fundamentals, OUP
3. C. Ghezzi, M. Jazayeri and D. Mandrioli : Fundamentals of Software Engineering, PHI

4. I. SomerVille : Software Engineering, Pearson Education
5. Royce : Software Project Management, Pearson Education
6. P. James, Pedrycz and Witold : Software Engineering- An Engineering Approach, John Wiley
7. Humphrey : Managing the Software Process, Pearson Education

Distributed and Parallel Algorithms [PGIT 104C]
Contact: 4L
Credit: 4
Allocated Hrs: 36L

Module 1 [8L] :
Need for parallel computing : SISD, MISD, SIMD and MIMD computers. Analyzing algorithms – running time, number of processors, cost.
Selection – linear order, rank, selection, complexity, sequential algorithm, desirable properties for parallel algorithms.

Module 2 [10L] :
Merging – Network for merging, merging on the CREW model – sequential and parallel merging, merging on the EREW model.
Sorting – Network for sorting, sorting on linear array, CRCW model, CREW model and EREW model.

Module 3 [10L] :
Searching – searching a sorted sequence, EREW searching, CREW searching, CRCW searching, searching a random sequence, searching on a tree, searching on a mesh.
Matrix operation – Transposition, matrix-by-matrix multiplication, matrix by vector multiplication.

Module 4 [8L] :
Computing Fourier Transform – FFT with application, computing DFT in parallel, parallel FFT algorithm.
Bit complexity of parallel computation.

Books :

1. Design and Analysis of Parallel Algorithms –By Selim G. Akl (PHI).
2. Parallel Programming – Barry Wilkinson and Michael Allen (Pearson)
3. Introduction to Parallel Algorithms – C. Xavier, Sundarraja S. Iyengar (John Wiley & Sons)
4. Introduction to Parallel Algorithms and Architectures : Array, Trees, Hypercubes by Frank Thomson Leighton.

Digital Signal Processing (PGIT105A)
Contacts: 4L
Credits- 4
Allocated Hrs: 36L

MODULE – I:
Discrete-time signals [4L]
Concept of discrete-time signal, basic idea of sampling and reconstruction of signal, sampling theorem, sequences – periodic, energy, power, unit-sample, unit-step, unit-ramp, real & complex exponentials, arithmetic operations on sequences.
LTI Systems [6L]
Definition, representation, impulse response, derivation for the output sequence, concept of convolution, graphical, analytical and overlap-add methods to compute convolution supported with examples and exercises, properties of convolution, interconnections of LTI systems with physical interpretations, stability and causality conditions, recursive and non-recursive systems.

MODULE –II:

Z-Transform [6L]:
Definition, mapping between s-plane and z-plane, unit circle, convergence and ROC, properties of Z-transform, Z-transform on sequences with examples and exercises, characteristic families of signals along with ROCs, convolution, correlation and multiplication using Z-transform, initial value theorem, Perseval's relation, inverse Z-transform by contour integration, power series & partial-fraction expansions with examples and exercises.

Discrete Fourier Transform:[6L]
Concept and relations for DFT/IDFT, Twiddle factors and their properties, computational burden on direct DFT, DFT/IDFT as linear transformations, DFT/IDFT matrices, computation of DFT/IDFT by matrix method, multiplication of DFTs, circular convolution, computation of circular convolution by graphical, DFT/IDFT and matrix methods, linear filtering using DFT, aliasing error, filtering of long data sequences – Overlap-Save and Overlap-Add methods with examples and exercises.

Fast Fourier Transform[4L]
Radix-2 algorithm, decimation-in-time, decimation-in-frequency algorithms, signal flow graphs, Butterflies, computations in one place, bit reversal, examples for DIT & DIF FFT Butterfly computations and exercises.

MODULE – III:
Filter Design: [6L]
Basic concepts of IIR and FIR filters, difference equations, design of Butterworth IIR analog filter using impulse invariant and bilinear transforms, design of linear phase FIR filters, no. of taps, rectangular, Hamming and Blackman windows.

MODULE – IV:
Digital Signal Processor:[4L]
Elementary idea about the architecture and important instruction sets of TMS320C 5416/6713 processor, writing of small programs in Assembly Language.

TEXT BOOKS:
1. Digital Signal Processing – Principles, Algorithms and Applications, J.G.Proakis & D.G.Manolakis, Pearson Ed.
2. Digital Signal processing – A Computer Based Approach, S.K.Mitra, TMH Publishing Co.
3. Digital Signal Processing Signals, Systems and Filters, A. Antoniou, TMH Publishing Co.
4. VLSI Digital Signal Processing Systems Design and Implementation, Wiley International Publication.
5. Digital Signal Processing with Field Programmable Gate Arrays, U.Meyer-Baese, Springer.
REFERENCE BOOKS:
6. Digital Signal Processing, P. Rameshbabu, Scitech Publications (India).
7. Digital Signal Processing, S.Salivahanan, A.Vallabraj & C. Gnanapriya, TMH Publishing Co.
8. Digital Signal Processing; A Hands on Approach, C. Schuler & M.Chugani, TMH Publishing Co.
9. Digital Signal Processing, A. Nagoor Kani, TMH Education
10. Digital Signal Processing, S. Poornachandra & B. Sasikala, MH Education
11. Digital Signal Processing; Spectral Computation and Filter Design Chi-Tsong Chen, Oxford University Press
12. Texas Instruments DSP Processor user manuals and application

Pattern Recognition (PGIT 105B)
Contacts: 4L
Credits- 4
Allocated Hrs: 39

Introduction (4L)
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.

Bayes Decision Theory (7L)
General framework; Optimal decisions; Classification; Simple performance bounds.

Learning - Parametric approaches (4L)
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 (4L)
Linear and quadratic discriminants; Shrinkage; Logistic classification; Generalized linear classifiers; Perceptrons; Maximum Margin; Error Correcting Codes.

Error Assessment (4L)
Sample error and true error; Error rate estimation; Confidence intervals; Resampling methods; Regularization; Model selection; Minimum description length; Comparing classifiers.

Nonparametric Classification (4L)
Histograms rules; Nearest neighbor methods; Kernel approaches; Local polynomial fitting; Flexible metrics; Automatic kernels methods.

Feature Extraction (6L)
Optimal features; Optimal linear transformations; Linear and nonlinear principal components; Feature subset election; Feature Extraction and classification stages, Unsupervised learning and clustering, Syntactic pattern recognition, Fuzzy set Theoretic approach to PR.

Margins and Kernel Based Algorithms (3L)
Advanced algorithms based on the notions of margins and kernels.

Applications of PR (3L)
Speech and speaker recognition, Character recognition, Scene analysis.

Books:

VLSI Design (PGIT 105C)
Contacts: 3L
Credits: 3
Allotted Hours : 40L

Introduction [5L]
VLSI technology, MOS Transistor & Switches, Layout of basic devices- Inverter, NAND, NOR, Compound gates, Multiplexer, Memory-Latches & Register

VLSI Physical Design Automation [5L]
VLSI Design cycle: System specification; Design- Functional, Logic, Circuit, Physical; Fabrication, Design methodologies, Packaging; Design styles- Full custom, Standard cell, Gate arrays & Sea of gates, FPGA; Design rules.

Partitioning [5L]
Problem formulation, Approximation of hypergraphs with graphs, Kerninghan-Lin & Fiduccia- Mattheyses heuristic algorithm, Ratio cut, Simulated annealing.

Placement [5L]
Cost function, Force directed methods, Partitioning placement, Resistive network, Regular & linear placement.

Floorplanning [5L]
Problem formulation, Hierarchical approach, Rectangular dualization, Floorplan sizing, Floorplannig based on simulated annealing.

Routing [8L]
Global- Problem formulation; Fundamentals- Maze running, Line searching, Steiner trees; Lee & line probe algorithm, Hierarchical approach, Multicomodity Flow based technique, Randomized routing; Detailed- Problem formulation, Channel routing & Switchbox routing, Hierarchical approach, Greedy algorithm; Single layer- General river routing algorithm; Two layer- Left edge algorithm (Basic & Dogleg); Constraint graph- Yoshimura & Kuh algorithm; FPGA- Array & Row based.

Testing [4L]
Need for testing- Functionality & Manufacturing test; Manufacturing test principles- Stuck At, short & open circuit, Observability, controlability, Fault coverage; Automatic test pattern generation, Statistical fault analysis; Design strategies for test- Scan based, Self test, IDDQ.

VHDL[3L]
Introduction to VHDL, VHDL Terms, Describing Hardware in VHDL –Entity, Architecture, Concurrent Signal Assignment, Structural Design, Sequential Behavior, Behavioral Modeling, Generics, Data Types, Sequential Statements- IF, CASE, LOOP, EXIT, ASSERT, WAIT.

Books:
1. Principles of CMOS VLSI Design: Weste & Esraghian, PE.
2. An Introduction to VLSI Physical Design: M Sarafzadeh&C.K.Wong,TMH.
3. VLSI Design: Sujata Pandey & Manoj Pandey, Dhanpati Rai & Co.
4. A VHDL Primer: Bhasker, PE.
5. Algorithms For VLSI Physical Design Automation: Naved A. Sherwani, Kulwer Academic Publisher
6. VHDL Programming by Example: Douglas L. Pery,TMH

Practical

Sl no	Paper	Paper Code	Syllabus
1.	IT Lab. I	PGIT101L	Based on theory of Advanced Computer Architecture and Computer Network
2.	Seminar I	PGIT102L	Seminar on engineering/ research topics
3.	Elective Lab. I	PGIT104AL	Based on theory of Web Technology
		PGIT104BL	Based on theory of Software Engineering
		PGIT104CL	Based on Design and Analysis of different types of Algorithms

2ND SEMESTER

Advanced Database Management System (PGIT 201)
Contact: 4L
Credit: 4
Allocated Hrs: 40L

Module I - Transaction Concept [2L]
Transaction Concept, ACID Properties, Conflict & View Serializability, Test for Conflict Serializability

Module II - Concurrency Control [6L]
Concurrency Control, Lock base Protocols, Two phase Locking, Deadlock

Module III - Database Recovery Technique [2L]
Purpose of Database Recovery, Types of Failure, Recovery Technique, Log-Based Recovery, Checkpoints, Shadow Paging

Module IV [8L]
Distributed DBMS features and needs, Reference architecture, Different Levels of distribution transparency, replication, Distributed database design - fragmentation, allocation criteria, Global query processing -Translation of global queries, Global query optimisation.

Module V [12L]
Concurrency control mechanism – locking based protocol, distributed deadlocks, Time based and quorum based protocols their comparisons, Reliability- non-blocking commitment protocols, Partitioned networks, Checkpoints and cold starts, Heterogeneous databases-federated databases, loosely and tightly coupled systems, overview of client-server architecture and its relationship to Distributed DBMS.

Module VI [5L]
Concept of Object-Oriented Databases- Object Identity, Object structure, type Constructors, Encapsulation of Operations, Methods & Persistence, Type Hierarchies & Inheritance, and Complex Objects.

Module VII[5L]
XML Database – Introduction, role of XML, XML structure – elements & attributes, XML schema, DTD , XML parsers, Java & DOM together, XML transformations – basic concept of XSLT.

Books:
Silberschatz, Korth, Sudarshan , "Database System Concepts'', McGraw-Hill
Elmasri Ramez and Novathe Shamkanta, "Fundamentals of Database Systems", Benjamin Cummings Publishing Company
Jain, "Advanced Database Management System" ,Cyber Tech
4. Principles of Distributed Database Systems, M. Tamerozsu Patrick Valduriez, Pearson
5. Distributed databases principles & systems, Stefano Ceri & Giuseppe Pelagatti, McGraw-Hill Publication.
6. Arun K Majumdar, Pritimay Bhattacharya, "Database Management Systems" ,Tata McGraw Hill

Advanced Operating System (PGIT 202)
Contact: 4L
Credit: 4
Allocated Hrs: 40L

Process Synchronization (5L)
Concepts of processes, Concurrent processes, Threads, Overview of different classical synchronization problems, Communicating Sequential processes (CSP).

Distributed operating system (10L)
Architectures, Issues in Distributed operating systems, Limitations of Distributed Systems, Lamport's logical clock, Global states, Chandy-Lampert's global state recording algorithm, Basic concepts of Distributed Mutual Exclusion , Lamport's Algorithm, Ricart-Agrawala Algorithm; Basic concepts of Distributed deadlock detection, Distributed File system, Architecture, Design issues, SUN Network File system Basic concepts of Distributed shared memory, Basic concepts of Distributed Scheduling, Load balancing, Load Sharing.

Distributed OS Implementation (4L)
Models, Naming, Process migration, Remote Procedure Calls.

Multiprocessor System (6L)
Motivation, Classification, Multiprocessor Interconnections, Types, Multiprocessor OS functions & requirements; Design & Implementation Issue; Introduction to parallel programming; Multiprocessor Synchronization.

Basics of real-time concepts (2 L)
Terminology: RTOS concepts and definitions, real-time design issues, examples; Hardware Considerations: logic states, CPU, memory, I/O, Architectures; RTOS building blocks; Real-Time Kernel.

Process Management (6 L)
Concepts, scheduling, IPC, RPC, CPU Scheduling, scheduling criteria, scheduling algorithms, thread.

Mutex (3L)
Creating, deleting, prioritizing mutex.

Memory Management (4L)
Process stack management, swapping, overlays, Page replacement algorithms.

Books:
1) Operating Systems Concepts & design - Milan Milenkovic, TMH
2) Operating System - H.M. Deitel, Pearsons .
3) Advanced Concepts in operating Systems - Mukesh Singhal and Niranjan G. Shivaratri, TMH
4) Real-Time and Embedded Guide by Herman B.
5) Real-Time System Design and Analysis by Philips A. Laplante

Information Theory and Coding (PGIT 203)
Contact: 4L
Credit: 4
Allocated Hrs: 40L

Source Coding [8L]
Uncertainty and information, average mutual information, Entropy, Mathematical Properties of the Entropy Function, Entropy and Coding, Shannon-Fano Coding, Variable-Length Codes: Unique Decoding, Instantaneous Codes, Construction of Instantaneous Codes, The Kraft Inequality, Huffman codes.

Channel Capacity and Coding [6L]
Channel models, channel capacity, channel coding, information capacity theorem, The Shannon limit.

Error Control Coding [7]
Introduction, Matrix description of linear block codes , parity check matrix, Encoding and decoding of Linear Block-codes, Syndrome Decoding, Hamming Codes.

Cyclic Codes [6]
Polynomials, Method for generating Cyclic Codes, Matrix description of Cyclic codes, Golay codes, Reed Solomon Code.

BCH Codes [6L]
Properties of BCH codes, minimal polynomials, generator polynomials, check polynomials, examples of BCH codes.

Convolutional Codes (7L)
Introduction, Polynomial description of Convolutional Codes, Generating function, Matrix description of Convolutional Codes, Viterbi Decoding of Convolutional codes,Trellis codes, Turbo codes.

Books:
1. Information theory, coding and cryptography - Ranjan Bose; TMH.
2. Coding and Information Theory – R. W. Hamming; Prentice Hall.
3. Essentials of Error-Control Coding – Jorge C. Moreira and Patrick G Farrell; Wiley.
4. Introduction to Error Control Codes – S Gravano; Oxford.
5. Error Control Coding - Shu Lin and D J Costello Jr.; Prentice Hall.

Image and Video Processing (PGIT 204A)
Contact: 4L
Credit: 4
Allocated Hrs: 40L

Image Representation [4]
Introduction, Gray scale and Colour Images, Sampling and Quantization, Discrete Fourier transform, Walsh transform, Hadamard transform, Haar transform, Discrete Cosine Transform, Karheunen-Loeve transform, Hough transform

Image Enhancement in the Spatial Domain [6]
Some Basic Gray Level Transformations, Histogram Processing, Basics of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters, Combining Spatial Enhancement Methods

Image Enhancement in the Frequency Domain [6]
Fourier Transform and the Frequency Domain, Smoothing Frequency-Domain Filters, Sharpening Frequency Domain Filters, Homomorphic Filtering

Image Restoration [6]
A Model of the Image Degradation/Restoration Process, Noise Models, Linear, Position- Invariant Degradations, Estimating the Degradation Function, Inverse Filtering, Minimum Mean Square Error (Wiener) Filtering, Constrained Least Squares Filtering, Geometric Mean Filter

Image Segmentation [4]
Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding, Region-Based Segmentation, Segmentation by Morphological Watersheds

Image Data Compression [4]
Introduction, Pixel coding, Predictive techniques,Transform coding, Inter-frame coding, coding of two tone images, Image Compression standards.

Video Processing [10]
Fundamental Concepts in Video - Types of video signals, Analog video, Digital video, Color models in video, Video Compression Techniques - Motion compensation, Search for motion vectors, H.261, H.263, MPEG 1, MPEG 2, MPEG 4, MPEG 7 and beyond, Content based video indexing.

References:

R. C. Gonzalez and R. E. Woods, "Digital Image Processing," 2nd edition, Pearson Education (Asia) Pte. Ltd/Prentice Hall of India, 2004.
M. Tekalp, "Digital Video Processing," Prentice Hall, USA, 1995.
A. Bovik, "Handbook ofImage & Video Processing", Academic Press, 2000

Soft computing (PGIT 204C)

Contact: 4L
Credit: 4
Allocated Hrs: 40L

Introduction [2L]

Artificial Intelligence: Introduction, concepts and limitation, Definition of Soft Computing; Difference between Hard and Soft Computing, Introduction to fuzzy logic, Neural Network, Genetic Algorithm, Rough Set.
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Unit I Fuzzy Sets & Logic [8L]

Introduction to Fuzzy Systems, Fuzzy Set Theory, Fuzzy Relation, Fuzzy Logic, Approximate Reasoning, Fuzzy logic Controller, Applications.

Unit II Artificial Neural Network[10L]

ANN: NN Architectures, Learning Methods, The Perceptron Model, Backpropagation Learning, Hopfield NN and Stability Analysis, Associative Memory, Competitive Learning Methods, Adaptive resonance Theory NN; Applications.

Unit III Genetic Algorithm[6L]

Difference between Traditional Algorithms and GA, Encoding, Fitness Function, Reproduction, Cross Over, Mutation, Convergence Theory; Applications.

Unit IV Rough Sets [4L]

Indiscernibility Relations, Reducts, Rough Approximation : Applications.

Unit V Hybrid Systems [10L]

Hybrid Systems: GA based BPNN(Weight determination, Application); Neuro Fuzzy Systems—Fuzzy BPNN--fuzzy Neuron, architecture, learning, application; Fuzzy Logic controlled G.A;, Fuzzy Membership Interpretation using Rough Set theory etc.

Books:

1. Neural Networks- A Comprehensive foundation, Simon Haykin, 2nd Ed; Pearson
2. Neural Networks, Fuzzy Logic & Genetic Algorithms – Synthesis & applications, T.S. Rajasekaran & G.A. Vijaylakshmi Pai, PHI
3. Genetic Algorithm & fuzzy Logic Systems - Sanchez, Takanori, Zadeh; World Scientific
4. Genetic Algorithm, Goldberg David E.; Pearson
5. Fuzzy Set Theory & Its Applications - Zimmermann H. J.; Allied Publishers Ltd.
6. Fundamentals of Neural Networks, architectures, algorithms & applications --- Laurence Fausett; Prentice Hall, Englewood Clifts.
7. Fuzzy Sets & Fuzzy Logic, Klir & Yuan, PHI.

Mobile Computing (PGIT 205A)

Contact: 3L
Credit: 3
Allocated Hrs: 40L

Introduction [6L]: A General Overview: History of wireless communication, Multiplexing, Multiple access basics, Different generations of Cellular Telephony. AMPS, GSM, GPRS, IMT-2000, UMTS, CDM2000.

Cellular Networks [8L]: Cellular Concept, Frequency Reuse, Channel Allocation Management, Call Setup, Location Management, Cell Handoffs, Interference: Co-channel and Adjacent Interference. System Capacity, Improving Cell Capacity and Coverage: Cell Splitting, Sectoring, Repeaters and Microcell Zone Concept.

Wireless Networks [9L]: Infrastructure and ad-hoc network, IEEE 802.11: System Architecture, Protocol Architecture, Physical Layer, 802.11a and 802.11b. Media Access Techniques – ALOHA, CSMA. Bluetooth: Architecture, Radio Layer, Baseband Layer, Link Management Protocol, L2CAP and Security, Wi-Fi & WiMAX.

Mobile Network Layer [8]: Mobile IP: Introduction, IP Packet Delivery, Agent Discovery, Registration, Tunneling and Encapsulation, Optimizations and Reverse Tunneling, MIPv6. Mobile Ad-hoc Networks: Routing, Destination Sequence Distance Vector, Dynamic Source Routing and AODV, Reactive routing.

Mobile Transport Layer [5L]: Introduction, Traditional TCP: Congestion Control, Slow Start, Fast Retransmit and Implications of Mobility. Classical TCP Improvements: Indirect TCP, Snooping TCP, Mobile TCP and Fast Retransmit/fast recovery.

Wireless Application Layer & Protocol [4L]: Introduction to WAP, Architecture, WML, WTA, BREW.

Books:

1. J. Schiller, Mobile Communications, Addison –Wesley, 2003
2. T. S. Rapport, Wireless Communications, Principle and Practices
3. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, Principles of Mobile Computing, Springer, New York, 2003
4. Asoke K. Talukdar, Mobile Computing, Tata McGraw-Hill Education
5. Forouzan, Data Communications and Networking, TMH

Wireless and Sensor Network (PGIT 205B)
Contact: 4L
Credit: 4
Allocated Hrs: 40L

Wireless Network

Introduction [3L]: Systems and Design Fundamentals, Propagation Models, Description of cellular system, Frequency Reuse, Cochannel and Adjacent channel interference, Propagation Models for Wireless Networks, Models for Multipath Reception

Evolution of Modern Mobile Wireless Communication System [5L]: First Generation Wireless Networks, Second Generation (2G) Wireless Cellular Networks, Major 2G standards, *2.5G* Wireless Networks, Third Generation 3G Wireless Networks, Wireless Local Area Networks (WLANs), Cellular –WLAN Integration, All-IP Network: Vision for 4G

GSM: Architecture and Protocols [6L]: Air Interface, GSM Multiple Access Scheme, GSM Channel Organization, Traffic Channel multiframe, Control (Signaling) Channel Multiframe, Frames, Multi-frames, Super-frames and Hyper-frames, GSM Call Set up Procedure, GSM Protocols and Signaling, Location Update Procedure, Routing of a call to a Mobile Subscriber

2.5G Networks [7L]: The General Packet Radio Services: (GPRS) - GPRS Networks Architecture, GPRS Interfaces and Reference Points, GPRS Logical Channel, GPRS Mobility Management Procedures, GPRS Attachment and Detachment Procedures, Session Management and PDP Context, Data Transfer Through GPRS

Network and Rout, GPRS Location Management Procedures, GPRS Roaming, The IP Internetworking Model, GPRS Interfaces and Related Protocols, GPRS Applications Overview of CDMA systems: IS-95 Networks

Wireless Sensor Network

Sensor networks overview [2L]: introduction, applications, design issues, requirements. Sensor node architecture.
Network architecture [3L]: optimization goals, evaluation metrics, network design Principles, brief introduction to Sensor network operating systems
Network protocols [3L]: MAC protocols and energy efficiency.
Routing protocols [4L]: data centric, hierarchical, location-based, energy efficient routing etc.;
Sensor deployment, scheduling and coverage issues, self configuration and topology control.
Introduction to Querying [3L]: data collection and processing, collaborative information processing and group connectivity.
Other Issues [4L]: Target tracking, localization and identity management, Power management, Security and privacy.

Practical

Sl no	Paper	Paper Code	Syllabus
1.	IT Lab. II	PGIT 201L	Based on theory of Advanced Database System and Advanced Operating System
2.	Seminar II	PGIT 202L	Seminar on engineering/ research topics
3.	Elective Lab. II	PGIT 204AL	Based on theory of Image and Video Processing
		PGIT 204BL	Based on theory of Embedded System
		PGIT 204CL	Based on theory of Soft Computing

3rd SEMESTER

Project Management (PGIT 301)

Contact: 4L
Credit: 4

1. Introduction to Project Management

Definition of a project
Why project management?
Project life cycle
Organization structures
Converting objectives into requirements

2. Project Selection and Planning

Project selection approaches
Decision methodologies
Project evaluation techniques
Project financing

3. Project Management and Leadership

Project communications
Organizational structure
Characteristics of successful project management
Management styles, leadership and motivation

4. Project Planning and Estimating

Work breakdown structure
Scheduling techniques (precedence diagrams, PERT/CPM, Gantt and milestone charts)
Budgeting techniques (S-curve, earned value)
Resource allocation techniques (resource loading and leveling)
Decomposition of requirements into a work breakdown structure
Principles of estimating time and cost
Budgeting resources and cost control
Analyzing risks for probability and impact
Mitigating and planning risk contingencies
Preparing baselines for scope, time, and cost
Obtaining stakeholder sign-off
Ensuring that all management responsibility areas are included in the project plan

5. Project Execution and Control

Project execution
Team-building principles and priorities
Project control
Financial controls
Life cycles
Levels of responsibility for control
Integrated change control during the life of the project
Performance reporting - monitoring and control
Exceptions - technical and management
Project failures related to controls
Status and performance reporting
Keeping stakeholders informed and involved
Steering performance back to the baseline

6. Risk and Quality Management

Fundamentals of risk

Identifying risks and triggers
Risk assessment and management process
Risk Severity Matrix Approach
Risk simulation (Monte Carlo simulation)
Methods for dealing with risk and uncertainty
Risk response plan
Historic roots of quality management
Current approaches to quality
Managing project issues

7. Exercises

Formal vs. Informal Project Management
Analyze Stakeholders
Convert Vague Objectives into realistic ones
Create a Work Breakdown Structure
Estimate Effort and Duration for Work Packages
Perform Network Diagramming and Determine Critical Path
Estimate Resource Costs for Work Packages
Analyze and Plan for Risk
Manage Project Change

Reference Books:

Any standard Project Management book [many publishers - PHI, Pearson, Shroff, etc]
1. PMBOK from PMI Institute
2. IEEE STANDARD 1490-2011 - IEEE Guide--Adoption of the Project Management Institute (PMI(R)) Standard A Guide to the Project Management Body of Knowledge (PMBOK(R) Guide)--Fourth Edition [Which is the same as 1.]

CLUSTER & GRID COMPUTING (PGIT 302A)
Contact: 4L
Credit: 4
Allocated Hrs: 39L

UNIT I: Grid Computing [4L]:
Data & Computational Grids, Grid Architectures and its relations to various Distributed Technologies

UNIT II: Autonomic Computing [3L]:
Autonomic Computing, Examples of the Grid Computing Efforts (IBM)

UNIT III: Cluster Computing 1 [6L]:
Cluster setup & its Administration, Performance Models & Simulations, Networking, Protocols & I/O, Lightweight Messaging systems, Active Messages

UNIT IV: Cluster Computing 2 [6L]:
Distributed shared memory, parallel I/O Clusters, Jib and Resource management system, scheduling parallel jobs on clusters

UNIT V: Cluster Computing 3 [8L]:
Load sharing and Fault tolerance manager, parallel programming scheduling techniques, Dynamic load balancing Example Cluster System,Beowlf, COMPaS and NanOS

UNIT VI: Pervasive Computing [6L]:
Pervasive Computing concepts & Scenarios, Hardware & Software, Human - machine interface Device connectivity, Java for Pervasive devices, Application examples

UNIT VII: Cloud Computing [6L]:
History, Working of cloud computers, pros and cons of cloud computing, developing cloud services, cloud computer web based applications

TEXT BOOKS:
1. Grid Computing, J. Joseph & C. Fellenstein, PEA.
2. High performance cluster computing, Raj Kumar Buyya, PEA.
3. Pervasive computing, J.Burkhardt et .al, PEA.
R
EFERENCE BOOKS:
1. A Networking approach to Grid Computing, Minoli, Wiley

Information and System Security (PGIT302B)
Contact: 4L
Credit: 4
Allocated Hrs: 40L

Introduction (4L)

Need for security, Security approaches, Principles of security, Types of attacks, IP and web security, media security.

Unit I
Cryptographic Techniques [15L]:
Cryptography: Cipher text, Substitution & Transposition techniques, Symmetric & Asymmetric Key Cryptography , block ciphers: modes of operation, DES and its variants, RCS, IDEA, BlowFish, AES, Differential & Linear Cryptanalysis, Shannon -Fano perfect secrecy[10L]
Public key parameter: Modular arithmetic, gcd, primality testing[2L]
Public key Encryption: RSA, side channel attacks, key exchange algorithm, KDC [3L]

Unit II
Transport and IP layer security [5L]
Transport layer security (TLS): overview, architecture, SSL[2L]

IP layer security (IPSEC): overview, architecture, authentication header and security payload encapsulation. [3L]

Unit III

Internet & Web security [10 L]

Basic of authentication and encryption in internet security: Digital signature, Knapsack algorithm, Kerberos, Passwords, Authentication tokens, Certificate based & Biometric authentication, Firewall [5L].

Web security

Intrusion detection systems, Expert systems, game theoretic approaches [5L]

Unit IV

Media security [6L]

Data hiding, Steganography & Steganalysis, Digital watermarking, Visual cryptography

References:

1. Cryptography & Network Security : Principles and practices: William Stalling
2. Cryptography & Network Security: Atul Kahate, TMH

Remote Sensing and GIS (PGIT302C)

Contacts: 3L+T

Credit: 4

No. of Lectures: 40

Concepts of Remote Sensing [6]

Energy Sources and Radiation Principles, Energy Interactions with the Atmosphere and Earth Surface, Data Acquisition and Interpretation, Global Positioning System, Characteristics of Remote Sensing Systems

Photographic Imaging [5]

Aerial Photography, Film photography, Digital Photography, Multiband Imaging

Photogrammetry [5]

Geometric Characteristics of Aerial Photographs, Photographic scale, Ground Coverage of Aerial Photographs,Digital Elevation Models, Orthophotos and Planimetric Features from Soft copy Photogrammetry, Area Measurement

Thermal Remote Sensing [4]

Thermal Infrared radiation properties, Thermal Properties of Terrain, Thermal Infrared Data Collection,

Microwave Remote Sensing [4]

Radar Development, Synthetic Aperture Radar, Transmission Characteristics of Radar System, Radar Image Interpretation, Passive Microwave Sensing, Lidar

Digital Image Processing [6]

Radiometric Correction, Geometric Correction
Image Enhancement: Image Reduction and Magnification, Transects, Contrast Enhancement Spatial Filtering to Enhance Low-and High Frequency Detail and Edges Special Transformations

Thematic Information Extraction [5]

Image Classification, Supervised Classification, Unsupervised Classification, Fuzzy Classification

Geographic Information System [5]

Fundamental Geographic Information System Concepts

Books

1. Introductory Digital Image Processing: A Remote Sensing Perspective by Jensen, Prentice Hall
2. Remote Sensing of the Environment
3. Remote Sensing and Image Interpretation by Lillesand , Keifer, Chipman, Wiley

Data Warehousing and Data Mining (PGIT302D)

Contact: 3L + T
Credit: 4
Allotted Hrs: 39L

Introduction [2L] :
Data warehousing – definitions and characteristics, Multi-dimensional data model, Warehouse schema.

Data Marts [4L] :
Data marts, types of data marts, loading a data mart, metadata, data model, maintenance, nature of data, software components; external data, reference data, performance issues, monitoring requirements and security in a data mart.

Online Analytical Processing [4L] :

OLTP and OLAP systems, Data Modeling, LAP tools, State of the
market, Arbor Essbase web, Microstrategy DSS web, Brio Technology, star schema for multi dimensional view, snowflake schema; OLAP tools.

Developing a Data Warehousing [4L] :
Building of a Data Warehousing, Architectural strategies & organizational issues, design considerations, data content, distribution of data, Tools for Data Warehousing

Data Mining [4L] :
Definitions; KDD(Knowledge Discovery database) versus Data Mining; DBMS versus Data Mining, Data Mining Techniques; Issues and challenges; Applications of Data Warehousing & Data mining in Government.

Association Rules [4L] :
A priori algorithm, Partition algorithm, Dynamic inset counting algorithm, FP – tree growth algorithm; Generalized association rule.

Clustering Techniques [4L] :
Clustering paradigm, Partition algorithms, CLARA, CLARANS; Hierarchical clustering, DBSCAN, BIRCH, CURE; Categorical clustering, STIRR, ROCK, CACTUS.

Decision Trees [4L] :
Tree construction principle, Best split, Splitting indices, Splitting criteria, Decision tree construction with presorting.

Web Mining [4L] :
Web content Mining, Web structure Mining, Web usage Mining, Text Mining. Temporal and Spatial Data Mining [5L] : Basic concepts of temporal data Mining, The GSP algorithm, SPADE, SPIRIT, WUM.

Books:
1. Data Warehousing –Concepts, Techniques, products, application; Prabhu; PHI.
2. Data Mining Techniques; A. K. Pujari; Universities Press.
3. Data Warehousing, Data Mining and OLAP; Alex Berson and Stephen J Smith; TMH.
4. Data Warehousing in the real world; Anahory; Pearson Education.
5. Data Mining Introductory & Advanced Topic; Dunham; Pearson Education.

Practical

Sl no	Paper	Paper Code	Syllabus
1.	**PGIT 401L**	**Dissertation (Part –I)**	**Project proposal, Synopsis, Literature survey, Design of work plan and Power Point Presentation**