

SCHEME OF EXAMINATION

&

SYLLABI

for

B. TECH -INFORMATION TECHNOLOGY

YEAR FOURTH

(Effective from the session: 2009-2010)



Uttarakhand Technical University, Dehradun

www.uktech.in

UTTRAKHAND TECHNICAL UNIVERSITY, DEHRADUN
STUDY AND EVALUATION SCHEME
B. TECH-INFORMATION TECHNOLOGY
YEAR FOURTH, SEMESTER - VII
(Effective from the session : 2009-2010)

S.No	Course Code	Subject	PERIODS			EVALUATION SCHEME				Subject Total
						SESSIONAL EXAM			EXAM ESE	
			L	T	P	CT	TA	Total		
1	TIT-701	Cryptography & Network Security	3	1	0	30	20	50	100	150
2	TIT-702	Artificial Intelligence	3	1	0	30	20	50	100	150
3		Elective-I	3	1	0	30	20	50	100	150
4		Elective-II	3	1	0	30	20	50	100	150
5		Open Elective	3	1	0	30	20	50	100	150
Practical/Training/Project										
1	PIT-751	Cryptography & Network Security Lab	0	0	2	-	25	25	25	50
2	PIT-752	Artificial Intelligence Lab	0	0	2	-	25	25	25	50
3	PIT-753	Colloquium & Industrial Report	0	0	2	-	50	50	-	50
4	PIT-754	Project	0	0	2	-	25	25	25	50
5	GP-701	General Proficiency	-	-	-	-	50	50	-	50
Total			15	5	8					1000

Choose one Subject from Each Elective.

Code	Elective I	Code	Elective II
IT – 011	Service Oriented Computing	IT 021/CS011	Digital Image Processing
IT – 012	Software Architecture	IT 022/CS012	Network Programming & Administration
IT – 013	Client Server Based IT Solutions	IT 023	Bio-Informatics
IT – 014/CS034	Multimedia communication & System design	IT 024/CS014	Wireless Networks

UTTRAKHAND TECHNICAL UNIVERSITY, DEHRADUN
PRAPOSED STUDY AND EVALUATION SCHEME
B. TECH.INFORMATION TECHNOLOGY
YEAR FOURTH, SEMESTER - VIII
(Effective from the session : 2009-2010)

S.No	Course Code	Subject	PERIODS			EVALUATION SCHEME				Subject Total
						SESSIONAL EXAM			EXAM ESE	
			L	T	P	CT	TA	Total		
1	TCS-801	Distributed Systems	3	1	0	30	20	50	100	150
2	TIT – 801	Advance Information System Engineering	3	1	0	30	20	50	100	150
3		Elective-III	3	1	0	30	20	50	100	150
4		Elective-IV	3	1	0	30	20	50	100	150
Practical/Training/Project										
1	PCS-851	Distributed Systems Lab	0	0	2	-	25	25	25	50
2	PIT-852	Project	0	0	2	-	100	100	200	300
3	GP-801	General Proficiency	-	-	-	-	50	50	-	50
Total			12	4	2					1000

*** Choose one Subject from Each Elective.**

Code	Elective III	Code	Elective IV
IT031	IT Infrastructure Management	IT041/CS – 041	Advanced DBMS
IT032	Software Quality Engineering	IT042/CS – 042	Data Mining & Date Warehousing
IT034/ CS – 035	Pattern Reorganization	IT043/TCS8 02	Mobile Computing
IT034/ CS-036	Natural Language Processing	IT044/CS- 046	Storage Networks
IT035/CS – 031	Embedded Systems	IT045	Software Configuration Management & Implementation

(TIT 701) CRYPTOGRAPHY AND NETWORK SECURITY

Unit-I

Introduction to security attacks, services and mechanism, introduction to cryptography. Conventional Encryption: Conventional encryption model, classical encryption techniques- substitution ciphers and transposition ciphers, cryptanalysis, stereography, stream and block ciphers.

Modern Block Ciphers: Block ciphers principals, Shannon's theory of confusion and diffusion, fiestal structure, data encryption standard(DES), strength of DES, differential and linear crypt analysis of DES, block cipher modes of operations, triple DES, IDEA encryption and decryption, strength of IDEA, confidentiality using conventional encryption, traffic confidentiality, key distribution, random number generation.

Unit-II

Introduction to graph, ring and field, prime and relative prime numbers, modular arithmetic, Fermat's and Euler's theorem, primality testing, Euclid's Algorithm, Chinese Remainder theorem, discrete logarithms. Principals of public key crypto systems, RSA algorithm, security of RSA, key management, Diffle-Hellman key exchange algorithm, introductory idea of Elliptic curve cryptography, Elganel encryption.

Unit-III

Message Authentication and Hash Function: Authentication requirements, authentication functions, message authentication code, hash functions, birthday attacks, security of hash functions and MACS, MD5 message digest algorithm, Secure hash algorithm(SHA).

Digital Signatures: Digital Signatures, authentication protocols, digital signature standards (DSS), proof of digital signature algorithm.

Unit-IV

Authentication Applications: Kerberos and X.509, directory authentication service, electronic mail security-pretty good privacy (PGP), S/MIME.

Unit-V

IP Security: Architecture, Authentication header, Encapsulating security payloads, combining security associations, key management.

Web Security: Secure socket layer and transport layer security, secure electronic transaction (SET).

System Security: Intruders, Viruses and related threads, firewall design principals, trusted systems.

Books:

1. William Stallings, "Cryptography and Network Security: Principals and Practice", Prentice Hall, New Jersey.
2. Johannes A. Buchmann, "Introduction to Cryptography", Springer-Verlag.
3. B. Forouzan, "Cryptography and Network Security, TMH

(TIT 702) ARTIFICIAL INTELLIGENCE

Unit-I: Introduction

Introduction to Artificial Intelligence, Simulation of sophisticated & Intelligent Behavior in different area, problem solving in games, natural language, automated reasoning visual perception, heuristic algorithm versus solution guaranteed algorithms.

Unit-II: Understanding Natural Languages

Parsing techniques, context free and transformational grammars, transition nets, augmented transition nets, Fillmore's grammars, Shanks Conceptual Dependency, grammar free analyzers, sentence generation, and translation.

Unit-III: Knowledge Representation

First order predicate calculus, Horn Clauses, Introduction to PROLOG, Semantic Nets Partitioned Nets, Minsky frames, Case Grammar Theory, Production Rules Knowledge Base, The Inference System, Forward & Backward Deduction.

Unit-IV: Expert System

Existing Systems (DENDRAL, MYCIN), domain exploration, Meta Knowledge, Expertise Transfer, Self Explaining System.

Unit-V: Pattern Recognition

Introduction to pattern Recognition, Structured Description, Symbolic Description, Machine perception, Line Finding, Interception, Semantic, & Model, Object Identification, Speech Recognition.

Programming Language: Introduction to programming Language, LISP, PROLOG

Books:

1. Charnick "Introduction to Artificial Intelligence." Addison Wesley.
2. Rich & Knight, "Artificial Intelligence".TMH
3. Winston, "LISP", Addison Wesley.
4. Marcellous, "Expert Systems Programming", PHI.
5. Elamie." Artificial Intelligence, "Academic Press.
6. Lioyed, Foundation of Logic Programming", Springer Verlag.

(IT – 011)SERVICE ORIENTED COMPUTING

Unit – 1

Computing with services, Basic standards for web services, principles of service oriented computing

Unit – 2

Modeling and representation

Modelling to enable interoperation, Integration vs. Interoperation, Common ontologies, Knowledge representations, Elementary algebra: relations, modeling fundamentals

Resource description framework

Motivation of RDF, RDF Basics, Key Primitives, XML syntax, Storing RDF

Unit – 3 Engagement

Execution Models

Basic Interaction models, messaging, CORBA, peer to peer computing, grid computing

Coordination framework for web services

WSCL, WSCI, WS-coordination, BTP: business transaction protocol

Unit – 4 Building SOC applications

Elements of SOC design, Quality of service, create an Ontology, create a process model, design agent based systems, composed services, exception handling, e-business application

Unit – 5 Challenges and Extensions

Trust, ethics, coherence, Benevolence, network architecture, Managing privacy, key challenges and recommendations

Books:

1. Service oriented Computing, Munindar P. Singh, Michael N Hunns, Wiley 2005
2. “Service-Oriented Computing: Agents, Semantics, and Engineering”, Huang, J.; Kowalczyk, R.; Maamar Springer 2007 ISBN: 978-3-540-72618-0
3. Service-oriented computing and SOA: Introduction

(IT - 012) SOFTWARE ARCHITECTURE

Unit – 1 Software Architecture terms: Component, Relationship, View, Architectural Styles, Frameworks, Patterns, Methodologies, Processes, Functional and Non-functional Properties of Software Architectures

Unit – 2 Enabling Techniques for Software Architecture: Abstraction, Encapsulation, Information Hiding, Modularization Separation of Concerns, Coupling and Cohesion, Sufficiency, Completeness and Primitiveness Separation of Policy and Implementation, Separation of Interface and Implementation

Unit – 3 Architectural Styles: Pipes and Filters, Data Abstraction and Object-Oriented, Event-Based, Implicit Invocation, Layered Systems, Repositories, Interpreters, Process Control, Heterogeneous Architectures

Unit – 4 Software Implementation - development environment facilities: code generation, reverse engineering, profiling, software libraries, testing and debugging

Unit – 5 Software Quality: Changeability, Efficiency, Interoperability, Reliability, Testability, Reusability, Fault tolerant software

Books:

1. M. Shaw: Software Architecture Perspectives on an Emerging Discipline, Prentice-Hall.
2. Len Bass, Paul Clements, Rick Kazman: Software Architecture in Practice, Pearson Education Asia.

(IT – 013) CLIENT-SERVER BASED IT SOLUTIONS

Unit – 1 Server Computing: Concept of Client-Server Technology, Client-Server Technology and Heterogeneous Computing, Costs and Benefits of Client Server Computing, Implementation and Scalability.

Unit – 2 Client Server Model and Software Design: Client-Server Model, Motivation, Terminology and Concepts, Applications, Concurrency in Network, Concurrency in Clients, Concurrency in Servers, Context Switching and Protocol Software Design, Advantages of concurrency.

Unit – 3 Architecture and Design of Client Server Model: Multitasking with Processes and Threads, Scheduling, Synchronization, Memory, Communications.

Unit – 4 Algorithms in Client/Server Software Design: TCP Client algorithms, Socket Interface, Programming a UDP Client. The Conceptual Server algorithm, Basic Types of Servers and their comparisons, Interactive Server algorithms, Concurrent Server algorithms, Problem of Server Deadlock.

Unit – 5 Portable Client/Server Applications: Architecting Portable Application Code, Architecting Platform-Independent Source-Code, Operating System/Communications/File System independent modules, Client Server Applications Architecting using Frameworks.

Books:

1. Douglas E. Comer, David L; Stevens, Internetworking with TCP/IP: Client-Server Programming and Applications : Vol III , Prentice Hall of India, New Delhi.
2. Jaffrey D. Schqnk; Client Server Applications and architecture, BPB Novell Press, New Delhi
3. Douglas J. Reilly; Client/Server Developers Guide, Addison Wesley Developers Press, Massachusetts

(IT – 014/CS034) MULTIMEDIA COMMUNICATION & SYSTEM DESIGN

Unit-I: Introduction

Introduction to Multimedia, Multimedia Information, Multimedia Objects, Multimedia in business and work. Convergence of Computer, Communication and Entertainment products

Stages of Multimedia Projects

Multimedia hardware, Memory & storage devices, Communication devices, Multimedia software's, presentation tools, tools for object generations, video, sound, image capturing, authoring tools, card and page based authoring tools.

Unit-II: Multimedia Building Blocks

Text, Sound MIDI, Digital Audio, audio file formats, MIDI under windows environment Audio & Video Capture.

Unit-III: Data Compression

Huffman Coding, Shannon Fano Algorithm, Huffman Algorithms, Adaptive Coding, Arithmetic Coding Higher Order Modelling. Finite Context Modelling, Dictionary based Compression, Sliding Window Compression, LZ77, LZW compression, Compression, Compression ratio loss less & lossy compression.

Unit-IV: Speech Compression & Synthesis

Digital Audio concepts, Sampling Variables, Loss less compression of sound, loss compression & silence compression.

Unit-V: Images

Multiple monitors, bitmaps, Vector drawing, lossy graphic compression, image file format animations Images standards, JPEG Compression, Zig Zag Coding, Multimedia Database. Content based retrieval for text and images, **Video:** Video representation, Colors, Video Compression, MPEG standards, MHEG Standard Video Streaming on net, Video Conferencing, Multimedia Broadcast Services, Indexing and retrieval of Video Database, recent development in Multimedia.

Books:

1. Tay Vaughan "Multimedia, Making IT Work" Osborne McGraw Hill.
2. Buford "Multimedia Systems" Addison Wesley.
3. Andleish & Thakrar "Multimedia & System Design", PHI.
3. Agrawal & Tiwari "Multimedia Systems" Excel.
4. Mark Nelson "Data Compression Book" BPB.
5. Sleinreitz "Multimedia System" Addison Wesley.

(IT 021/CS011) DIGITAL IMAGE PROCESSING

UNIT-I

Introduction and Fundamentals

Motivation and Perspective, Applications, Components of Image Processing System, Element of Visual Perception, A Simple Image Model, Sampling and Quantization.

Image Enhancement in Spatial Domain

Introduction; Basic Gray Level Functions – Piecewise-Linear Transformation Functions: Contrast Stretching; Histogram Specification; Histogram Equalization; Local Enhancement; Enhancement using Arithmetic/Logic Operations – Image Subtraction, Image Averaging; Basics of Spatial Filtering; Smoothing - Mean filter, Ordered Statistic Filter; Sharpening – The Laplacian.

UNIT-II

Image Enhancement in Frequency Domain

Fourier Transform and the Frequency Domain, Basis of Filtering in Frequency Domain, Filters – Low-pass, High-pass; Correspondence Between Filtering in Spatial and Frequency Domain; Smoothing Frequency Domain Filters – Gaussian Lowpass Filters; Sharpening Frequency Domain Filters – Gaussian Highpass Filters; Homomorphic Filtering.

Image Restoration

A Model of Restoration Process, Noise Models, Restoration in the presence of Noise only- Spatial Filtering – Mean Filters: Arithmetic Mean filter, Geometric Mean Filter, Order Statistic Filters – Median Filter, Max and Min filters; Periodic Noise Reduction by Frequency Domain Filtering – Bandpass Filters; Minimum Mean-square Error Restoration.

UNIT-III

Color Image Processing

Color Fundamentals, Color Models, Converting Colors to different models, Color Transformation, Smoothing and Sharpening, Color Segmentation.

Morphological Image Processing

Introduction, Logic Operations involving Binary Images, Dilation and Erosion, Opening and Closing, Morphological Algorithms – Boundary Extraction, Region Filling, Extraction of Connected Components, Convex Hull, Thinning, Thickening

UNIT-IV

Registration

Introduction, Geometric Transformation – Plane to Plane transformation, Mapping, Stereo Imaging – Algorithms to Establish Correspondence, Algorithms to Recover Depth

Segmentation

Introduction, Region Extraction, Pixel-Based Approach, Multi-level Thresholding, Local Thresholding, Region-based Approach, Edge and Line Detection: Edge Detection, Edge Operators, Pattern Fitting Approach, Edge Linking and Edge Following, Edge Elements Extraction by Thresholding, Edge Detector Performance, Line Detection, Corner Detection.

UNIT-V

Feature Extraction

Representation, Topological Attributes, Geometric Attributes

Description

Boundary-based Description, Region-based Description, Relationship.

Object Recognition

Deterministic Methods, Clustering, Statistical Classification, Syntactic Recognition, Tree Search, Graph Matching

Books:

1. Digital Image Processing 2nd Edition, Rafael C. Gonzalvez and Richard E. Woods. Published by: Pearson Education.
2. Digital Image Processing and Computer Vision, R.J. Schalkoff. Published by: John Wiley and Sons, NY.
3. Fundamentals of Digital Image Processing, A.K. Jain. Published by Prentice Hall, Upper Saddle River, NJ.
4. B. Chanda, D.D. Majumder, “Digital Image Processing & Analysis”, PHI

(IT 022/CS012) Network Programming & Administration

Unit – I

Introduction to Systems Programming: Files, System Files, File Formats, Buffered I/O, Directories, File System, Inodes, links,fcntl, links, locks, Device I/O, Terminal I/O, ioctl(), Files and Devices ,Signals, video I/O ,Multi-Tasking

Unit - II

Processes and Inter-Process Communication: timers, polling vs interrupts, environment, fork, exec, wait, environment, exit and wait, pipe, fifos, message queues, semaphore

Unit - III

Network Programming: Sockets, Operation, Socket types, Domains Name Binding, Closing Sockets, I/O Multiplexing, Client/Server Models, Connection Based Services, Handling Out of Band Data, Connectionless Services, Design issues of Concurrent and iterative servers, Socket options

Unit - IV

XDR and Remote Procedure Calls, Network Programming at the level of Programming Language (can use Java or Python as case study)

Text Book:

1. Unix Network Programming, W. Richard Stevens, Prentice Hall, 1998

References:

1. Internetworking with TCP/IP, Volume3, Douglas Comer, Prentice Hall, 2000
2. Internetworking with TCP/IP, Volume1, Douglas Comer, Prentice Hall, 2000

(IT - 023) BIOINFORMATICS

Unit I: Introduction

Bioinformatics objectives and overviews, Interdisciplinary nature of Bioinformatics, Data integration, Data analysis, Major Bioinformatics databases and tools. Metadata: Summary & reference systems, finding new type of data online.

Molecular Biology and Bioinformatics: Systems approach in biology, Central dogma of molecular biology, problems in molecular approach and the bioinformatics approach, Overview of the bioinformatics applications.

Unit II: The Information Molecules and Information Flow

Basic chemistry of nucleic acids, Structure of DNA, Structure of RNA, DNA Replication, -Transcription, -Translation, Genes- the functional elements in DNA, Analyzing DNA, DNA sequencing. Proteins: Amino acids, Protein structure, Secondary, Tertiary and Quaternary structure, Protein folding and function, Nucleic acid-Protein interaction.

Unit III: Perl

Perl Basics, Perl applications for bioinformatics- Bioperl, Linux Operating System, Understanding and Using Biological Databases, Java clients, CORBA, Introduction to biostatics.

Unit IV: Nucleotide sequence data

Genome, Genomic sequencing, expressed sequence tags, gene expression, transcription factor binding sites and single nucleotide polymorphism. Computational representations of molecular biological data storage techniques: databases (flat, relational and object oriented), and controlled vocabularies, general data retrieval techniques: indices, Boolean search, fuzzy search and neighboring, application to biological data warehouses.

Unit V: Biological data types and their special requirements: sequences, macromolecular structures, chemical compounds, generic variability and its connection to clinical data. Representation of patterns and relationships: alignments, regular expressions, hierarchies and graphical models.

Books:

1. Fundamental Concepts of Bioinformatics, Dan E. Krane, Michael L. Raymer, ISBN-10: 0805346333, Benjamin Cummings / Prentice Hall
2. O'Reilly, "Developing Bioinformatics computer skills", Indian Edition's publication
3. Rastogi, Mendiratta, Rastogi, "Bioinformatics concepts, skills & Applications", CBS Publishers
4. Rashidi, Hooman and Lukas K. Buehler, "Bioinformatics Basic Applications" CRC Press.
5. "Bioinformatics a Computing Perspective, Shuba Gopal, TMH

(IT 024/CS014) WIRELESS NETWORKS

Unit – 1 Introduction

Liberalization of communications Industry, Digitalization of content, changes in spectrum management, cellular reuse, drive towards broadband, IEEE 802.11 networks

Unit – 2 Wireless Network Systems

Cellular networks

The GSM circuit switched network, GSM channel structure, Authentication and location updating, physical channels, TMN

GPRS

Introduction to GPRS, contexts, PDP context, Mobility management context, MS-SGSN physical layer, MS-SGSN protocols, GPRS operations

Unit – 3 Principles of access network planning

Circuit voice networks

Introduction to CVN, coverage, capacity, planning for circuit multimedia services

Planning for packet multimedia services

Planning approaches, buffer-pipe model, characterization of applications, practical modeling methodologies, multiuser packet transport configurations

Unit – 4 Planning and design

RAN, GSM RAN, UMTS RAN, Cellular OFDM RAN, Mesh network

Unit – 5 Network operation and optimization

Enhanced telecom operations model (eTOM), wireless network life cycle – strategy, infrastructure and product, operations, enterprise management,

GSM network performance optimization – principles and key performance indicators, coverage optimization, GPRS RAN optimization, UMTS network performance optimization

Books:

1. Deploying Wireless networks, Andy wilton, Tim charity, Cambridge university press
2. Fundamental of Wireless Networking, Ron Price, TMH
3. 3G Wireless Networks, Clint Smity, TMH
4. Essentials of UMTS, Christopher Cox, Cambridge University Press

(TCS-801) DISTRIBUTED SYSTEMS

Unit-I

Characterization of Distributed Systems: Introduction, Examples of distributed Systems, Resource sharing and the Web Challenges.

System Models: Architectural models, Fundamental Models

Theoretical Foundation for Distributed System: Limitation of Distributed system, absence of global clock, shared memory, Logical clocks, Lamport's & vectors logical clocks, Causal ordering of messages, global state, termination detection.

Distributed Mutual Exclusion: Classification of distributed mutual exclusion, requirement of mutual exclusion theorem, Token based and non token based algorithms, performance metric for distributed mutual exclusion algorithms.

Unit-II

Distributed Deadlock Detection: system model, resource Vs communication deadlocks, deadlock prevention, avoidance, detection & resolution, centralized dead lock detection, distributed dead lock detection, path pushing algorithms, edge chasing algorithms.

Agreement Protocols: Introduction, System models, classification of Agreement Problem, Byzantine agreement problem, Consensus problem, Interactive consistency Problem, Solution to Byzantine Agreement problem, Application of Agreement problem, Atomic Commit in Distributed Database system.

Unit-III

Distributed Objects and Remote Invocation: Communication between distributed objects, Remote procedure call, Events and notifications, Java RMI case study.

Security: Overview of security techniques, Cryptographic algorithms, Digital signatures Cryptography pragmatics, Case studies: Needham Schroeder, Kerberos, SSL & Millicent.

Distributed File Systems: File service architecture, Sun Network File System, The Andrew File System, Recent advances.

Unit-IV

Transactions and Concurrency Control: Transactions, Nested transactions, Locks, Optimistic Concurrency control, Timestamp ordering, Comparison of methods for concurrency control.

Distributed Transactions: Flat and nested distributed transactions, Atomic Commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery. Replication: System model and group communication, Fault - tolerant services, highly available services, Transactions with replicated data.

Unit –V

Distributed Algorithms: Introduction to communication protocols, Balanced sliding window protocol, Routing algorithms, Destination based routing, APP problem, Deadlock free Packet switching, Introduction to Wave & traversal algorithms, Election algorithm.

CORBA Case Study: CORBA RMI, CORBA services.

Books:

1. Singhal & Shivaratri, "Advanced Concept in Operating Systems", McGraw Hill
2. Coulouris, Dollimore, Kindberg, "Distributed System: Concepts and Design", Pearson Ed.
3. Gerald Tel, "Distributed Algorithms", Cambridge University Press

(TIT – 801) ADVANCED INFORMATION SYSTEM ENGINEERING

Unit – 1 Methods & Models for Information System

Modeling of Secure Information System

Introduction to secure information system, Tropos Methodology, Development process, Introduction to Internet Based Information System (IBIS), Semantic data integration, Framework for data integration, Query processing, Architecture of IBIS, Data extraction, Interaction with the user

Situation Method Engineering (SME)

Generic process model for SME, Assembly based method engineering, paradigm-based method engineering

Unit – 2 Advanced design of Information System

Web based federated Information system

Designing, Hera Methodology, Role of RDF, RDFS, RQL in Hera, Integration and data retrieval, Hera front-end

Embedding metrics into IS development

Meta modeling technique and MEL, method assembly for measurable methods, defining metrics with MEL

Unit – 3 Methodologies for IS development

Method components, application of the method component, introduction to change centric method engineering, typology of method engineering approaches, Generic operations for method engineering, introduction to two-Hemisphere model driven approach, software development driven by particular model.

Unit – 4 Requirements Engineering

Requirements on Modelling technique

Communication driven knowledge transformation, Conceptual framework, Guidelines for the usage of modeling techniques, concern oriented RE model, COM for RE, Realization of the model.

Unit – 5 Enterprise Modelling

Business Process Modelling

Process model frameworks, validity of process models, supply chain operations reference model (SCOR)

Dataware House Methodology

Approaches to DW development methods, IPD approach, organizational process modeling.

Books:

1. Advanced Information System Engineering, CAiSE 2005, Oscar Pastor, Joao Falcao e Cunha, Springer
2. Advanced Information System Engineering, CAiSE 2004, Anne Person, Janis Stirna, Springer
3. Advanced Information System Engineering, CAiSE 2003, Johann Eder Michale Missikoff, Springer
4. Software Reuse, Ivar Jacobson, Martin Griss, Patrik Jonsson, Pearson Education.

(IT - 031) IT INFRASTRUCTURE MANAGEMENT

UNIT I

Infrastructure Management Overview

Definitions, Infrastructure management activities, Evolutions of Systems since 1960s (Mainframes-to-Midrange-to-PCs-to-Client-server computing-to-New age systems) and their management, growth of internet, current business demands and IT systems issues, complexity of today's computing environment, Total cost of complexity issues, Value of Systems management for business.

UNIT II

Preparing for Infrastructure Management

Factors to consider in designing IT organizations and IT infrastructure, Determining customer's Requirements, Identifying System Components to manage, Exist Processes, Data, applications, Tools and their integration, Patterns for IT systems management, Introduction to the design process for information systems, Models, Information Technology Infrastructure Library (ITIL).

UNIT III

Service Delivery Processes

Service-level management, financial management and costing, IT services continuity management, Capacity management, Availability management.

UNIT IV

Service Support Processes

Configuration Management, Service desk. Incident management. Problem management, Change management, Release management.

UNIT V

Storage and Security Management

Introduction Security, Identity management, Single sign-on, Access Management, Basics of network security, LDAP fundamentals, Intrusion detection, firewall, security information management Introduction to Storage, Backup & Restore, Archive & Retrieve, Space Management, SAN & NAS, Disaster Recovery, Hierarchical space management, Database & Application protection, Bare machine recovery, Data retention

Reference Books:

1. Foundations of IT Service Management: based on ITIL, by Jan Van Bon, Van Haren Publishing, 2nd edition 2005
2. High Availability: Design, Techniques, and Processe, by Floyd Piedad, Michael Hawkins, Prentice Hall, 2000
3. IT Organization: Building a Worldclass Infrastructure, by Harris Kem, Stuart Gaiup, Guy Nemiro, Publisher: Prentice Hall, 2000
4. IT Systems Management: Designing, Implementing, and Managing World-Class Infrastructures Rich Schiesser, Prentice Hall PTR; 2001

(IT-032) SOFTWARE QUALITY ENGINEERING

UNIT-I: Introduction

Defining Software Quality, Software Quality Attributes and Specification, Cost of Quality, Defects, Faults, Failures, Defect Rate and Reliability, Defect Prevention, Reduction, and

Containment, Overview of Different Types of Software Review, Introduction to Measurement and Inspection Process, Documents and Metrics.

UNIT-II: Software Quality Metrics

Product Quality Metrics: Defect Density, Customer Problems Metric, Customer Satisfaction Metrics, Function Points, In-Process Quality Metrics: Defect Arrival Pattern, Phase-Based Defect Removal Pattern, Defect Removal Effectiveness, Metrics for Software Maintenance: Backlog Management Index, Fix Response Time, Fix Quality, Software Quality Indicators.

UNIT-III: Software Quality Management and Models

Modeling Process, Software Reliability Models: The Rayleigh Model, Exponential Distribution and Software Reliability Growth Models, Software Reliability Allocation Models, Criteria for Model Evaluation, Software Quality Assessment Models: Hierarchical Model of Software Quality Assessment.

UNIT-IV: Software Quality Assurance

Quality Planning and Control, Quality Improvement Process, Evolution of Software Quality Assurance (SQA), Major SQA Activities, Major SQA Issues, Zero Defect Software, SQA Techniques, Statistical Quality Assurance, Total Quality Management, Quality Standards and Processes.

UNIT-V: Software Verification, Validation & Testing:

Verification and Validation, Evolutionary Nature of Verification and Validation, Impracticality of Testing all Data and Paths, Proof of Correctness, Software Testing, Functional, Structural and Error-Oriented Analysis & Testing, Static and Dynamic Testing Tools, Characteristics of Modern Testing Tools.

Books:

1. Jeff Tian, Software Quality Engineering (SQE), Wiley-Interscience, 2005; ISBN 0-471-71345-7.
2. Metrics and Models in Software Quality Engineering, Stephen H. Kan, Addison-Wesley (2002), ISBN: 0201729156
3. Metrics and Models in Software Quality Engineering, [Stephen H. Kan](#), Addison-Wesley Professional
4. Fundamental Concepts for the Software Quality Engineer, [Taz Daughtrey](#), ASQ Quality Press.

(IT034/ CS – 035) PATTERN RECOGNITION

Unit – 1 Introduction

Pattern recognition, classification and description, patterns and features extraction, training and learning in PR systems, pattern recognition approaches

Unit – 2

Pattern Discrimination

Decision regions and functions, feature Space Metrics, The Covariance Matrix, Principal components, feature assessment, dimensionality ratio problem

Data Clustering

Unsupervised classification, Standardization issues, tree clustering, dimensional reduction, K-means clustering, cluster validation

Unit – 3 Statistical Classifications

Linear Discriminants, Bayesian classification, Model free techniques, feature selection, classifier evaluation, tree classifier

Unit – 4 Syntactic pattern recognition

Introduction, quantifying structure in pattern description, grammar based approach and applications, elements of formal grammars, recognition of syntactic descriptions, parsing, CYK parsing algorithm

Unit – 5 Structural pattern recognition

Primitives, structural representations, syntactic analysis, structural matching

Text Books:

1. Pattern Recognition: Statistical, structural and neural approaches, Robert J. Schalkoff, WILEY 1992
2. Pattern Recognition: Concepts, Methods and applications, J.P. Marques, Springer 2008
3. Pattern Recognition: Techniques and applications, rajjan Shinghal, Oxford University Press, 2006

(IT034/ CS-036) NATURAL LANGUAGE PROCESSING

Unit-I

Introduction to Natural Language Understanding: The study of Language, Applications of NLP, Evaluating Language Understanding Systems, Different levels of Language Analysis,

Representations and Understanding, Organization of Natural language Understanding Systems, Linguistic Background: An outline of English syntax.

Unit-II

Introduction to semantics and knowledge representation, Some applications like machine translation, database interface.

Unit-III

Grammars and Parsing: Grammars and sentence Structure, Top-Down and Bottom-Up Parsers, Transition Network Grammars, Top-Down Chart Parsing. Feature Systems and Augmented Grammars: Basic Feature system for English, Morphological Analysis and the Lexicon, Parsing with Features, Augmented Transition Networks.

Unit-IV

Grammars for Natural Language: Auxiliary Verbs and Verb Phrases, Movement Phenomenon in Language, Handling questions in Context-Free Grammars. Human preferences in Parsing, Encoding uncertainty, Deterministic Parser.

Unit-V

Ambiguity Resolution: Statistical Methods, Probabilistic Language Processing, Estimating Probabilities, Part-of-Speech tagging, Obtaining Lexical Probabilities, Probabilistic Context-Free Grammars, Best First Parsing. Semantics and Logical Form, Word senses and Ambiguity, Encoding Ambiguity in Logical Form.

Books:

1. Akshar Bharti, Vineet Chaitanya and Rajeev Sangal, *NLP: A Paninian Perspective*, Prentice Hall, New Delhi
2. James Allen, *Natural Language Understanding*, 2/e, Pearson Education, 2003
3. D. Jurafsky, J. H. Martin, *Speech and Language Processing*, Pearson Education, 2002
4. L.M. Iivansca, S. C. Shapiro, *Natural Language Processing and Language Representation*
5. T. Winograd, *Language as a Cognitive Process*, Addison-Wesley

(IT035/CS – 031) EMBEDDED SYSTEMS

Unit-I

Introduction to embedded systems: Classification, Characteristics and requirements

Unit-II

Timing and clocks in Embedded systems, Task Modeling and management, Real time operating system issues.

Unit-III

Signals, frequency spectrum and sampling, digitization (ADC, DAC), Signal Conditioning and Processing. Modeling and Characterization of Embedded Computation System.

Unit-IV

Embedded Control and Control Hierarchy, Communication strategies for embedded systems: Encoding and Flow control.

Unit-V

Fault-Tolerance
Formal Verification.

Books:

1. H.Kopetz, "Real-Time Systems", Kluwer, 1997.
2. R.Gupta, "Co-synthesis of Hardware and Software for Embedded Systems", Kluwer 1995.
3. Rajkamal, "Embedded Systems", TMH, 2008

(IT 041/CS – 041) ADVANCED DATABASE MANAGEMENT SYSTEMS

UNIT-1

Distributed DBMS Concepts and design: Introduction, functions and architecture of a DDBMS, distributed relational database design, Transparencies in a DDBMS, Twelve rules for a DDBMS. Advanced concepts: Distributed transaction management, distributed concurrency control, distributed deadlock management, distributed database recovery, X/open distributed Transaction processing model, Replication servers, Distributed query optimization, Mobile databases.

UNIT-2

Object-Oriented DBMS Introduction, advanced database applications, weakness of RDBMS, storing objects in a relational database, next-generation database systems. Concepts and design: OODBMS perspectives, persistence, issues in OODBMS, advantages and disadvantages of OODBMS, Object-oriented database design.

UNIT-3

Standards and systems: object management group, object database standard ODMG 3.0 1999, Object store. Object relational DBMS: Introduction, third generation database manifestos, SQL8, Object oriented extensions in Oracle, Comparison of ORDBMS and OODBMS.

UNIT-4

Web technology and DBMS Web as a database Application Platform: Requirements for web-DBMS integration, web-DBMS architecture, advantages and disadvantages of web-DBMS approach, approaches to integrating the web and DBMS, Oracle Internet Application Server (IAS).

UNIT-5

Data Warehousing Concepts, OLAP and Data mining Evolution of data warehousing, data warehousing concepts, benefits and problems of data warehousing, comparison of OLTP systems and data warehousing, On-Line Processing, Introduction to data mining.

Books:

1. [Adam, Nabil R.](#), [Bhargava, Bharat K.](#), “Advanced Database Systems”, Springer.
2. [Carlo Zaniolo](#), [Stefano Ceri](#), “Advanced Database Systems”, Morgan Kaufmann, 1997

(IT042/CS – 042) DATA MINING AND WAREHOUSING

Unit-I

Overview, Motivation(for Data Mining),Data Mining-Definition & Functionalities, Data Processing, Form of Data Preprocessing, Data Cleaning: Missing Values, Noisy Data, (Binning, Clustering, Regression, Computer and Human inspection),Inconsistent Data, Data Integration and Transformation. **Data Reduction**:-Data Cube Aggregation, Dimensionality reduction, Data Compression, Numerosity Reduction, Clustering, Discretization and Concept hierarchy generation.

Unit-II

Concept Description:- Definition, Data Generalization, Analytical Characterization, Analysis of attribute relevance, Mining Class comparisons, Statistical measures in large Databases. Measuring Central Tendency, Measuring Dispersion of Data, Graph Displays of Basic Statistical class Description, Mining Association Rules in Large Databases, Association rule mining, mining Single-Dimensional Boolean Association rules from Transactional Databases– Apriori Algorithm, Mining Multilevel Association rules from Transaction Databases and Mining Multi-Dimensional Association rules from Relational Databases.

Unit-III

Classification and Predictions:

What is Classification & Prediction, Issues regarding Classification and prediction, Decision tree, Bayesian Classification, Classification by Back propagation, Multilayer feed-forward Neural Network, Back propagation Algorithm, Classification methods Knearest neighbor classifiers, Genetic Algorithm.

Cluster Analysis:

Data types in cluster analysis, Categories of clustering methods, Partitioning methods. Hierarchical Clustering- CURE and Chameleon, Density Based Methods-DBSCAN, OPTICS, Grid Based Methods- STING, CLIQUE, Model Based Method –Statistical Approach, Neural Network approach, Outlier Analysis

Unit-IV

Data Warehousing: Overview, Definition, Delivery Process, Difference between Database System and Data Warehouse, Multi Dimensional Data Model, Data Cubes, Stars, Snow

Flakes, Fact Constellations, Concept hierarchy, Process Architecture, 3 Tier Architecture, Data Marting.

Unit-V

Aggregation, Historical information, Query Facility, OLAP function and Tools. OLAP Servers, ROLAP, MOLAP, HOLAP, Data Mining interface, Security, Backup and Recovery, Tuning Data Warehouse, Testing Data Warehouse.

Books:

1. M.H.Dunham,"Data Mining:Introductory and Advanced Topics" Pearson Education
2. Jiawei Han, Micheline Kamber, "Data Mining Concepts & Techniques" Elsevier
3. Sam Anahory, Dennis Murray, "Data Warehousing in the Real World : A Practical Guide for Building Decision Support Systems, 1/e " Pearson Education
4. Mallach,"Data Warehousing System",McGraw –Hill

(IT043/TCS802) MOBILE COMPUTING

Unit – I

Introduction, issues in mobile computing, overview of wireless telephony: cellular concept, GSM: air-interface, channel structure, location management: HLR-VLR, hierarchical, handoffs, channel allocation in cellular systems, CDMA, GPRS.

Unit - II

Wireless Networking, Wireless LAN Overview: MAC issues, IEEE 802.11, Blue Tooth, Wireless multiple access protocols, TCP over wireless, Wireless applications, data broadcasting, Mobile IP, WAP: Architecture, protocol stack, application environment, applications.

Unit – III

Data management issues, data replication for mobile computers, adaptive clustering for mobile wireless networks, File system, Disconnected operations.

Unit - IV

Mobile Agents computing, security and fault tolerance, transaction processing in mobile computing environment.

Unit – V

Ad Hoc networks, localization, MAC issues, Routing protocols, global state routing (GSR), Destination sequenced distance vector routing (DSDV), Dynamic source routing (DSR), Ad Hoc on demand distance vector routing (AODV), Temporary ordered routing algorithm (TORA), QoS in Ad Hoc Networks, applications.

Books:

1. J. Schiller, Mobile Communications, Addison Wesley.
2. A. Mehrotra , GSM System Engineering.
3. M. V. D. Heijden, M. Taylor, Understanding WAP, Artech House.

4. Charles Perkins, Mobile IP, Addison Wesley.
5. Charles Perkins, Ad hoc Networks, Addison Wesley.

(IT044/CS-046) STORAGE NETWORKS

Unit – 1 Introduction to Storage Technology

Introduction to storage network, Five pillars of IT, parameters related with storage, data proliferation, problem caused by data proliferation, Hierarchical storage management, Information life cycle management (ILM), Role of ILM, Information value vs. time mapping, Evolution of storage, Storage infrastructure component, basic storage management skills and activities, Introduction to Datacenters, Technical & Physical components for building datacenters

Unit – 2 Technologies for Storage network

Server centric IT architecture & its limitations, Storage centric IT architecture & advantages, replacing a server with storage networks, Disk subsystems, Architecture of disk subsystem, Hard disks and Internal I/O channel, JBOD, RAID & RAID levels, RAID parity, comparison of RAID levels, Hot sparing, Hot swapping, Caching : acceleration of hard disk access, Intelligent Disk subsystem architecture,

Tape drives

Introduction to tape drives, Tape media, caring for Tape & Tape heads, Tape drive performance, Linear tape technology, Helical scan tape technology

Unit- 3 I/O techniques

I/O path from CPU to storage systems, SCSI technology – basics & protocol, SCSI and storage networks, Limitations of SCSI,

Fibre channel

Fibre channel, characteristic of fibre channel, serial data transfer vs. parallel data transfer, Fibre channel protocol stack, Links, ports & topologies, Data transport in fibre channel, Addressing in fibre channel, Designing of FC-SAN, components, Interoperability of FC-SAN, FC products,

IP Storage

IP storage standards (iSCSI, iFCP, FCIP, iSNS), IPSAN products, Security in IP SAN, introduction to infiniband, Architecture of Infiniband

NAS – Evolution, elements & connectivity, NAS architecture,

Unit – 4 Storage Virtualization

Introduction to storage virtualization, products, definition, core concepts, virtualization on various levels of storage network, advantages and disadvantages, Symmetric and asymmetric virtualization, performance of San virtualization, Scaling storage with virtualization

Unit – 5 Management of storage Networks

Management of storage network, SNMP protocol, requirements of management systems, Management interfaces, Standardized and proprietary mechanism, In-band& Out-band management,

Books:

1. "Storage Networks: The Complete Reference", R. Spalding, McGraw-Hill
2. "Storage Networking Fundamentals: An Introduction to Storage Devices, Subsystems, Applications, Management, and Filing Systems", Marc Farley, Cisco Press.
3. "Designing Storage Area Networks: A Practical Reference for Implementing Fibre Channel and IP SANs, Second Edition", Tom Clark Addison Wesley

(IT045) Software Configuration Management & Implementation

Unit – 1

Examining the target levels, examining the customizable set of SCM tasks, Introduction to SCM, Fundamentals of SCM, Benefits of SCM

Unit – 2 Establish SCM in an organization

Focusing on the organization level, SCM commitment phase, SCM direction phase, foundation phase

Unit – 3 Establish an SCM infrastructure for an application

Application level, SCM analysis phase, Implementation planning phase, Technology selection phase, design phase, process phase, technology implementation phase, training phase, System testing phase, transition phase

Unit – 4 Establish SCM tasks on a project

Project level, planning and requirement phase, design phase, development phase, test phase, release phase.

Unit – 5 SCM Templates and processes

Policy template, plan template, Analysis investigator template, Implementation project plan template, evaluation requirements list template, design specification template, development strategy template

Process- problem management process, change control process, identification process, version control process, merge process, build process, release process, audit process.

Text Books:

1. Software configuration management implementation roadmap, Mario E. Moreira, WILEY 2004