UTTARAKHAND TECHNICAL UNIVERSITY

Program: B. Tech-CSE

Year: Session: 2011 – 2012

Scheme and Evaluation Pattern

S.No	Course No.	Subject	Periods			Evaluation				Total Marks
			L	T	P	Sessional			External Exam	
						CT	TA	Total		
Semester:5th										
Theory										
1.	TCS – 501	Computer Graphics	3	1	0	30	20	50	100	150
2.	TCS – 502	Computer Network	3	1	0	30	20	50	100	150
3.	TCS – 503	Design & Analysis of Algorithms	3	1	0	30	20	50	100	150
4.	TCS – 504	Principles of Programming Languages	2	1	0	15	10	25	50	75
5.	TCS – 505	Advance Java Programming	3	1	0	30	20	50	100	150
6.	TCS – 506	Modeling & Simulation	2	1	0	15	10	25	50	75
Practical/Design										
1.	PCS -551	Computer Graphics Lab.	0	0	2	0	0	25	25	50
2.	PCS-552	Computer Network Lab.	0	0	2	0	0	25	25	50
3.	PCS-553	Algorithms Lab.	0	0	2	0	0	25	25	50
4	PCS-555	Adv. Java Lab.	0	0	2	0	0	25	25	50
5.		Discipline	0	0	2	0	0	50	0	50
Semester: 6th										
Theory										
S.No	**Course No.**	**Subject**	**Periods**			**Evaluation**				**Total Marks**
			L	T	P	Sessional			External Exam	
						CT	TA	Total		
1.	TCS – 601	Operating System	3	1	0	30	20	50	100	150
2.	TCS – 602	Compiler Design	3	1	0	30	20	50	100	150
3.	TCS – 603	Artificial Intelligence	3	1	0	30	20	50	100	150
4.	TCS – 604	Graph Theory	2	1	0	15	10	25	50	75
5.	TCS – 605	Visual Programming & DotNet Technologies	3	1	0	30	20	50	100	150
6.	THU – 608	Principles of Management	2	1	0	15	10	25	50	75
Practical/Design										
1.	PCS-651	Operating System Lab.	0	0	2	0	0	25	25	50
2	PCS-652	Compiler Design Lab.	0	0	2	0	0	25	25	25
3.	PCS-653	Artificial Intelligence Lab.	0	0	2	0	0	25	25	50
4.	PCS-655	Visual Programming Lab.	0	0	2	0	0	25	25	50
5.		Discipline	0	0	2	0	0	50	0	50

UTTARAKHAND TECHNICAL UNIVERSITY

Program: B. Tech-CSE

Year: Session: 2012 – 2013

Scheme and Evaluation Pattern

S.No	Course No.	Subject	Periods			Evaluation				Total Marks
			L	T	P	Sessional			External Exam	
						CT	TA	Total		
Semester:7th										
Theory										
1.	TCS- 701	System Administration	3	1	0	30	20	50	100	150
2.	TCS -702	Advance Computer Architecture	3	1	0	30	20	50	100	150
3.	TCS -703	Data Warehousing & Mining	3	1	0	30	20	50	100	150
4.	TCS-07X	ELECTIVE-I	3	1	0	30	20	50	100	150
5.	TOE-XX	Open Elective	3	1	0	30	20	50	100	150
Practical/Design										
1.	PCS -757	Project	0	0	4	0	0	50	50	100
2.	PCS-758	Industrial Interaction/ Seminar (Term Paper)	0	0	2	0	0	25	25	50
3.	PCS-751	System Administration Lab	0	0	2	0	0	25	25	50
4.		**Discipline**	0	0	0	0	0	50	0	50
Semester: 8th										
Theory										
S.No	**Course No.**	**Subject**	**Periods**			**Evaluation**				**Total Marks**
			L	T	P	Sessional			External Exam	
						CT	TA	Total		
1.	TCS -801	Distributed Computing	3	1	0	30	20	50	100	150
2.	TCS-802	Web Technology	3	1	0	30	20	50	100	150
3.	TCS-02X	ELECTIVE-II	3	1	0	30	20	50	100	150
4.	TCS-03X	ELECTIVE-III	3	1	0	30	20	50	100	150
Practical/Project										
1.	PCS-857	Project	0	0	6	0	0	100	200	300
2.	PCS-852	Web Technology Lab.	0	0	2	0	0	50	0	50
3.		**Discipline**	0	0	0	0	0	50	0	50

ELECTIVE-I

TCS-071 Digital Image Processing

TCS-072 Soft Computing TCS-

073 Wireless Networks TCS-

074 Information Security

ELECTIVE-II

TCS-081 Parallel Computing

TCS-082 Database Administration

TCS-083 Advance Computer Network

TCS-084 Fault Tolerant Computing

ELECTIVE-III

TCS-086 Computer Vision

TCS-087 Advanced DBMS

TCS-088 Intrusion Detection Systems

TCS-089 Cryptography & Network Security

COMPUTER GRAPHICS (TCS-501)

Unit-I

Line generation: Points lines, Planes, Pixels and Frame buffers, vector and character generation. Graphics Primitives: Display devices, Primitive devices, Display File Structure, Display control text.

Unit-II

Polygon: Polygon Representation, Entering polygons, Filling polygons. Segments: Segments table, creating deleting and renaming segments, visibility, image transformations.

Unit-III

Transformations: Matrices transformation, transformation routines, displays procedure. Windowing and Clipping: Viewing transformation and clipping, generalize clipping, multiple windowing.

Unit-IV

Three Dimension: 3-D geometry primitives, transformations, projection clipping.

Hidden Line and Surface: Back face removal algorithms, hidden line methods

Unit-V

Graphics Programming: The Sierpinski Gasket, Programming Two-Dimensional Applications, The OpenGL API, Primitives and Attributes, Color, Viewing, Control Functions, Polygons and Recursion, The Three-Dimensional Gasket, Plotting Implicit Functions

Input and Interaction: Interaction, Input Devices, Clients and Servers, Display Lists, Programming Event-Driven Input, Menus, Picking, Building Interactive Models, Animating Interactive Programs, Design of Interactive Programs, Logic Operations.

References :

1. Hill, Jr. & Kelley; Computer Graphics Using OpenGL, 3rd Ed. , Phi Learning Pvt. Ltd. (2009)
2. Donald D. Hearn**,** M. Pauline Baker**;** Computer Graphics with OpenGL; 3/E; Pearson Education
3. Rogers, "Procedural Elements of Computer Graphics", McGraw Hill
4. Asthana, Sinha, "Computer Graphics", Addison Wesley
5. Newman and Sproul, "Principle of Interactive Computer Graphics", McGraw Hill
6. Steven Harrington, "Computer Graphics:, A Programming Approach", 2nd Edition6.
7. Rogar and Adams, "Mathematical Elements of Computer Graphics", McGraw Hill.

COMPUTER NETWORKS (TCS-502)

Unit -I

Introduction Concepts : Goals and Applications of Networks, Network structure and architecture, The OSI reference model, services, Network Topology Design - Delay Analysis, Back Bone Design, Local Access Network Design. Physical Layer Transmission Media, Switching methods, ISDN, Terminal Handling.

Unit-II

Medium Access sub layer: Medium Access sub layer – Channel Allocations, LAN protocols - ALOHA protocols - Overview of IEEE standards - FDDI. Data Link Layer - Elementary Data Link Protocols, Sliding Window protocols, Error Handling.

Unit - III

Network Layer: Network Layer - Point - to Pont Networks, routing, Congestion control ,Internetworking -TCP / IP - IP packet, IP address, IPv6. '

Unit - IV

Transport Layer: Transport Layer - Design issues, connection management, session Layer-Design issues, remote procedure call. Presentation Layer-Design issues, Data compression techniques, cryptography - TCP – Window Management.

Unit-V

Application Layer: Application Layer: File Transfer, Access and Management, Electronic mail, Virtual Terminals, Other application, Example Networks - Internet and Public Networks.

References:

1. Forouzen, "Data Communication and Networking", TMH
2. A.S. Tanenbaum, “Computer Networks”, 3rd Edition, Prentice Hall India, 1997.
3. S. Keshav, “An Engineering Approach on Computer Networking”, Addison Wesley, 1997
4. W. Stallings, “Data and Computer Communication”, Macmillan Press.

DESIGN & ANALYSIS OF ALGORITHMS (TCS-503)

Unit -I

Introduction: Algorithms, analysis of algorithms, Growth of Functions, Master's Theorem, Designing of Algorithms. Sorting and order Statistics: Heap sort, Quick sort, Sorting in Linear time, Medians and Order Statistics.

Unit -II

Advanced Data Structure: Red-Black Trees, Augmenting Data Structure. B Trees, Binomial Heaps, Fibonacci Heaps, Data Stricture for Disjoint Sets.

Unit -III

Advanced Design and Analysis Techniques : Dynamic Programming, Greedy Algorithms, Amortized Analysis, Back Tracking.

Unit -IV

Graph Algorithms: Elementary Graphs Algorithms, Minimum Spanning Trees, Single-source Shortest Paths, Al l-Pairs Shortest Paths, Maximum Flow, and Traveling Salesman Problem.

Unit -V

Selected Topics: Randomized Algorithms, String Matching, NP Completeness, Approximation Algorithms.

References:

1. Coreman, Rivest, Lisserson, “Algorithm", PHI.
2. Basse, "Computer Algorithms: Introduction to Design & Analysis", Addision Wesley.
3. Horowitz, Sahani, and Rajasekaran "Fundamental of Computer Algorithms", Universities Press

PRINCIPLES OF PROGRAMMING LANGUAGES (TCS-504)

Unit -I

Introduction: Characteristics of programming Languages, Factors influencing the evolution of programming language, developments in programming methodologies, desirable features and design issues. Programming language processors: Structure and operations of translators, software simulated computer, syntax, semantics, structure, virtual computers, binding and binding time.

Unit -II

Elementary and Structured Data Types, Structured data type and objects, Sub Program and programmer defined data types: Evolution of data types, abstractions, encapsulations, information hiding, sub programmes, abstract data types. Sequence Control; Implicit and Explicit sequence control, sequence control with within expression and statements, recursive sub programmes, exception handling, co-routines, Scheduled sub programmes, concurrent execution.

Unit -III

Data control referencing environments, static and dynamic scope, local data local data referencing environment, shared data: Explicit common environment dynamic scope parameter passing mechanism. Storage Management: Major run time requirements, storage management phases, static storage management, stack based, heap based storage management.

Unit -IV

Syntax and translation: General syntactic criteria, syntactic element of a language, stages in translation, formal syntax and semantics.

Introduction to Functional Programming, Lambda calculus, Data flow language and Object Oriented language, Comparison in various general and special purpose programming languages e.g. Fortran, C, Pascal, Lisp, etc.

References:

1. Terrance W Pratt, "Programming Languages: Design and Implementation" PHI
2. Sebesta, "Concept of Programming Language", Addison Wesley
3. E Horowitz , "Programming Languages", 2nd Edition, Addison Wesley
4. "Fundamentals of Programming Languages", Galgotia.

Advance Java Programming (TCS-505)

UNIT-1

Java Beans and Web Servers: Introduction to Java Beans, Advantage, Properties, BDK, Introduction to EJB, Java Beans API Introduction to Servelets, Lifecycle, JSDK, Servlet API, Servlet Packages: HTTP package, Working with Http request and response, Security Issues.

Java Script: Data types, variables, operators, conditional statements, array object, date object, string object, Dynamic Positioning and front end validation, Event Handling

UNIT-2

JSP: Introduction to JSP, JSP processing, JSP Application Design, Tomcat Server, Implicit JSP objects, Conditional Processing, Declaring variables and methods, Error Handling and Debugging, Sharing data between JSP pages- Sharing Session and Application Data.

Database Connectivity: Database Programming using JDBC, Studying Javax.sql.*package, accessing a database from a JSP page, Application-specific Database Action, Developing Java Beans in a JSP page, introduction to Struts framework.

UNIT-4

Java Servlet: Brief origin and advantages over CGI, J2EE Servlet 2.x Specification, Writing small Servlet Programs, Deployment Descriptor, Inter Servlet Collaboration, Session: Definition, State on web, Different ways to track sessions,

UNIT-5

J2SE: Concepts and Prerequisites: Data Types, Arrays, Dynamic Arrays, Type Casting, Classes and Objects, Inheritance, Interfaces, Exception Handling, Multi-Threading,

J2EE Architecture: J2EE as a framework, Client Server Traditional model, Comparison amongst 2-tier, 3-tier and N-tier architectures, Thin and Thick Clients

TEXT BOOKS:

1. Elliotte Rusty Harold, " Java Network Programming", O'Reilly publishers, 2000
2. Ed Roman, "Mastering Enterprise Java Beans", John Wiley & Sons Inc., 1999.
3. Hortsmann & Cornell, "Core Java 2 Advanced Features, Vol II", Pearson Education, 2002.

REFERENCES:

1. Web reference: http://java.sun.com.
2. Patrick Naughton, "COMPLETE REFERENCE: JAVA2", Tata McGraw-Hill, 2003.

MODELING AND SIMULATION (TCS-506)

UNIT-I

Introduction: Systems, models, discrete event simulation and continuous simulation.
Discrete Event Simulation: Time-advance mechanisms, event modeling of discrete dynamic systems, single-server single queue model, event graphs, Monte Carlo simulation.

UNIT-II

GPSS: Model structure, entities and transactions, blocks in GPSS, process oriented programming, user defined functions, SNA, logic switches, save locations, user chains, tabulation of result, programming examples.

Random Number Generation: Congruence generators, long period generators, uniformity and independence testing

UNIT-III

Random Variate Generation: Location, scale and shape parameters, discrete and continuous probability distributions; Inverse transform method, composition and acceptance-rejection methods

UNIT-IV

Queuing Models: Little's theorem, analytical results for M/M/1, M/M/1/N, M/M/c, M/G/1 and other queuing models.

Books:

1. Karian, Z.A. and Dudewicz, E.J., "Modern Statistical Systems and GPSS Simulation", 2nd Ed., CRC Press. 1999
2. Banks, J., Carson, L.S., Nelson, B.L. and Nicol, D.M., "Discrete Event System Simulation", 3rd Ed., Pearson Education. 2002
3. Law, A.M. and Kelton, W.D., "Simulation, Modeling and Analysis", 3rd Ed., Tata McGraw-Hill. 2003

COMPUTER GRAPHICS LAB (PCS-551)

1. Implementation of line generation using slope's method, DDA and Bresenham's algorithms.
2. Implementation of circle generation using Mid-point method and Bresenham's algorithm.
3. Implementation of ellipse generation using Mid-point method.
4. Implementation of polygon filling using Flood-fill, Boundary-fill and Scan-line algorithms.
5. Implementation of 2D transformation: Translation, Scaling, Rotation, Mirror Reflection and Shearing (write a menu driven program).
6. Implementation of Line Clipping using Cohen-Sutherland algorithm and Bisection Method.
7. Implementation of Polygon Clipping using Sutherland-Hodgman algorithm.
8. Implementation of 3D geometric transformations: Translation, Scalind and rotation.
9. Implementation of Curve generation using Interpolation methods.
10. Implementation of Curve generation using B-spline and Bezier curves.
11. Implementation of any one of Back face removal algorithms such as Depth-Buffer algorithm, Painter's algorithm, Warnock's algorithm, Scanline algorithm).

COMPUTER NETWORKS LAB (PCS-552)

1. Implementation of the Data Link Layer framing method such as character stuffing and bit stuffing.
2. Implementation of CRC algorithm.
3. Implementation of a Hamming (7,4) code to limit the nois e. We have to code the 4 bit data in to 7 bit data by adding 3 parity bits.
4. Implementation of LZW compression algorithm.
5. Write a socket program to implement a listener and a talker.
6. Simulation of a network of 3 nodes and measure the performance on the same network.
7. Write a program to encrypt 64-bit text using DES algorithm.

ALGORITHMS LABORATORY (PCS-553)

Programming assignments on each algorithmic strategy:

1. Divide and conquer method (quick sort, merge sort, Strassen's matrix multiplication),
2. Greedy method (knapsack problem, job sequencing, optimal merge patterns, minimal spanning trees).
3. Dynamic programming (multistage graphs, OBST, 0/1 knapsack, traveling sales person problem).
4. Back tracking (n-queens problem, graph coloring problem, Hamiltonian cycles).
5. Sorting: Insertion sort, Heap sort, Bubble sort
6. Searching: Sequential and Binary Search
7. Selection: Minimum/ Maximum, Kth smallest element

ADVANCE JAVA LAB (PCS-555)

At least following must be completed

1. Development of dynamic website of an online Departmental Store. The website should be user friendly and should have the following pages:
    - Home page
    - Registration and user login
    - User profile page
    - Items catalog
    - Shopping cart
    - Payment by credit card
    - Order confirmation
2. Add validations to the above site for registration, user login, user profile and payment by credit card using Java Script.
1. Creation of a JavaBean which gives the converted value of Temperature (in degree celcius) into equivalent Fahrenheit
2. Creation of a simple Bean with a label – which is a "count" of number of clicks. Then create a BeanInfo class such that only the "count" is visible in the Property Window.
3. Creation of two Beans a) Keypad b) Display pad. After that integrate the two beans to make it work as a calculator.
4. Do the assignment 2 using JSP by converting the static web pages of assignment 2 into dynamic web pages. Create database with User Information and Item information. The Item catalog should be dynamically loaded from the database.
5. Implementation of currency converter program using JSP Struts Framework.

OPERATING SYSTEMS (TCS-601)

Unit -I

Introduction: Operating System and Function, Evolution of Operating System, Batch, Interactive, Time Sharing and Real Time System, System Protection. Operating System Structure: System Components, System Structure, Operating System Services.

Unit - II

Concurrent Processes: Process Concept, Principle of Concurrency, Producer / Consumer Problem, Critical Section Problem, Semaphores, Classical Problems in Concurrency, Inter Processes Communication, Process Generation, Process Scheduling, Threads.

CPU Scheduling: Scheduling Concept, Performance Criteria, Scheduling Algorithm Evolution, Multiprocessor Scheduling.

Unit - III

Deadlock: System Model, Deadlock Characterization, Prevention, Avoidance and Detection, Recovery from Deadlock, Combined Approach.

Memory Management: Basic Machine, Resident Monitor, Multiprogramming with Fixed Partition, Multiprogramming with Variable Partition, Multiple Base Register, Paging, Segmentation, Paged Segmentation, Virtual' Memory Concept, Demand Paging, Performance, Paged Replaced Algorithm, Allocation of Frames, Thrashing, Cache Memory Organization, Impact on Performance.

Unit - IV

File Concept: Access Methods, Directory Structure, File System Mounting, File Sharing, Protection, File System Structure, File System Implementation, Directory Implementation, Allocation Methods, Free space Management, Kernel I/O Subsystems, Disk Structure, Disk Scheduling, Disk Management, Swap, Space Management.

UNIT V

Linux overview: Kernel Architecture, Process, memory, file and I/O management, Interprocess communication and synchronization, Security.

Windows XP: System architecture, system management mechanisms, process, thread, memory and file management, I/O subsystem, Interprocess communication, Security.

Suggested Books and References:

1. Milenekovie , "Operating System Concept", McGraw Hill.
2. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, “Operating System Concepts”, John Wiley & Sons (ASIA) Pvt. Ltd, Seventh edition, 2005
3. Harvey M. Deitel, Paul J. Deitel, and David R. Choffnes, “Operating Systems”, Prentice Hall, Third edition, 2003
4. Petersons, "Operating Systems", Addision Wesley.
5. Tannenbaum, "Operating System Design and Implementation", PHI.
6. Stalling, Willium, "Operating System", Maxwell Macmillan
7. Gary Nutt, "Operating System, A Modern Perspective", Addision Wesley.

COMPILER DESIGN (TCS-602)

Unit-I

Introduction to Compiler, Phases and passes, Bootstrapping, Finite state machines and regular expressions and their applications to lexical analysis, Implementation of lexical analyzers, lexical-analyzer generator, LEXcompiler,

Formal grammars and their application to syntax analysis, BNF notation, ambiguity, YACC. The syntactic specification of programming languages : Context free grammars, derivation and parse trees, capabilities of CFG.

Unit-II

Basic Parsing Techniques: Parsers, Shift reduce parsing, operator precedence

parsing, top down parsing, predictive parsers Automatic Construction of efficient Parsers : LR parsers, the canonical Collection of LR(0) items, constructing SLR parsing tables, constructing Canonical LR parsing tables, Constructing LALR parsing tables, using ambiguous grammars, an automatic parser generator, implementation of LR parsing tables, constructing LALR sets of items.

Unit-III

Syntax-directed Translation: Syntax-directed Translation schemes,

Implementation of Syntax- directed Translators, Intermediate code, postfix notation, Parse trees & syntax trees, three address code, quadruple & triples, translation of assignment statements, Boolean expressions, statements that alter the flow of control, postfix translation, translation with a top down parser.

More about translation: Array references in arithmetic expressions, procedures call, declarations, case statements.

Unit-IV

Symbol Tables: Data structure for symbols tables, representing scope information. Run-Time Administration: Implementation of simple stack allocation scheme, storage allocation in block structured language. Error Detection & Recovery: Lexical Phase errors, syntactic phase errors semantic errors.

Unit-V

Introduction to code optimization: Loop optimization, the DAG representation of basic blocks, value numbers and algebraic laws, Global Data-Flow analysis.

Implementation of a subset of C using YACC.

References:

1. Aho, Sethi & Ullman, "Compiler Design", Addision Wesley/ Pearson.
2. O. G. Kakde; Compiler Design,4/e; Universities Press (2008)
3. Chattopadhyay Santanu; Compiler Design; Phi Learning (2009)

ARTIFICIAL INTELLIGENCE (TCS-603)

UNIT I

Introduction: History of AI, Intelligent agents – Structure of agents and its functions, Problem spaces and search - Heuristic Search techniques – Best-first search, Problem reduction - Constraint satisfaction - Means Ends Analysis.

UNIT II

Knowledge Representation: Approaches and issues in knowledge representation, Knowledge Based Agent, Propositional Logic, Predicate logic – Unification – Resolution, Weak slot – filler structure, Strong slot - filler structure.

UNIT III

Reasoning under uncertainty: Logics of non-monotonic reasoning, Implementation, Basic probability notation, Bayes rule, Certainty factors and rule based systems, Bayesian networks, Dempster - Shafer Theory, Fuzzy Logic.

UNIT IV

Planning and Learning: Planning with state space search, conditional planning, continuous planning, Multi-Agent planning. Forms of learning - inductive learning - Reinforcement Learning - learning decision trees - Neural Net learning and Genetic learning

UNIT V

Advanced Topics: Game Playing: Minimax search procedure - Adding alpha-beta cutoffs.
Expert System: Representation - Expert System shells - Knowledge Acquisition.
Swarm Intelligent Systems – Ant Colony System, Development, Application and Working of Ant Colony System.

TEXT BOOKS

1. Elaine Rich, Kevin Knight and Shivashankar B.Nair, “Artificial Intelligence”, Tata McGraw-Hill, Third edition, 2009. (UNITs I, II, III & V)
2. Stuart J. Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach", Pearson Education Asia, Second edition, 2003. (UNIT IV)
3. N. P. Padhy, “Artificial Intelligence and Intelligent System”, Oxford University Press, Second edition, 2005. (UNIT V)

REFERENCES

1. Rajendra Akerkar, “Introduction to Artificial Intelligence”, Prentice-Hall of India, 2005.
2. Patrick Henry Winston, “Artificial Intelligence”, Pearson Education Inc., Third edition, 2001.
3. Eugene Charniak and Drew Mc Dermott, “Introduction to Artificial Intelligence", Addison-Wesley, ISE Reprint, 1998.
4. Nils J.Nilsson, “Artificial Intelligence - A New Synthesis", Harcourt Asia Pvt. Ltd., Morgan Kaufmann, 1988.

GRAPH THEORY (TCS 604)

Graph theoretic algorithms must be provided wherever required to solve the problems.

Unit- I

Graphs, Sub graphs, some basic properties, various example of graphs & their sub graphs, walks, trails, path & circuits, connected graphs, disconnected graphs and component, various operation on graphs, Euler graphs, Hamiltonian paths and circuits, the traveling salesman problem, directed graphs, some types of directed graphs, directed paths and connectedness, Hamiltonian and Euler digraphs.

Unit- II

Trees and fundamental circuits, distance diameters, radius and pendent vertices, rooted and binary trees, on counting trees, spanning trees, fundamental circuits, finding all spanning trees of a graph and a weighted graph, trees with directed edges, fundamental circuits in digraph, algorithms of Prim, Kruskal and Dijkstra.

Unit -III

Cuts sets and cut vertices, some properties, all cut sets in a graph, fundamental circuits and cut sets, connectivity and separability, network flows, planer graphs, Euler's formula and its corollaries, Kuratowski's theorem and its application to planarity detection of graphs, combinatorial and geometric dual, some more criterion of planarity, thickness and crossings.

Unit -IV

Incidence matrix of graph, sub matrices of A(G), circuit matrix, cut set matrix, fundamental circuit matrix and rank of B, path matrix and relationships among A_f, B_f & C_f, adjacency matrices, adjacency matrix of a digraph, matrices A, B and C of digraphs, rank- nullity theorem, coloring and covering and partitioning of a graph, chromatic number, chromatic partitioning, chromatic polynomials, matching, covering, enumeration, types of enumeration, counting of labeled and unlabeled trees.

References:

1. *Deo, N: Graph theory, PHI*
2. *Bondy and Murthy: Graph theory and application. Addison Wesley.*
3. *John M. Aldous and Robin J. Wilson: Graphs and Applications-An Introductory Approach, Springer*
4. *Robin J, Wilson: Introduction to Graph Theory, Addison Wesley.*

Visual Programming & DotNet Technologies (TCS-605)

UNIT 1 The Philosophy of .NET

Understanding the previous states affair, The .NET Solution, The building Block of the .NET platform (CLR,CTS,CLS), the role of the .NET base class libraries, C# characteristics, additional .NET Aware programming Languages, An overview of .NET binaries (assemblies), The role of the common intermediate language, The role of .NET type metadata, The role of the assembly manifest, Compiling CIL to platform specific instruction, Understanding the common type system, Intrinsic CTS data types, Understanding the common languages specification, Understanding the common languages runtime, A tour of the .NET namespace, increasing your namespace nomenclature, Deploying the .NET runtime.

UNIT 2 Building C# Applications

The role of the command line compiler (CSC.exe), Building application using csc.exe, Working with csc.exe response file, generating bug reports, C# compiler option, The command line debugger, using the visual studio .Net IDE, Other key aspects of the VS.Net IDE, Documenting source code via XML, C# preprocessor directives, An interesting Aside: The System. Environment class.

C# Language Fundamentals : An Anatomy of a basic class, Creating objects: Constructor basic, the composition of an application, Default Assignment and variable scope, member initialization syntax, Basic input and output with the console class, Understanding value types and reference types, The master node: System. Objects, The system Data type (And C# aliases), Converting between value type and reference type: Boxing and Unboxing, Defining program constraints, Iterations constructs, control flow constructs, The complete set operator, Defining Custom class methods, Understanding static methods, Method parameter modifiers, Array manipulation, String manipulation, Enumerations, Defining structures, Defining custom namespaces.

UNIT 3 Object Oriented Programming with C#

Formal definition of the class, Definition the "Default public interface" of a type, Recapping the pillars of OOP, The first pillar: Encapsulation services, Pseudo Encapsulation: Creating read only field, The second pillar: Inheritance supports keeping family secrets: The "Protected" keyword, The Nested type definitions, The third pillar: Polymorphic support casting between types, Generating class definitions using Visual Studio.

Net. Exceptions and Objects Life Time Ode to errors, Bugs and exceptions, The role of .NET exceptions handling, The system. Exception base class throwing a generic exception catching exception, CLR system level exception (System. system exception),Custom application level exception (System. application exception), Handling multiple exception, The finally block The last chance exception, dynamically identify application and system level exception, Debugging system exception using VS.Net, Understanding Object life time, The CIT of new, The basic of garbage collection, Finalizing a type, Finalization process, building and Ad hoc destruction method, garbage collection optimization, The system .GC type.

UNIT 4 Interfaces and Collections

Defining interfaces using C#, Invoking interface member at the object level, Exercising the shape hierarchy, Understanding explicit interface implementation, Interfaces as Polymorphic agents, Building interface hierarchies, Implementing interface using VS.Net, Understanding the Iconvertible interface, Building a custom enumerator, Building cloneable objects, Building comparable objects, Exploring the system the collection namespace, Building a custom container (Retrofitting the cars type).

UNIT 5

Understanding .Net Assembles Problems with classic COM Binaries, An overview of .Net assembly, Building a simple file test assembly, A C# Client Application, A Visual Basic .Net Client application, Cross Language Inheritance, Exploring the Carlibrary's manifest, Exploring the Carlibrary's Types, Building the multi file assembly, Using the multi file assembly, Understanding private assemblies, Probing for private assemblies (The Basics), Private assemblies and XML Configuration files, Probing for private assemblies (The details),Understanding Shared assembly, Understanding Shared Names, Building a Shared assembly, Understanding delay Signing, Installing/Removing shared assemblies, Using a Shared assembly.

Text Book:

1. Andrew Troelsen; Pro C# 2008 And The . Net 3. 5 Platform, 4Th Ed**; D**reamtech Press
2. Bill Evjen, Christian Nagel, Karli Watson, Jay Glynn, Morgan Skinner; Proffessional C# 2008
3. Joel Murach; Murach's C# 2008; Shroff/murachs (2008)

PRINCIPLES OF MANAGEMENT (THU-608)

UNIT 1
INTRODUCTION TO MANAGEMENT: Theories of management: Traditional behavioral, contingency and systems approach. Organization as a system.

UNIT 2
MANAGEMENT INFORMATION: Interaction with external environment. Managerial decision making and MIS.

UNIT 3
PLANNING APPROACH TO ORGANIZATIONAL ANALYSIS: design of organization structure; job design and enrichment; job evaluation and merit rating.

UNIT 4
MOTIVATION AND PRODUCTIVITY: Theories of motivation, leadership styles and managerial grid. Co-ordination, monitoring and control in organizations. Techniques of control. Japanese management techniques. Case studies.

TEXT BOOK:

1. Peter Drucker, Harper and Row: The Practice of Management.
2. Koontz: Essentials of Management, PHI Learning.
3. Staner: Management, PHI Learning.
4. Daft: Principles of Management, Cengage Learning.
5. T. N. Chhabra: Principle and Practice of Management, Dhanpat Rai, New Delhi.
6. Hirschey: Managerial Economics, Cengage Learning.
7. T. R. Banga and S.C. Sharma: Industrial Organisation and Engineering Economics, Khanna Publishers.
8. O.P. Khanna: Industrial Engineering and Management, Dhanpat Rai.
9. Joel Dean: Managerial Economics, PHI learning.
10. V. L. Mote, Samuel Paul and G.S. Gupta: Managerial Economics Concepts & Cases, TMH, New Delhi.

OPERATING SYSTEMS LAB (PCS-651)

1. Simulation of the CPU scheduling algorithms a) Round Robin b) SJF c) FCFS d) Priority
2. Simulation of MUTEX and SEMAPHORES.
3. Simulation of Bankers Deadlock Avoidance and Prevention algorithms.
4. Implementation of Process Synchronization (Reader-Writer, Sleeping Barber and Dining Philosopher's Problem)
5. Simulation of page Replacement Algorithms a) FIFO b) LRU c) LFU
6. Simulation of paging techniques of memory management.
7. Simulation of file allocation Strategies a) Sequential b) Indexed c) Linked
8. Simulation of file organization techniques a) Single Level Directory b) Two Level c) Hierarchical d) DAG

COMPILER DESIGN LAB (PCS-652)

1. Simulation of a Finite state Automata to recognize the tokens of various control statements.
2. Simulation of a Finite state machine to distinguish among Integers, Real Numbers & Numbers with Exponents.
3. Program in LEX tool to recognize the tokens and to return the token found for a C like Language
4. Parsing of arithmetic and algebraic expressions and equations.
5. Use of YACC tool to parse the statements of C like Language.

ARTIFICIAL INTELLIGENCE LAB (PCS-653)

1. Write a LISP Program to solve the water-jug problem using heuristic function.
2. Create a compound object using Turbo Prolog.
3. Write a Prolog Program to show the advantage and disadvantage of green and red cuts.
4. Write a prolog program to use of BEST-FIRST SEARCH applied to the eight puzzle problem.
5. Implementation of the problem solving strategies: Forward Chaining, Backward Chaining, Problem Reduction.
6. Write a Lisp Program to implement the STEEPEST-ASCENT HILL CLIMB ING.
7. Write a Prolog Program to implement COUNTE PROPAGATION NETWORK.

Visual Programming Lab. (PCS-655)

At least following should be covered

Starting with simple exercise given in the text book regarding C# language constructs (flow control structures, data types, file I/O and local libraries) the lab must graduate to a full project using GUI forms for data entry (with validation) processing, querying and reporting on .Net platform with database connectivity.

UTTARAKHAND TECHNICAL UNIVERSITY

Program: B. Tech-CSE

Year: Session: 2012 – 2013

Scheme and Evaluation Pattern

S.No	Course No.	Subject	Periods			Evaluation				Total Marks
			L	T	P	Sessional			External Exam	
						CT	TA	Total		
Semester:7th										
Theory										
1.	TCS- 701	System Administration	3	1	0	30	20	50	100	150
2.	TCS -702	Advance Computer Architecture	3	1	0	30	20	50	100	150
3.	TCS -703	Data Warehousing & Mining	3	1	0	30	20	50	100	150
4.	TCS-07X	ELECTIVE-I	3	1	0	30	20	50	100	150
5.	TOE-XX	Open Elective	3	1	0	30	20	50	100	150
Practical/Design										
1.	PCS -757	Project	0	0	4	0	0	50	50	100
2.	PCS-758	Industrial Interaction/ Seminar (Term Paper)	0	0	2	0	0	25	25	50
3.	PCS-751	System Administration Lab	0	0	2	0	0	25	25	50
4.		**Discipline**	0	0	0	0	0	50	0	50
Semester: 8th										
Theory										
S.No	**Course No.**	**Subject**	**Periods**			**Evaluation**				**Total Marks**
			L	T	P	Sessional			External Exam	
						CT	TA	Total		
1.	TCS -801	Distributed Computing	3	1	0	30	20	50	100	150
2.	TCS-802	Web Technology	3	1	0	30	20	50	100	150
3.	TCS-08X	ELECTIVE-II	3	1	0	30	20	50	100	150
4.	TCS-08X	ELECTIVE-III	3	1	0	30	20	50	100	150
Practical/Project										
1.	PCS-857	Project	0	0	6	0	0	100	200	300
2.	PCS-852	Web Technology Lab.	0	0	2	0	0	50	0	50
3.		**Discipline**	0	0	0	0	0	50	0	50

ELECTIVE-I

TCS-071	Digital Image Processing
TCS-072	Fault Tolerant Computing
TCS-073	Wireless Networks
TCS-074	Soft Computing

ELECTIVE-II

TCS-081	Parallel Computing
TCS-082	Database Administration
TCS-083	Adv. Computer Network
TCS-084	Information Security

ELECTIVE-III

TCS-086	Computer Vision
TCS-087	Advanced DBMS
TCS-088	Intrusion Detection Systems
TCS-089	Cryptography & Network Security

SYSTEM ADMINISTRATION (TCS-701/TIT-701)

Unit-I

Introduction: Duties of the Administrator, Administration tools, Overview of permissions. Processes: Process status, Killing processes, process priority. Starting up and Shut down: Peripherals, Kernel loading, Console, The scheduler, init and the inittab file, Run-levels, Run level scripts.

Managing User Accounts: Principles, password file, Password security, Shadow file, Groups and the group file, Shells, restricted shells, user management commands, homes and permissions, default files, profiles, locking accounts, setting passwords, Switching user, Switching group, Removing users.

Unit - II

Managing Unix File Systems: Partitions, Swap space, Device files, Raw and Block files, Formatting disks, Making file systems, Superblock, I-nodes, File system checker, Mounting file systems, Logical Volumes, Network File systems, Boot disks

Configuring the TCP/IP Networking : Kernel Configuration; Mounting the /proc File system, Installing the Binaries, Setting the Hostname, Assigning IP Addresses, Creating Subnets, Writing hosts and networks Files, Interface Configuration for IP, ifconfig, netstat command, Checking the ARP Tables; Name service and resolver configuration.

Unit- III

TCP/IP Firewall : Methods of Attack, What Is a Firewall? What Is IP Filtering? Setting Up Linux for Firewalling Testing a Firewall Configuration; A Sample Firewall Configuration: IPAccounting, Configuring the Kernel for IP Accounting, Configuring IP Accounting, Using IPAccounting Results

IP Masquerade and Network Address Translation : Side Effects and Fringe Benefits, Configuring the Kernel for IP Masquerade, Configuring IP Masquerade.

Unit-IV

The Network Information System : Getting Acquainted with NIS, NIS Versus NIS+ , The Client Side of NIS, Running an NIS Server, NIS Server Security.

Network file system: Preparing NFS, Mounting an NFS Volume, The NFS Daemons, The exports File.

System Backup & Recovery: Log files for system and applications; Backup schedules and methods (manual and automated).

Unit- V

Active Directory, LDAP

Text Books:

1. L.L. Beck – "System Software " (3rd Ed.)- Pearson Education
2. Michel Ticher – "PC System Programming", Abacus
3. Kirch – " Linux network Administrator's guide (2nd Ed.)" – O'Rielly
4. Maxwell – "Unix system administration" – TMH
5. Limoncelli –"The Practice of System & Network Administration"-Pearson
6. Wells, LINUX Installation & Administration, Vikas

Reference Books:

E. Nemeth, G. Snyder, S. Seebass, T. R. Hein – " Unix system administration handbook" – Pearson Education

ADVANCE COMPUTER ARCHITECTURE (TCS - 702)

Unit 1

Parallel computer models: The state of computing, Classification of parallel computers, Multiprocessors and multicomputers, Multivector and SIMD computers.

Program and network properties: Conditions of parallelism, Data and resource Dependences, Hardware and software parallelism, Program partitioning and scheduling, Grain Size and latency, Program flow mechanisms, Control flow versus data flow, Data flow Architecture, Demand driven mechanisms, Comparisons of flow mechanisms

Unit 2

System Interconnect Architectures: Network properties and routing, Static interconnection Networks, Dynamic interconnection Networks, Multiprocessor system Interconnects, Hierarchical bus systems, Crossbar switch and multiport memory, Multistage and combining network.

Advanced processors: Advanced processor technology, Instruction-set Architectures, CISC Scalar Processors, RISC Scalar Processors, Superscalar Processors, VLIW Architectures, Vector and Symbolic processors

Unit 3

Pipelining: Linear pipeline processor, nonlinear pipeline processor, Instruction pipeline Design, Mechanisms for instruction pipelining, Dynamic instruction scheduling, Branch Handling techniques, branch prediction, Arithmetic Pipeline Design

Memory Hierarchy Design: Cache basics & cache performance, reducing miss rate and miss penalty, multilevel cache hierarchies, main memory organizations, design of memory hierarchies. Memory consistency models: SC, PC,WO/WC, RC;

Unit 4

Multiprocessor architectures: Symmetric shared memory architectures, distributed shared memory architectures, cache coherence protocols (MSI, MESI, MOESI), scalable cache coherence, overview of directory based approaches, design challenges of directory protocols, memory based directory protocols, cache based directory protocols, synchronization. Introduction of OpenMP and MPI, threads, mutex etc.

Unit 5

Introduction to multi-core architectures, multiprocessor Chip architecture case studies: Intel core 2 duo, Core i3, Core i5

Text Books:

1. Kai Hwang, "Advanced computer architecture"; TMH. 2000
2. D. A. Patterson and J. L. Hennessey, "Computer organization and design", Morgan Kaufmann, 2nd Ed. 2002
3. www.intel.com

Reference Books:

1. J.P. Hayes, "computer Architecture and organization"; MGH. 1998.
2. V. Rajaranam & C.S.R. Murthy, "Parallel computer- Theory and practices"; PHI. 2002.
3. J. Quin, "Parallel Computing", TMH
4. R.K. Ghose, Rajan Moona & Phalguni Gupta, "Foundation of Parallel Processing", Narosa Publications, 2003
5. Kai Hwang and Zu, "Scalable Parallel Computers Architecture", MGH. 2001
6. Stalling W, "Computer Organization & Architecture", PHI. 2000
7. D.A. Patterson, J.L. Hennessy, "Computer Architecture :A quantitative approach"; Morgan Kauffmann, 2002.

DATA MINING AND DATA WAREHOUSING (TCS-703/TIT-702)

UNIT I

Data Preprocessing, Language, Architectures, Concept Description: Preprocessing, Cleaning, Integration, Transformation, Reduction, Discretization, Concept Hierarchy Generation, Data Mining Primitives, Query Language, Graphical User Interfaces, Architectures, Concept Description, Data Generalization, Characterizations, Class Comparisons, Descriptive Statistical Measures.

UNIT II

Association Rule: Association Rule Mining, Single-Dimensional Boolean Association Rules from Transactional Databases, Multi-Level Association Rules from Transaction Databases-mining multidimensional Association rules –association mining to correlation analysis-constraint based association mining.

UNIT III

Classification and Prediction: Classification and Prediction, Issues, Decision Tree Induction, Bayesian Classification, Association Rule Based, Other Classification Methods, Prediction, Classifier Accuracy.

UNIT IV

Cluster Analysis: Cluster Analysis, Types of data, Categorization of methods, Partitioning methods, hierarchical methods, density based methods, grid based methods - Outlier Analysis. Recent trends - Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Databases, Multimedia Databases, Time Series and Sequence Data, Text Databases, World Wide Web, Applications and Trends in Data Mining

UNIT V

Data Warehousing: Introduction, Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Implementation - Data Warehousing to Data Mining -Data warehousing components-building a data warehouse – mapping the data warehouse to an architecture – data extraction - cleanup- transformation tools- metadata – OLAP - Patterns and models – Data visualization principles.

TEXT BOOKS

1. J. Han and M. Kamber, “Data Mining: Concepts and Techniques”, Harcourt India /Morgan Kauffman, 2001. (UNITs 1 to IV)
2. Alex Berson and Stephen J. Smith, “Data Warehousing, Data mining and OLAP”, Tata McGraw-Hill, 2004. (UNIT V)

REFERENCES

1. Margaret H. Dunham, “Data Mining: Introductory and Advanced Topics”, Pearson Education, 2004.
2. Sam Anahory and Dennis Murry, “Data Warehousing in the Real World”, Pearson Education, 2003.

DIGITAL IMAGE PROCESSING (TCS-071)

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.

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.

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

SOFT COMPUTING (TCS-072/TIT-074)

Unit –I

Introduction to soft computing. Applications of Artificial Neural Networks, fuzzy logic, genetic algorithms and other soft-computing techniques. Their strengths and weaknesses. Synergy of soft computing techniques. Artificial neural networks : over view of history, Mathematical Models of Neurons, ANN architecture.

Unit-II

Introduction to artificial neural network

Neural Networks: Learning rules, Learning Paradigms-Supervised, Unsupervised and reinforcement Learning, ANN training Algorithms-perceptions, Training rules, Delta, Back Propagation Algorithm, Multilayer Perceptron Model, Competitive learning networks, Kohonen self organizing networks, Hebbian learning; Hopfield Networks,

Unit-III

Fuzzy Logic: Introduction to Fuzzy Logic, Classical and Fuzzy Sets: Overview of Classical Sets, Membership Function, Fuzzy rule generation. Operations on Fuzzy Sets: Compliment, Intersections, Unions, Combinations of Operations, Aggregation Operations. Fuzzy Arithmetic: Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations.

Unit - IV

Genetic algorithms(Gas), Evolution strategies(Ess), Evolutionary programming(EP), Genetic Programming(GP),Selecting, crossover, mutation, schema analysis, analysis of selection algorithms; convergence; Markov & other stochastic models.

Unit - V

Other Soft computing approaches Simulated Annealing, Tabu Search, Ant colony based optimization.

Text:

1. "Neuro-Fuzzy and Soft computing", Jang, Sun, Mizutani, Pearson
2. "Neural networks: a comprehensive foundation", Haykin,
3. "Genetic Algorithms", Goldberg,
4. "Fuzzy Sets & Fuzzy Logic", G.J. Klir & B. Yuan, PHI.

Reference:

1. Anderson J.A., "An Introduction to Neural Networks", PHI, 1999
2. Hertz J. Krogh, R.G. Palmer, "Introduction to the Theory of Neural Computation", Addison- Wesley, California,
3. Melanie Mitchell, "An Introduction to Genetic Algorithm", PHI, 1998.
4. "Neural Networks-A Comprehensive Foundations", Prentice-Hall International, New Jersey, 1999
5. Freeman J.A. & D.M. Skapura, "Neural Networks: Algorithms, Applications and Programming Techniques", Addison Wesley, Reading, Mass, (1992).

WIRELESS NETWORKS (TCS-073/TIT-073)

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

Tthe 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

Text 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

INFORMATION SECURITY (TCS-074/TIT-703)

UNIT I

Introduction: Security problem in computing, Secure system characteristics, What to secure –How to secure- at what cost?

Elementary Cryptography – DES – AES – Public Key Encryption – Uses of Encryption.

UNIT II

Program Security: Security Programs – Non-malicious Program Errors – Virus and other Malicious Code – Targeted Malicious Code – Control against program Threats.

UNIT III

Security in Operating Systems: Protected Objects and Methods of Protection – Memory and Address Protection –Control of Access generated Objects – File Protection Mechanisms – User Authentication – Trusted Operating Systems – Models of Security.

UNIT IV

Database and Network Security: Database Security Requirements – reliability and integrity – Sensitive Data – Inference – Multilevel Databases and Multilevel Security – Threats in Networks –Network Security Controls – Firewalls – Intrusion Detection Systems – Secure Email.

UNIT V

Administering Security and Ethical Issues: Security Planning – Risk Analysis – Organizational Security Policies – Physical Security – Protecting Programs and Data – Information and the Law –Software Failures – Computer Crime – Privacy – Ethical Issues.

TEXT BOOK

1. Charles B. Pfleeger, and Shari Lawrence Pfleeger, "Security in Computing", Pearson Education, Third edition, 2003.

REFERENCES

1. Matt Bishop, "Computer Security – Art and Science", Pearson Education, First edition, 2003.
2. William Stallings, "Cryptography and Network Security – Principles and Practices", Prentice-Hall of India, Third edition, 2003.
3. Atul Kahate, "Cryptography and Network Security", Tata McGraw-Hill, 2003.

SYSTEM ADMINISTRATION LAB (PCS-751/PIT-751)

1. Installation of operating system (Window 7 and LINUX)
2. Installation of office productivity software (MS Office/ Open Office)
3. User Management
4. Security Management
5. Startup & Shutdown scripts
6. Network planning – subnet creation
7. Firewall configuration
8. Basic properties of Windows Registry
9. Study of Important Windows Services
10. Study of Important LINUX Services

PROJECT (PCS-757)

The project is intended to develop and test complete understanding of various ICT Technologies for practical real life applications. Proper project work is necessary for over all development of the student. Its need cannot be over emphasized for improving employability of the students.

Students must work for at least 50 hours to develop the project. Project topic must be decided within first two weeks of the start of the semester.

INDUSTRIAL INTERACTION/ SEMINAR (TERM PAPER) (PCS-758)

It will involve documentation of technical activities of some prominent industry/company in IT field by a group of students (not more than 4). Students must deliver a seminar on current technology in covered in the syllabus which must be submitted as hard copy document in the form of a term paper.

DISTRIBUTED COMPUTING (TCS-801/TIT-087)

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.

Unit–II

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.

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.

Unit–III

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

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

Unit–IV

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

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

Unit –V

Introduction to Grid Computing: Basics of grid Computing, Benefits of grid computing, Grid terms and concepts, Grid user roles, Standards for grid environments, Grid security requirements.

Introduction to Cloud Computing: basics of cloud computing, Layers of Cloud Computing, types of cloud computing, Cloud Computing Features, Cloud Computing Security requirements, Cloud Computing Challenges.

Books:

1. Singhal & Shivaratri, "Advanced Concept in Operating Systems", McGraw Hill
2. Coulouris, Dollimore, Kindberg, "Distributed System: Concepts and Design", Pearson Ed.

INTRODUCTION TO WEB TECHNOLOGY (TCS-802/TIT-603)

UNIT I:

Internet Principles and Components: History of the Internet and World Wide Web-HTML; protocols – HTTP, SMTP, POP3, MIME, IMAP. Domain Name Server, Web Browsers and Web Servers

UNIT II: HTML, DHTML and XML

List, Tables, Images, Forms, Frames, CSS Document type definition, Dynamic HTML, XML schemes, Object Models, Presenting XML, Using XML Processors: DOM and SAX, Introduction to Java Script, Object in Java Script, Dynamic HTML with Java Script.

UNIT III: Web Services

Introduction to Web Services, UDDI, SOAP, WSDL, Web Service Architecture, Developing and deploying web services. Ajax – Improving web page performance using Ajax, Programming in Ajax. CORBA,

UNIT IV: Web 2.0

Interactive and social web**: Blogs, wikis, and social networking sites – The technology behind these applications- AJAX,** RSS and syndication, Ruby on Rails, Open APIs,

UNIT V:

Web 3.0: Semantic Web, Widgets, drag & drop mashups (iGoogle) **- The technology behind these applications- RDF**

Web based Information Systems, Search engines, Recommender Systems, Web Mining

Books:

1. Burdman, "Collaborative Web Development" Addison Wesley.
2. Chris Bates, "Web Programing Building Internet Applications", 2nd Edition, WILEY, Dreamtech
3. Joel Sklar , "Principal of web Design" Vikash and Thomas Learning
4. Jon Duckett, "Beginning Web Programming with HTML, XHTML, and CSS", Wiley India Pvt Ltd (June 2008)
5. http://ugweb.cs.ualberta.ca/~c410/F06/schedule/index.html

PARALLEL COMPUTING (TCS-081)

UNIT-1

Introduction: What is parallel and distributed computing, Scope of parallel and distributed computing, Scope of parallel computing. Parallel Programming Platforms: implicit parallelism, Dichotomy of parallel computing platforms, Physical organization for parallel platforms, communication cost in parallel machines, routing mechanism for interconnection networks.

UNIT-2

Basic Communication Operation: One-to-all broadcast; All-to-all broadcast; Reduction and prefix sums; One-to-all personalized communication; All-to-all personalized communication;

UNIT-3

Performance and Scalability of Parallel Systems: Performance matrices for Parallel systems ? Run time, Speed up, Efficiency and Cost; The effect of granularity on performance

UNIT-4

Sorting: Sorting networks; Bubble sort and its variants; Quick sort and other sorting algorithms

UNIT-5

Dynamic Programming: Overview of dynamic programming, Serial monadic DP Formulations: The shortest path Problem, the 0/1 Knapsack Problem, Serial Polyadic DP Formulation : all pair shortest paths algorithms.

References:

1. Vipin Kumar, Ananth Grama, Anshul Gupta and George Karypis; Introduction to Parallel Computing, The Benjamin/Cumming Publishing Company, Inc., Masschachusetts
2. George Coulouris, Jean Dollimore and Tim Kindberg; Distributed Systems Concepts and Design, Addison-Wesley, Masschachusetts
3. S G Akl; The Decision and analysis of parallel algorithms, PH Englewood Cliffs, New Jersey.
4. Advanced Computer Architecture: Parallelism, Scalability, Programmability, TMH.
5. J Jaja; An Introduction to Parallel Algorithms, Addison Wesley, Masschachusetts
6. T G Lewis and H E Rewini; Introduction to Parallel Computing, Prentice-Hall, Englewood Cliffs, New Jersey
7. M J Quinn; Parallel Computing: Theory and Practice, McGraw-Hill, New York.

DATABASE ADMINISTRATION (TCS-082/TIT-083)

Any of MySQL, Oracle, DB2 or Microsoft SQL Server may be used. Replace Oracle word with the selected RDBMS.

UNIT 1 DBA Fundamental I

Oracle Architectural Components, Getting Started With Oracle Server , Managing an Oracle Instance, Creating a Database, Data Dictionary Contents and Usage, Maintaining the Control File, Redo Log Files, Managing Tablespaces and Data Files, Storage Structures and Relationships, Managing Undo Data, Tables, Indexes, Maintaining Data Integrity, Managing Password, Managing Security, Resources, users, Privileges & Roles, Loading Data Into a Database & Globalization Support

UNIT 2 DBA Fundamental II

Networking Overview, Basic Oracle Net Architecture, Server-Side Configuration, Basic Oracle Net Services Client-Side Configuration, Usage and Configuration of the Oracle Shared Server, Backup and Recovery Overview, Instance and Media Recovery Structures, Configuring the Database Archiving Mode, Oracle Recovery Manager Overview and Configuration, User Managed Backups, RMAN Backups, User Managed Complete & Incomplete Recovery, RMAN Complete Recovery, Incomplete Recovery & Maintenance, Recovery Catalog Creation and Maintenance, Transporting Data Between Databases

UNIT 3 Performance Tuning

Overview Of Oracle 9i Performance Tuning, Diagnostic and Tuning Tools, Sizing the Shared Pool & the Buffer Cache, Sizing The Other SGA Structures, Database Configuration and I/O Issues, Optimizing Sort Operations, Diagnosing Contention For Latches, Tuning Rollback Segments, Monitoring and Detecting Lock Contention, Tuning The Oracle Shared Server, Application Tuning, Using Oracle Blocks Efficiently
SQL Statement Tuning, Tuning the OS and Using Resource Manager

UNIT 4 Managing Oracle

Oracle10i: Overview, Preparing the Operating System & Install Oracle9i Software, Create a Custom Oracle Database, Install and Configure Enterprise Manager, Customize the Oracle Database
Linux Measurement Tools, Oracle Measurement Tools, Tuning Oracle

UNIT 5 Database Troubleshooting

One Time Troubleshooting, Adhoc Troubleshooting, Escalations, Connectivity, Business Continuity, High Availability and Scalability, Data Sharing and information Integration

BOOKS:
For Oracle:

1. Oracle Database Administrator's Guide
2. Oracle DBA Handbook
3. Oracle DBA on Unix and Linux *by Michael Wessler*

ADVANCE COMPUTER NETWORK (TCS-083/TIT-084)

UNIT I

Network Design: Design Principles - Determining Requirements - Analyzing the Existing Network - Preparing the Preliminary Design - Completing the Final Design Development - Deploying the Network - Monitoring and Redesigning – Maintaining - Design Documentation - Modular Network Design - Hierarchical Network Design - The Cisco Enterprise Composite Network Model.

UNIT II

Technologies - Switching Design: Switching Types - Layer 2 and 3 Switching - Spanning-Tree Protocol - Redundancy in Layer 2 Switched Networks - STP Terminology and Operation – Virtual LANs – Trunks - Inter-VLAN Routing - Multilayer Switching - Cisco Express Forwarding - Switching Security - Switching Design Considerations - **IPv4 Routing Design**: IPv4 Address Design - Private and Public Addresses – NAT - Subnet Masks - Hierarchical IP Address Design - IPv4 Routing Protocols – Classification - Metrics - Routing Protocol Comparison - IPv4 Routing Protocol Selection.

UNIT III

Network Security Design: Hacking – Vulnerabilities - Design Issues - Human Issues - Implementation Issues – Threats - Reconnaissance Attacks - Access Attacks – Information Disclosure Attacks - Denial of Service Attacks - Threat Defense - Secure Communication - Network Security Best Practices - SAFE Campus Design.

UNIT IV

Wireless LAN Design: Wireless Technology Overview - Wireless Standards – Wireless Components - Wireless Security - Wireless Security Issues - Wireless Threat Mitigation – Wireless Management - Wireless Design Considerations - Site Survey - WLAN Roaming - Wireless IP Phones - Quality of Service Design - QoS Models – IntServ - DiffServ154 - QoS Tools – Policing and Shaping - Congestion Avoidance - Congestion Management - Link-Specific Tools1 – QoS Design Guidelines.

UNIT V

Network Management Design: ISO Network Management Standard - Protocols and Tools – SNMP – MIB – RMON - Cisco NetFlow – Syslog – CiscoWorks - Network Management Strategy - SLCs and SLAs - IP Service-Level Agreements – Content Networking Design – Case Study – Venti Systems.

TEXT BOOK

Diane Tiare and Catherine Paquet, “Campus Network Design Fundamentals”, Pearson Education, 2006.

REFERENCE

Craig Zacker, “The Complete Reference: Upgrading and Troubleshooting Networks”, Tata McGraw-Hill, 2000.

FAULT TOLERANT COMPUTING (TCS-084)

UNIT-I

Introduction: Computer and Computation Distribution, System models and Fault models. Test generation for combinational circuits, sequential circuits and Fault simulation.

UNIT-II

Fault Tolerance Concepts- Recovery in time, Fault detection techniques, Modeling Fault tolerant systems - Rollback modular redundancy and Exception Handling.

UNIT-III

Fault Tolerant in Real time Systems - Architecture of Fault - tolerant computers general purpose commercial systems - High availability systems - Critical computations
Fault Tolerant multiprocessor - Communication Architectures, Shared memory

UNIT-IV

Interconnections, loop architectures, Tree Networks, Graph Network and in Binary cube interconnection.

UNIT-V

Fault Tolerant Software - **Design** of fault Tolerant software - Reliability Models, Construction of acceptance tests, validation of Fault tolerant software.

TEXT BOOKS

1. Israel & Krishnan, "Fault Tolerant Systems" Elsevier Publications, 2007.
2. D. K. Pradhan, "Fault Tolerant computing - Theory and Techniques "Prentice Hall.Inc. 1986.

COMPUTER VISION (TCS-086)

UNIT-I

Introduction: Purpose, State of the art

Image Formation: Projection, Sensing, Color

UNIT-II

Image Processing: Filtering (low-pass and median), derivatives, and Edges

UNIT-III

Geometric Calibration: Interior and Exterior Calibration, Rectification

Stereo: Epipolar Geometry, Correspondence, Triangulation, Depth Estimation

UNIT-V

Motion: Detection and Tracking of Point Features, Optical Flow

Object Tracking: Kalman Filter, Condensation, Tracking Humans

Books & References:

1. E. Trucco and A. Verri, *Introductory Techniques for 3-D Computer Vision*, Prentice Hall, 1998
2. Ballard D., Brown C., Computer Vision, Prentice Hall
3. Sonka M., Hlavac V., Boyle R., Image Processing Analysis and Machine Design. PWS Publishers
4. http://www.cs.duke.edu/courses/fall07/cps296.1

ADVANCED DBMS (TCS-087/TIT-089)

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

INTRUSION DETECTION SYSTEMS (TCS-088/TIT-088)

UNIT-I
Intruder types, intrusion methods, processes and detection, message integrity and authentication, honey pots. General IDS model,

UNIT-II
Data mining based IDS, Denning model, data mining framework for constructing features and models for intrusion detection systems. Unsupervised anomaly detection, CV5 clustering, SVM,

UNIT-III
probabilistic and statistical modeling, general IDS model and taxonomy, evaluation of IDS, cost sensitive IDS. NBAD, specification based and rate based DDOS, scans/probes, predicting attacks

UNIT-IV
Network based anomaly detection, stealthy surveillance detection; Defending against DOS attacks in scout: signature-based solutions, snort rules.

Host-based anomaly detection, taxonomy of security flaws in software, self-modeling system calls for intrusion detection with dynamic window size.

UNIT-V
Secure intrusion detection systems, network security, secure intrusion detection environment, secure policy manager, secure IDS sensor, alarm management, intrusion detection system signatures, sensor configuration, signature and intrusion detection configuration, IP blocking configuration, intrusion detection system architecture.

Books

1. Endorf, C., Schultz E. and Mellander J., "Intrusion Detection and Prevention," McGraw-Hill. 2003
2. Bhatnagar, K., "Cisco Security", Course Technology. 2002
3. Marchette, D. J., "Computer Intrusion Detection and Network Monitoring: A Statistical Viewpoint", Springer. 2001
4. Rash, M., Orebaugh, A. and Clark, G., "Intrusion Prevention and Active Response: Deploying Network and Host IPS", Syngress. 2005
5. Cooper, M., Northcutt, S., Fearnow, M. and Frederick, K., "Intrusion Signatures and Analysis", Sams.

CRYPTOGRAPHY AND NETWORK SECURITY (TCS-089/TIT-802)

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 Jersy.
2. Johannes A. Buchmann, "Introduction to Cryptography", Springer-Verlag
3. B. Forouzan, "Cryptography and Network Security, TMH

PROJECT (PCS-857)

The project is intended to develop and test complete understanding of various ICT Technologies for practical real life applications. Proper project work is necessary for over all development of the student. Its need cannot be over emphasized for improving employability of the students.

Students must work for at least 100 hours to develop the project. Project topic must be decided within first two weeks of the start of the semester.

WEB TECHNOLOGY LAB (PCS-852)

At least following must be completed

3. Installation and configuration of Apache server
4. Development of static website of an online Departmental Store. The website should be user friendly and should have the following pages:
    - Home page
    - Registration and user login
    - User profile page
    - Items catalog
    - Shopping cart
    - Payment by credit card
    - Order confirmation
5. Add validations to the above site for registration, user login, user profile and payment by credit card using Java Script.
6. Installation and configuration of TOMCAT web server. Convert the static web pages of assignments 2 into dynamic web pages using servlets and cookies.
7. Creation of a XML document of 20 students of UKTech. Add their roll numbers, marks obtained in 5 subjects, total and percentage and save this XML document at the server. Write a program that takes students' roll number as an input and returns the students marks, total and percentage by taking the students' information from the XML document.
8. Design a website using existing web services (Google map, weather forecast, market information etc.) using AJAX.

UTTARAKHAND TECHNICAL UNIVERSITY
SESSION 2009-10

LIST OF OPEN ELECTIVES-VII SEMESTER
Effective from the session – 2009-10

[List of Open Elective of 7th Semester for B. Tech. Civil/Electrical/Electrical and Electronics/ Mechanical & Allied Courses/ Electronics and Communications & Allied Courses/ Instrumentation and Control & Allied Courses/Computer Science and Engineering & Allied Courses/ Information Technology & Allied Courses/ Biotechnology]

S.No.	P.Code	Subject	Dept.
1.	TOE 01	Non-conventional Energy Resources	Electrical
2.	TOE 02	Reliability Engineering	Electrical
3.	TOE 03	Environment & Ecology	Civil
4.	TOE 04	Geographic Inf. System (GIS) Technology & its Applications	Civil
5.	TOE 05	Entrepreneurship Development Programme	Humanities
6.	TOE 06	Ancient Indian Culture	Humanities
7.	TOE 07	Human Values	Humanities
8.	TOE 08	Quality System & Management	Mechanical
8.	TOE 09	Condition Monitoring & Diagnostics	Mechanical
10.	TOE 10	Value Engineering	Mechanical
11.	TOE 11	Nanotechnology	Mechanical
12.	TOE 12	Solar Energy	Mechanical
13.	TOE 13	Human Resource Management	Mechanical
14.	TOE 14	Advance Material Science	Mechanical
15.	TOE 15	Industrial Instrumentation	Instrumentation & Control
16.	TOE 16	Biomedical Engineering	Instrumentation & Control
17.	TOE 17	Fundamentals of Coding Theory	Electronics & Communication
18.	TOE 18	Consumer Electronics	Electronics & Communication
19.	TOE 19	Artificial Neural Networks & Fuzzy Logic	Electrical
20.	TOE 20	Human Computer Interaction	Computer Science
21.	TOE 21	I T in Business	Information Technology
22.	TOE 22	Artificial Intelligence in Manufacturing	Manufacturing Technology
23.	TOE 23	Health, Hospital and Equipment Management	Biomedical Engineering
24.	TOE 24	Introduction to Medical Physics	Biomedical Engineering
25.	TOE 25	Modern Control System	Electrical
26.	TOE 26	Mechatronics	Electrical
27.	TOE 27	SCADA & Energy Management System	Electrical

Note: The students will choose any one subject of the course of other than their Engineering Branch.

TOE-01 NON-CONVENTIONAL ENERGY RESOURCES

Unit I:

Introduction: Various non-conventional energy resources- Introduction, availability, classification, relative merits and demerits.

Unit II:

Solar Cells:Theory of solar cells. Solar cell materials, solar cell power plant, limitations.
Solar Thermal Energy: Solar radiation flat plate collectors and their materials, applications and performance, focusing of collectors and their materials, applications and performance; solar thermal power plants, thermal energy storage for solar heating and cooling, limitations.

Unit III:

Geothermal Energy: Resources of geothermal energy, thermodynamics of geo-thermal energy conversion-electrical conversion, non-electrical conversion, environmental considerations.
Magneto-hydrodynamics (MHD): Principle of working of MHD Power plant, performance and limitations.

Unit IV:

Fuel Cells: Principle of working of various types of fuel cells and their working, performance and limitations.
Thermo-electrical and thermionic Conversions: Principle of working, performance and limitations.
Wind Energy: Wind power and its sources, site selection, criterion, momentum theory, classification of rotors, concentrations and augments, wind characteristics. performance and limitations of energy conversion systems.

Unit V:

Bio-mass: Availability of bio-mass and its conversion theory.
Ocean Thermal Energy Conversion (OTEC): Availability, theory and working principle, performance and limitations.
Wave and Tidal Wave: Principle of working, performance and limitations. Waste Recycling Plants

Books Recommended:

1. Andra Gabdel, "A Handbook for Engineers and Economists".
2. A. Mani, "Handbook of Solar radiation Data for India".
3. Peter Auer, "Advances in Energy System and Technology". Vol. 1 & II Edited by Academic Press.
4. F.R. the MITTRE, "Wind Machines" by Energy Resources and Environmental Series.
5. Frank Kreith, "Solar Energy Hand Book".
6. N. Chermisinogg and Thomes, C. Regin, "Principles and Application of Solar Energy".
7. N.G. Calvert, " Wind Power Principles".
8. W. Palz., P. Chartier and D.O. Hall," Energy from Biomass".

TOE – 02 RELIABILITY ENGINEERING

Unit I:
Introduction: Definition of reliability, types of failures, definition and factors influencing, system effectiveness, various parameters of system effectiveness.

Unit II:
Reliability Mathematics: Definition of probability, laws of probability, conditional probability, Bay's theorem; various distributions; data collection, recovery of data, data analysis procedures, empirical reliability calculations.

Unit III: Reliability Types of system- series, parallel, series parallel, stand by and complex; development of logic diagram, methods of reliability evaluation; cut set and tie set methods, matrix methods event trees and fault trees methods, reliability evaluation using probability distributions, Markov method, frequency and duration method.

Unit IV:
Reliability Improvements: Methods of reliability improvement, component redundancy, system redundancy, types of redundancies series, parallel, series - parallel, stand by and hybrid, effect of maintenance.

Unit V:
Reliability Testing: Life testing, requirements, methods, test planning, data reporting system, data reduction and analysis, reliability test standards.

Books Recommended:

1. R.Billintan & R.N. Allan," Reliability Evaluation of Engineering and Systems", Plenum Press.
1. K.C. Kapoor & L.R. Lamberson,"Reliability in Engineering and Design", John Wiley and Sons.
2. S.K. Sinha & B.K. Kale, "Life Testing and Reliability Estimation", Wiley Eastern Ltd.
3. M.L. Shooman, "Probabilistic Reliability, An Engineering Approach", McGraw Hill.
4. G.H.Sandler,"System Reliability Engineering", Prentice Hall.

TOE-03 ENVIRONMENT AND ECOLOGY

Unit I:
Environment: Environment and its components, pollution of environment by human activity, kinds of pollution.

Unit II:
Water Quality: Measure of water quality, water quality standards, water treatment; waste water transport and treatment, sludge treatment and disposal.
Air Quality: Sources and effects of air pollution, major air pollutants, air quality control, treatment of emissions, dispersion of air pollutants.

Unit III:
Solid waste: Collection of refuse, removal and transport, disposal of refuse.
Noise Pollution: Effect of noise on human health and its control.

Unit IV:
Ecology: Ecology and Ecosystems, concept of ecological imbalances, physical and climate factors, biotic components, energy and material flows in ecosystems, human influence on ecosystems.
Unit V:
Conservation of Natural Resources: Water resources, mineral resources, agricultural and forestry resources, agriculture soil and need of nutrients, fertilizers and pesticides. Brief introduction about environmental legislation and environmental audit.

Books Recommended:
1. Vesilind, " Introduction to Environmental Engineering," Thomson Asia Pvt. Ltd. Singapore.

TOE-04 GEOGRAPHIC INFORMATION SYSTEMS (GIS) TECHNOLOGY AND ITS APPLICATIONS:

Unit I

Definition of GIS, Cartography and GIS, GIS database: spatial and attribute date; Spatial models: Semantics, spatial information, temporal information, conceptual models of spatial information, representation of geographic information: point, line and area futures, topology,

Unit II

Raster and vector data, raster to vector data conversion, map projection, analytical transformation, rubber sheet transformation, manual digitizing and semi-automatic line following digitizer; Remote sensing data as an input to GIS data;

Unit III

Attribute database: scale and source of inaccuracy; GIS functionality; data storage and data retrieval through query, generalization, classification, containment search within a spatial region;

Unit IV

Overlay: arithmetical, logical and conditional overlay, buffers, inter visibility, aggregation; Network analysis;

Unit V

Applications of GIS in planning and management of utility lines and in the filed of environmental engineering, geotechnical engineering, transportation engineering and water resources engineering.

Books Recommended:

1. Geographic Information Systems: A Management Perspective, by Stan Arnoff, WDL Publications.
2. Fundamentals of Spatial Information Systems by Robert laurini and Derek Thompson, Academic Press.
3. Geographical Information Systems, Vo. I and II edited by Paul Longely, M.F. Goodchild, et.al, John Wiley and Sons, Inc. 1999.

TOE-05 ENTREPRENEURSHIP DEVELOPMENT PROGRAMME

Unit I:

Entrepreneur: Definition. Growth of small scale industries in developing countries and their positions vis-a-vis large industries; role of small scale industries in the national economy; characteristics and types of small scale industries; demand based and resources based ancillaries and sub-control type. Government policy for small scale industry; stages in starting a small scale industry.

Unit II:

Project identification: Assessment of viability, formulation, Evaluation, financing, field-study and collection of information, preparation of project report, demand analysis, material balance and output methods, benefit cost analysis, discounted cash flow, internal rate of return and net present value methods.

Unit III:

Accountancy: Preparation of balance sheets and assessment of economic viability, decision making, expected costs, planning and production control. Quality control. marketing, industrial relations. Sales and purchases, advertisement, wages and incentive, inventory control, preparation of financial reports, accounts and stores studies.

Unit IV:

Project Planning and control: The financial functions, cost of capital approach in project planning and control. Economic evaluation, risk analysis, capital expenditures, policies and practices in public enterprises. Profit planning and programming, planning cash flow, capital expenditure and operations, control of financial flows, control and communication.

Unit V:

Laws concerning entrepreneur: Partnership laws, business ownership, sales and income taxes and workman compensation act. Role of various national and state agencies which render assistance to small scale industries.

Books Recommended:

1. Joseph, L. Massod, " Essential of Management", Prentice Hall of India.

TOE-06 ANCIENT INDIAN CULTURE

Unit I: Main features of Indian Culture
(a) The orientlist view (b) The nationalist view
(c) The Marxist view (d) Analysis and formulations
Principal Components – historical and archeo-ethic perspective
(a) Indian Civilization (b) Vedic culture
(c) Tribal and folk culture (d) Foreign elements

Unit II: Impact of integrating, disintegrating and proliferating forces of History.
(a) Eras of political unification (b) Foreign invasions
(c) Regional conflicts (d) Religious movements
(e) Trade and Dissemination

Unit III: Ideas and Institution
a. Political b. Social
c. Economic d. Religious

Unit IV: Achievements in Arts, Science and Technology
(a) Literature (b) Art and Architecture
(c) Music and Dance (d) Astronomy and Mathematics
(e) Medicine

Unit V: Values and disvalues
a. Humanism and spiritualism b. Ahinsa
c. Altmism d Caste
e. Unsociability f. Religious suicide and superstition
g. Degradation of women and prostitution.

Books Recommended:

1. Ghose Aurobindo, Foundations of Indian culture.
2. Pande, G.C., Foundations of Indian culture, 2 Vols.
3. Coomarswami, dance of Siva
4. Thapar Ramila, Ancient Indian Social History
5. R.s. Sharma, (ed.), Indian Society Historical Probing, People's Publishing House, New Delhi, 1977.
6. Kossambi, Introduction to Indian History.
7. Altekar, A.S., State and Government in Ancient India.
8. Altekar, A.S., Position of Women in Hindu Civilization
9. Prakash, Om, conceptualization and History.
10. Bartam, A.I., Wonder that was India.

TOE 07 HUMAN VALUES

Unit I: Introduction

1. Nature of value crisis in the contemporary Indian society and the larger human community.
2. Meaning and nature of values; holistic view of life and its value.
3. Conceptualizing 'good' life and its value dimensions.

Material and Societal value

1. Role of material values in promoting human well being.
2. Role of Science and technology; problems of material development.
3. Socio-political ideologies for promoting material wellbeing
4. Conceptualizing 'good' society and 'social goods'
5. Justice as a societal value.
6. Democracy and rule of law.
7. Values in the Indian Constitution.
8. Gandhian concepts of good society; gram swaraj, sarvodaya, antyodaya

Unit II : Psychological and Aesthetic Values

1. Humanistic psychology; meaning of 'personhood'
2. Maslow's hierarchy of human need; characteristics of 'self-actualizing' persons.
3. Mental health
4. Psycho-spiritual Indian concepts.
5. Areas and nature of aesthetic experiences.
6. Nature of beauty; aesthetic sensibilities.

Unit III : Ethical and Spiritual Values

1. Bases for moral judgments : customary morality, religious morality, reflective morality.
2. Some principles of ethics; ethical canons and their significance in modern life.
3. Virtue ethics; personal virtues for the modern times.
4. Ethics of duty and ethics of responsibility.
5. Factors to be considered in making ethical judgments: motives, means and consequences.
6. Spirituality and spiritual values : spiritual wisdom of the Upanishads; Buddha's view.
7. Science, materialism and spirituality.
8. Spirituality in the modern times.

Unit IV : Human Values

1. Different meaning of human values: foundational human values – freedom, creativity, love and wisdom.
2. Nature of Human freedom; individual freedom, intellectual freedom, freedom of will, spiritual freedom.
3. Creativity: its meaning and nature; different kinds of creativity.
4. Creative problem solving.
5. Creative personality, creative environment.
6. Love as a foundational human value; different kinds of love.
7. Human wisdom; characteristics of a wise person.
8. Concepts & Principles of interdependence.

Unit V : Work Ethics and Professional Ethics

1. Different attitudes to work.
2. Demands of work-ethics, ethics at work place.
3. 'Good' organization and its values.
4. What is a profession?
5. Professional ethos and code of professional ethics.
6. IEEE Code of professional ethics.
7. Problems in practicing the code.
8. Case studies.

Books Recommended:

1. Human Values By : Prof. A.N. Tripathi New Age International.
2. 7 Habits of Highly By : Dr. Stephen R. Covey Effective People Harper Publications.
3. Wisdom Leadership By : Prof. S.K. Chakraborthy Wheeler Publication.

TOE-08 QUALITY SYSTEM & MANAGEMENT

Introduction
Definition, need of quality systems, role of quality standards, stages of quality assurance systems. Quality charts, control charts for variables and attributes, acceptance sampling.

Quality Systems
Overall responsibility for progress of quality systems. quality manuals, procedures and role of auditing, auditing for conformance versus quality for effectiveness, auditing a tool for quality improvement. ISO 9000 quality systems, British Standards BS5750/ISO 9000 origin of standards, requirements, issues associated with implementation.

Registration
Registration and accreditation in quality system-certification, approval, registration of leading accessors.

Recommended Books:

1. Mohamed Isiri, " Total Quality Management for Engineers".
2. Juran, J., " Quality Planning and Analysis, Mc -Graw Hill.
3. James R. Evans,& J.W. Dean," Total Quality-management, Organization and Strategy," Thomson Asia Pvt. Ltd., Singapore.

TOE – 09 CONDITION MONITORING & DIAGNOSTICS

Unit I
Productivity, Quality circle in Maintenance, Reliability, Reliability assurance, Maintainability vs. Reliability. Failure analysis, Equipment downtime analysis, breakdown analysis.

Unit II
Maintenance type, Breakdown maintenance, Corrective maintenance, Opportunity maintenance, Routine maintenance, Preventive and predictive maintenance, Condition based maintenance systems, Design-out maintenance.

Unit III
Equipment health monitoring, Signals, Online & off-line monitoring, Visual & temp. Monitoring, Leakage monitoring, Lubricant monitoring.

Unit IV
Ferrography, Spectroscopy, Crack monitoring, Corrosion monitoring, thickness monitoring. Noise/sound monitoring, Smell/Odour monitoring, Thermography.

Unit V
Vibration-characteristics, Vibration monitoring-causes, identification, measurement of machine vibration. C.M.of lubes and hydraulic systems, C.M. of pipe lines, Selection of C.M. Techniques, Advantages.

TOE – 10 VALUE ENGINEERING

Unit I: An Overview
Definition, value engineering recommendations, programmes, advantages. Approach of function Evaluation of function, determining function, classifying function, evaluation of costs, evaluation of worth, determining worth, evaluation of value.

Unit II: VE Job Plan
Introduction, orientation, information phase, speculation phase, analysis phase. Selection of Evaluation of
VE Projects
Projects selection, Methods selection, value standards, application of VE methodology.

Unit III: Versatility of VE
VE operation in maintenance and repair activities, value engineering in non hardware projects.
Initiating A VE Programme
Introduction, training plan, career development for VE specialties.

Unit IV: Fast Diagramming
Cost models, life cycle costs

Unit V: VE level of Effort
VE team, Co-coordinator, designer, different services, definitions, construction management contracts, value engineering case studies.

Recommended Books:

1. Tufty Herald, G., "Compendium on Value Engineering" The Indo American Society, First Edition, 1983.
2. Miles, L.D., "Techniques of Value Engineering and Analysis:, McGraw Hill second Edition, 1972.
3. Khanna, O.P., Industrial Engineering and Management", Dhanpat Rai & Sons, 1993.

TOE-11 NANOTECHNOLOGY

Unit I: Introduction to Physics of Solid State

Structure: Size dependence of properties; crystal structures, face centered cubic nano particles; Tetrahedral bounded semiconductor structures; lattice vibrations.

Energy bounds: Insulators, semiconductor and conductors; Reciprocal space; Energy bounds and gaps of semiconductors; effective masses; Fermi Surfaces.

Localized Particles: Acceptors and deep taps; mobility; Eacitons.

Unit II: Methods of Measuring Properties

Structure: Atomic Structures; Crystallography; Particle size determination, surface structure.

Microscopy: Transmission electron Microscopy; field ion microscopy Scanning Microscopy.

Spectroscopy: Infrared and Raman Spectroscopy; Photoemission and X-ray Spectroscopy; Magnetic resonance, optical and vibrational Spectroscopy, Luminescence.

Unit III: Properties of Individual Nano particles

Metal Nano clusters: Magic Numbers; Theoretical Modelling of nano particles, Geometric Structure; Electronic Structure; Reactivity; Fluctuations Magnetic Clusters; Bulle to Nano structure.

Semi conducting Nanoparticles: Optical Properties; Photofragmentation; Columbic Explosion.

Rare Gas & Molecular Clusters: Inert Gas Clusters; Superfluid Clusters molecular clusters.

Method of Synthesis: RF Plasma; Chemical methods; thermolysis; pulsed laser methods.

Unit IV: Carbon Nanoparticles

Carbon Molecule: Nature of carbon bond; New carbon structures.

Carbon Clusters: Small carbon clusters; Discovery of 60 c ; Strictures of 60 c , Alkali doped 60 c; superconductivity in 60 c ; Large and smaller fullerenes; other buckyballs.

Carbon Nano tubes: Fabrication; structure, Electrical Properties; Vibrational properties, Mechanical Properties. Field emission & Shielding; Computers; Fuel cells, chemicals sensors; catalysis, Mechanical reinforcement.

Balle Nanostructure materials:

Solid Disordered Nanostructure, Nano structured Crystals, Nano structured Ferromagnetism Basics of Ferromagnetism; Effect of structuring of Magnetic properties, Dynamics of Nanomagnets; Nanopore containment of magnetic particles, Nanocarbon Ferromagnets, Giant & colossal magnetoresistance; Ferrofluids.

Unit V: Quantum Wells, Wires and Dots

Preparation of Quantum Nanostructure; Size and Dimensionality effect, Fermi gas; Potential wells; Partial confinement; Excitons; Single electron Tunneling, Infrared detectors; Quantum dot laser Superconductivity. Nano-machines & Nano-device, Microelectromechanical systems (MEMS) Nanoelectromechanical systems (NEMS), Fabrication, Nanodevices and Nanomachines. Molecular & Supermolecular switches Applications areas of Nanotechnology in Engineering.

Recommended Books

1. Introduction to Nanotechnology – C.P.Poole Jr F.J. Owens
2. Introduction to S.S. Physics - (7th Edn.) Wiley 1996.
3. Microcluster Physics – S. Sugano & H. Koizuoni Springor 1998
4. Handbook of Nanostructured Materials & Nanotechnology vol.-5. Academic Press 2000

TOE 12 SOLAR ENERGY

Unit I:
Introduction, Energy alternative, Devices for thermal collection and storage, Thermal applications.
Solar radiation: Instruments for measuring solar radiation, Solar radiation geometry, Empirical equations for prediction the availability of solar radiation, Solar radiation on tilted surfaces.

Unit II:
Liquid flat- Plate Collectors: General performance analysis, Transmissivity, absorptivity, product and overall loss coefficient and heat transfer correlations, Collector efficiency factor, Numerical, Analysis of collectors similar to the conventional collector. Testing procedures, Alternatives to the conventional collector, Numerical.

Unit III:
Solar Air Heaters: Performance analysis of a conventional air heater, Other types of air heaters.
Concentrating Collectors: Flat plate collectors with plane reflectors, Cylindrical parabolic collector, Compound parabolic dish collector, Central receiver collector, Numerical.

Unit IV:
Thermal energy storage: Sensible heat storage, Latent heat Storage, Thermochemical storage .Solar
distillation: Introduction, working principal of solar distillation, Thermal efficiency of distiller unit, External heat transfer, Top loss coefficient, Bottom and side loss coefficient, Internal heat transfer, Radioactive loss coefficient, connective loss coefficient, Evaporative loss coefficient, Overall heat Evaluation of distillation output, Passive solar stills, Conventional solar still, Basin construction, Thermal analysis of conventional solar still.

Unit V:
Photovoltaic Systems: Introduction doping Fermi level, P-N junction characteristics, Photovoltaic effect, Photovoltaic material, Module, Cell temperature, Numerical. Economic analysis: Introduction, cost analysis.

Recommended Books

1. Solar Energy: Thermal Processes, by Duffie John A, and Beckman W.A, john Wiley and Sons.
2. Solar Energy, by S.P Sukhatme, Tata Mc Graw Hill.
3. Treatise on Solar Energy, by H.P Garg, john Wiley and Sons.

TOE-13 HUMAN RESOURCE MANAGEMENT

Unit I

Scope and Importance of Human Resource management, Historical background of Evolution of HRM and HRD in 20th century, Outlining the contemporary role for HRM in organization. Goals of HRM. (Why behavioural approach?)

Unit II

Manpower as a resource in job related behaviour and individual motivation in a work setting. Various theories of human motivation, Maslow' s hierarchy of needs. Needs for achievement, power and affiliation, other theories, group motivation and conflicts.

Unit III

Manpower planning and recruitment, Testing procedures and their limitations. Reservations in jobs, pre-induction training.

Unit IV

Wage and salary administration-pay roll and compensation. Job analysis and job specification, other pay plans, employment contracts, special compensation plans for example personnel, effect of Financial rewards on individual's performance. Goal setting and performance evaluation, promotion policy, employee satisfaction, turnover.

Unit V

Assessment of training needs, forces promoting investment in HRD, Human resource development through individual and group efforts. Training analyses and training methods guidelines for individual development, job enlargement and job enrichment, job rotation, special assignment, Sponsored courses cost benefit exercise. Importance of unions, industrial petitions and conflict analysis and resolution . Relevant labour laws.

TOE-14 ADVANCED MATERIAL SCIENCE

Unit I: Introduction

Solid Solution: Properties of solid solutions and alloys, types binary alloys, Thermal Equilibrium Diagrams, Cooling curves, Eutectic and peritectic alloys, Intermetallic compounds. Heat Treatment Heat treatment principles and processes for Ferrous and non-ferrous metals and alloys, Effect on structures and Properties.

Unit II: Fatigue & Creep: Fatigue loading, Mechanisms of fatigue, fatigue curve, Fatigue tests. Design criteria in fatigue, Corrosion fatigue.

Unit III: Corrosion and its prevention

Mechanism of corrosion, Chemical Corrosion, Electro chemical corrosion, Anodic and Cathodic protection, Forms of metallic coatings. Anodizing, Phosphasting.

Unit IV: Selection of materials for hazardous/ saline environment

Selection of materials of saline/ hazardous environment - Boilers, Steam and Gas turbine and Diesel engine components, Pumping, Machinery, Piping, Engine seating, Propellers and Rudders, Composition strength value and other requirements for materials used. Material standards.

Unit V: Electrical and Electronics materials

Science and engineering of electrical and electronics materials such as semiconductor, super conductor, its devices and applications.

TOE-15 INDUSTRIAL INSTRUMENTATION

Unit I

Basic Measurement principles & Source of Errors, Units of pressure and vacuum, different type of manometer, diaphragm gauges, bellows and force balance type sensors, bourdon gauge, and piezoelectric, capacitive and inductive pressure pickups. Vacuum pressure measurements: McLeod gauge, pirani gauge, thermocouple gauge, Knudsen gauge ionization calibration procedures,

Unit II

Temperature Measurements: Standards and calibration, Thermal expansion methods, bimetallic thermometer, Liquid-in-gas (thermocouples) common thermocouples, Resistance thermometers, Bulk semiconductor sensors, Radiation thermometers, automatic null balance radiation thermometers. Optical parameters, Case studies of temperature controllers.

Unit III

Differential pressure flow meters: Bernoulli's theorem, pitot tube orifice, venturi, and flow nozzle. Hot wire and hot film anemometers, constant pressure drop, variable area meters (rotameter), Turbine meters. Electromagnetic flow meters, Ultrasonic flow meter. Measurement of level. Float type gauge, purge method, differential pressure method, conductive and capacitive method, and electromechanical method, use of radio scope for level measurement.

Unit IV

Measurement of weight: Load cell method, strain gauge, LVDT, piezoelectric, pneumatic and hydraulic load cell, null balance method. Density, Viscosity , pH and conductivity measurement.

Unit V

Measurement of moisture: Thermal dying method, Distillation Method, Chemical reaction Method, Electrical Method Recorders: Graphic Recorders , Strip Chart Recorders , Circular-chart –recorders, Multipoint Recorders and X-Y Recorders.

Text Books:

1. Doeblin / Measurements systems: Application and Design, 4th edition / Tata Mc Graw Hill.
2. S.K Singh,/ Industrial instrumentation and control/TMH 2nd edition
3. Eckman/Industrial Instrumentation / Wiley Eastern Ltd.

Reference Books:

1. Beckwith & Beck /Mechanical Measurements / NaronaPublishers,1988
2. Nakara/Instrumentation: measurements & Analysis/ Tata Mc Graw Hill.
3. Douglas, D.Considine / Handbook of Instrumentation Measurement and Control Mc Graw Hill.

TOE-16 BIOMEDICAL ENGINEERING

Unit I: Introduction:
Specifications of bio-medical instrumentation system, Man- Instrumentation system Components, Problems encountered in measuring a living system. Basics of Anatomy and Physiology of the body.
Bioelectric potentials: Resting and action potentials, propagation of action potential, The Physiological potentials – ECG, EEG, EMG, ERG, EOG and Evoked responses.
Electrodes and Transducers: Electrode theory, Biopotential Electrodes – Surface electrodes, Needle electrodes, Microelectrodes. Biomedical Transducers.

Unit II: Cardiovascular Measurements:
Electrocardiography –ECG amplifiers, Electrodes and Leads, ECG recorders –Single channel, Three channel, Vector Cardiographs, ECG System for Stresses testing, Holter recording, Blood pressure measurement, Heart sound measurement. Pacemakers and Defibrillators.
Patient Care & Monitoring: Elements of intensive care monitoring, displays, diagnosis, Calibration & Reparability of patient monitoring equipment.

Unit III: Respiratory system Measurements:
Physiology of Respiratory system .Measurement of breathing mechanism – Spirometer. Respiratory Therapy equipments: Inhalators, Ventilators &Respirators, Humidifiers, and Nebulizers & Aspirators.
Nervous System Measurements: Physiology of nervous system, Neuronal communication, Neuronal firing measurements.

Unit IV: Ophthalmology Instruments:
Electroretinogram, Electro-oculogram, Ophthalmoscope, Tonometer for eye pressure measurement.
Diagnostic techniques: Ultrasonic diagnosis, Eco-cardiography, Ecoencephalography, Ophthalmic scans, X-ray &Radio-isotope diagnosis and therapy, CAT-Scan, Emission computerized tomography, MRI.

Unit V: Bio-telemetry:
The components of a Bio-telemetry system, Implantable units, Telemetry for ECG measurements during exercise, for Emergency patient monitoring.
Prosthetic Devices and Therapies: Hearing Aids, Myoelectric Arm, Dia-thermy, Laser applications in medicine.

Text Books:

1. Khandpur R.S.- Biomedical Instrumentation- TMH
2. Venkata Ram,S.K.-Bio-Medical Electronics & Instrumentation (Revised)- Galgotia.

Reference Books::

3. Cromwell- Biomedical Instrumentation and Measurements- PHI
4. Webster, J.G. –Bio- Instrumentation ,Wiley (2004)
5. Ananthi, S. –A Text Book of Medical Instruments-2005-New Age International
6. Carr &Brown –Introduction to Biomedical Equipment Technology – Pearson
7. Pandey & Kumar-Biomedical Electronics and Instrumentation. - Kataria

TOE-17 FUNDAMENTALS OF CODING THEORY

Unit I: Purpose of encoding, separable binary codes, Shannon-fano encoding, noiseless coding. Shannon binary encoding, Huffman encoding, discrete coding in presence of noise.

Unit II: Error detecting and error correcting codes, Hamming single error correcting code, Elias's iteration technique for coding.

Unit III: Block codes, encoders and decoders for block codes, syndrome and syndrome decoding.

Unit IV: Cyclic codes. Encoders and decoders for cyclic code, Golay code, BCH code, Reed soloman code.

Unit V: Convolution coding, code generation, decoding of convolution code, sequential decoding, state and trellis diagram.

Text Book:

1. F. M. Reza, "An introduction to Information theory", Dover Publication Inc.
2. H. Taub and D. L. Schilling, "Principles of communication system" TMH 2nd Ed.

TOE-18 CONSUMER ELECTRONICS

Unit I

Audio Systems: Microphones, Loudspeakers, Speaker baffle and enclosure, Acoustics, Mono, Stereo, Quad, Amplifying Systems, Equalizers and Mixers, Electronic Music Synthesizers, Commercial Sound, Theater Sound System

Unit II

Video Systems and Displays: Monochrome TV, Colour TV standards and systems, TFT, Plasma, HDTV, Digital TV, Video Telephone and Video Conferencing

Unit III

Domestic Appliances: Washing machines, Microwave ovens, Air- conditioners and Refrigerators, In car computers Office Systems: FAX, Xerox, Telephone Switching System, Mobile Radio System

Unit IV

Recording and Reproduction Systems: Disc recording and reproduction, Magnetic recording and
reproduction, Video tape recording and reproduction, Video disc recording and play back, Distortion and Noise reduction in Audio and Video System

Unit V

Power Supplies and other systems: SMPS, UPS and Preventive Maintenance, Set Top Boxes, Remote controls, Bar codes, ATM

Text Books:

1. S P Bali, Consumer Electronics; Pearson ed 2005

TOE-19 ARTIFICIAL NEURAL NETWORKS & FUZZY LOGIC

Unit I: Fundamental Concepts
Introduction and history, human brain, biological neuron, models of neuron, network architecture, knowledge representation. Error correction learning, Hebbian learning, competitive learning, Boltzmann learning, learning with and without teacher. Artificial neurons. Neural networks and architectures
Introduction, neuron signal function, mathematical preliminaries, Feedforward & feedback architecture.

Unit II: Geometry of Binary threshold neurons and their networks
Pattern recognition, convex sets and convex hulls, space of Boolean functions, binary neurons for pattern classification, non linear separable problems, capacity of TLN, XOR solution. Perceptions and LMS, Learning objective of TLN, pattern space & weight space, perception learning algorithm, perception convergence theorem, pocket algorithm, a - LMS learning, MSE error surface, steepest descent search, μ -LMS and application.

Unit III: Back propagation algorithm
Multilayered architecture, back propagation learning algorithm, practical considerations, structure growing algorithms, applications of FFNN. Statistical Pattern Recognition Bayes' theorem, classical decisions with bayes' theorem, probabilistic interpretation of neuron function, interpreting neuron signals as probabilities, multilayered networks & posterior probabilities, error functions for classification problems.

Unit IV: Self Organizing Feature MAP
Introduction, Maximal eigenvector filtering, principal component analysis, generalized learning laws, competitive learning, vector quantization, maxican hat networks, SOFM, applications of SOFM. Other Networks Generalized RBF networks. Stochastic Machines: simulated annealing, Boltzmann machine, ART.

Unit V: Fuzzy Logic
Introduction, classical & Fuzzy sets, classical & fuzzy relations, membership function, geometry & operations of fuzzy sets, fuzzy rules, rule composition & defuzzification, fuzzy engineering applications, Neural network & fuzzy logic. Fuzzy Neural Control

Text Books
1. Simon Haykin, "Neural Networks", Peal-son Education 2nd edition.
2. Satish Kumar, 'Neural Networks," Tata McGraw-HIII.

Reference Books
1. Jack M. Zurada, " Introduction to Artificial Neural System," Jaico Publishing House.
2. Timothy J. Ross, "Fuzzy Logic with Engineering Applications," McGraw-Hill Inc.

TOE- 20 HUMAN COMPUTER INTERACTION

Unit I
User centered design of system & interfaces, anatomy and rational of WIMP (Window, Icon, Menus & Pointing Devices) interfaces.

Unit II
Dialogue design, Presentation design, user documentation, evaluation / usability testing of user interface.

Unit III
Ergonomics and Cognitive issues, hypertext and the World Wide Web.

Unit IV
User centered design, human factors in user-centered design, development & evaluation, Interactive design rapid prototyping.

Unit V
Designing for usability –effectiveness, learnability, flexibility, attitude and usability goals, criteria for acceptability.

Books Recommended:
1. Sudifte AG , "Human Computer Interface Design" , 2nd ed, Macmillan ,1995
2. Sheiderman B Desiging the user interface, "Strategies for Effective Human Computer Interaction" , 2nd ed. Addison Wesley , 1992

TOE – 21 IT IN BUSINESS

Unit I
Business Drivers IT's Competitive Potential Strategic Alignment Strategic Management and Competitive Strategy

Unit II
Rethinking Business through IT Developing a Competitive Strategy Interorganization Information Systems
Business-To-Business Systems Electronic Commerce and Market Systems

Unit III
Forming a Corporate IT Strategy Developing an Information Architecture

Unit IV
Incorporating Business Innovation into the Corporate IT Strategy The Changing Role of IT In International business The Changing Global IT Practices

Unit V
The Impact and value of Information Technology in Competitive Strategy Changing the Focus of Strategy Trends: Beyond 2000

Books Recommended:
1. Callon, Jack D., "Competitive Advantage Through Information Technology", McGraw - Hill, 1996
2. Tapscott, Don, "The Digital Economy", McGraw-Hill, 1996. [DIGI]

TOE –22 ARTIFICIAL INTELLIGENCE IN MANUFACTURING

Unit I: Artificial Intelligence
Definition - Components - Scope - Application Areas; Knowledge - Based Systems (Expert Systems) - Definition - Justification -Structure – Characterization

Unit II: Knowledge Sources
Expert - Knowledge Acquisition – Knowledge Representation - Knowledge Base - Interference Strategies - Forward and Backward Chaining

Unit III: Expert System Languages
ES Building Tools or Shells; Typical examples of Shells. Expert System software for manufacturing applications in CAD, CAPP, MRP , Adaptive control,

Unit IV: Robotics
Robotics, Process control, Fault diagnosis, Failure Analysis; Process Selection, GT etc. Linking expert systems to other software such as DBMS, MIS, MDB.

Unit V: Process control and Office automation
Process control and Office automation. Case studies of typical applications in tool selection, Process selection, Part classification, inventory control, Process Planning etc.

Books Recommended:
1. Jhon & Andrew Kusiak; Artificial Intelligent Hand book.
2. T. Barnold; Artificial Intelligent
3. Dan. W. Patterson; Introduction to Artificial Manufacturing Export system

TOE 23 HEALTH, HOSPITAL AND EQUIPMENT MANAGEMENT

Unit I: HEALTH SYSTEM
Health organization of the country, the state, the cities and the region, Health Financing System, Organization of Technical Section.

Unit II: HOSPITAL ORGANIZATION AND MANAGEMENT
Management of Hospital organization, Nursing section Medical Sector, Central Services, Technical Department, Definition and Practice of Management by Objective, Transaction Analysis Human relation in Hospital, Importance to Team Work, Legal aspect in Hospital Management.

Unit III: REGULATORY REQUIREMENT AND HEALTH CARE CODES
FDA Regulation, joint commission of Accreditation for Hospitals, National Fire Protection Association Standard, IRPC.

Unit IV: EQUIPMENT MAINTENANCE MANAGEMENT
Organizing Maintenance Operations, Paper Work Control, Maintenance Job, Planning Maintenance Work, Measurement and Standards, Preventive Maintenance, Maintenance Budgeting and Forecasting,Maintenance Training, Contract Mainframe.

Unit V: TRAINED TECHNICAL PERSONNEL
Function of Clinical Engineer, Role to be performed in Hospital, Man power Market, Professional Registration, Structure in hospital.

Books Recommended:
1. Cesar A. Caceres and Albert Zara, The practice of Clinical Engineering, Academic Press, 1977.
1. Webter, J.G. and Albert M. Cook, Clinical Engineering Principles and Practices, Prentice Hall Inc. Englewood Cliffs, 1979.
2. Anatomy Kelly, Maintenance planning and control, Butterworth's London, 1984.
3. Hans Pfeiff, Vera Dammann (Ed.) Hospital Engineering in Developing Countries, Z report Eschborn, 1986.
4. Jacob Kline, Handbook of Bio Medical Engineering, Academic Press, San Diego

TOE 24 INTRODUCTION TO MEDICAL PHYSICS

Unit I: ATOMIC PHYSICS
Traditional definition of atom, periodic system of elements, mechanical properties of atom, emission of light and its frequencies. Electromagnetic spectra. Principles of Nuclear Physics — Natural radioactivity, Decay series, type of radiation and their applications, artificially produced isotopes and its application, accelerator principles; Radionuclide used in Medicine and technology.

Unit II: INTERACTION WITH LIVING CELLS
Target theory, single hit and multi target theory, cellular effects of radiation, DNA damage, depression of Macro molecular synthesis, Chromosomal damage.

Unit III: SOMATIC EFFECT OF RADIATION
Radio sensitivity protocol of different tissues in human, LD 50/30 effect of radiation on skin, blood forming organs, lenses of eye, embryo and Endocrinal glands.

Unit IV: GENETIC EFFECT OF RADIATION
Threshold of linear dose effect, relationship, factors affecting frequency of radiation induced mutation, Gene controlled hereditary disease, biological effect of microwave and RF wave. Variation in dielectric constant and specific conductivity of tissues. Penetration and propagation of signals effects in various vital organs, Protection standards.

Unit V: PHOTO MEDICINE
Synthesis of Vitamin D in early and late cataneous effects, Phototherapy, Photo hemotherapy, exposure level, hazards and maximum permissible exposure.
LASER PHYSICS — Characteristics of Laser radiation, Laser speckle, biological effects, laser safety

Books Recommended:

1. Moselly, Non lonisingRadiation Adam Hilgar Brustol 1988.
2. Branski. S and Cherski. P 'Biological Effects of Microwave' -Hutchinson & ROSS Inc.

TOE – 25 MODERN CONTROL SYSTEM

Unit I: Introduction to control systems
Introduction to control systems, properties of signals and systems. Convolution integral, Ordinary differential equation, Transfer function, Pole zero concepts, effect of pole location on performance specification.

Unit II: State Space analysis
State equations for dynamic systems, State equations using phase, physical and canonical variables, realization of transfer matrices, Solution of state equation, concepts of controllability, observability, Controllability and Observability tests.

Unit III: Discrete time control systems
Sampling theorem, Sampled-data systems, the sample and hold element, pulse transfer function, The Ztransform, stability analysis.

Unit IV: Stability
Liapunov's method, generation of Liapunov's function, Popov's criteria, design of state observers and controllers, adaptive control systems , model reference.

Unit V: Optimal Control
Introduction , formation of optimal control problems, calculus of variation, minimization of functions, constrained optimization, dynamic programming, performance index , optimality principles, Hamilton – Jacobian equation, linear quadratic problem, Ricatti II equation and its solution, solution of two point boundary value problem

Text Books:

1. K. Ogata, "Modern Control Engineering", Prentice Hall of India.
2. M. Gopal, "Modern Control System", Wiley Eastern.

Reference Books:

1. B.D.O. Anderson and IB. Moore, " Optimal Control System: Linear Quadratic Methods", Prenctice Hall International.
2. U. Itkis, "Control System of Variable Structure", John Wiley and Sons.
3. H. Kwakemaok and R. Sivan, "Linear Optimal Control System", Wiley Interscience.

TOE 26 MECHATRONICS

Unit I: Mechatronics and its scope
Sensors and transducers- Displacement, position & proximity, velocity, force, pressure and level. Signal conditioning amplification, filtering & data acquisition.

Unit II: Pneumatic and Hydraulic actuation systems
Directional control valves, pressure control valves and cylinders. process control valves. Mechanical actuation system-kinematic chains, cams, geartrains. Ratchet & Pawl, dampers, bearings. Electrical actuation system. Mechanical switches- solenoid operated solid state switches, DC, AC & stepper motors.
Building blocks of Mechanical spring, mass and damper. Drives- Electrical Drives, Fluid systems, hydraulic, servo, closed loop controllers.

Unit III: Elements of Microprocessors & Microcontrollers
Elements of Microprocessors & Microcontrollers Programmable logic controllers & Communication interface.

Unit IV: Case Studies of Mechatronic Systems
Industrial Robot and its control Automobile Engine Control Electromechanical disc-control.

Unit V: Veil suspension Control
Micro mechanical systems. Computer Printer, VCR, Fax Machine, NC Machine.

Books Recommended:

1. Rolf Isennann, " Mechatronics Systems", Springer, 2005.
2. W. Bolten, "Mechatronics", Pearson Education 2003.

TOE 27 SCADA & ENERGY MANAGEMENT SYSTEM

Unit I: SCADA

Purpose and necessity, general structure, data acquisition, transmission & monitoring. general power system hierarchical Structure. Overview of the methods of data acquisition systems, commonly acquired data, transducers, RTUs, data concentrators, various communication channels- cables, telephone lines, power line carrier, microwaves, fiber optical channels and satellites.

Unit II: Supervisory and Control Functions

Data acquisitions, status indications, majored values, energy values, monitoring alarm and event application processing. Control Function: ON/ OFF control of lines, transformers, capacitors and applications in process in industry - valve, opening, closing etc. Regulatory functions: Set points and feed back loops, time tagged data, disturbance data collection and analysis. Calculation and report preparation.

Unit III: MAN- Machine Communication

Operator consoles and VDUs, displays, operator dialogues, alarm and event loggers, mimic diagrams, report and printing facilities.

Unit IV: Data basis

SCADA, EMS and network data basis. SCADA system structure - local system, communication system and central system. Configuration- NON-redundant- single processor, redundant dual processor. multicontrol centers, system configuration. Performance considerations: real time operation system requirements, modularization of software programming languages.

Unit V: Energy Management Center

Functions performed at a centralized management center, production control and load management economic dispatch, distributed centers and power pool management.

Books Recommended:

1. Torsten Cergrell, " Power System Control Technology", Prentice Hall International.
2. George L Kusic "Computer Aided Power System Analysis",, Prentice Hall of India,
3. A. J. Wood and B. Woolenberg, "Power Generation Operation and Control", John Wiley & Sons.
4. Sunil S Rao, "Switchgear Protection & Control System" Khanna Publishers 11th Edition.