

DEPARTMENT OF INFORMATION
TECHNOLOGY

**COURSE STRUCTURE & SYLLABUS
(w.e.f. July 2010)**



**VEER SURENDRA SAI UNIVERSITY
OF TECHNOLOGY, BURLA, ORISSA**

FIRST YEAR B.TECH
(COMMON TO ALL BRANCHES)

FIRST SEMESTER				SECOND SEMESTER			
Theory		Contact Hrs.	CR	Theory		Contact Hrs.	CR
Course Code	Subject	L . T . P		Course Code	Subject	L. T. P	
BMA 101	Mathematics-I	3 - 1 - 0	4	BMA 102	Mathematics-II	3 - 1 - 0	4
BPH 101/ BCH 101	Physics/Chemistry	3 - 1 - 0	4	BCH 101/ BPH 101	Chemistry/ Physics	3 - 1 - 0	4
BME 101/ BCS 101	Engg. Mechanicss/ Programming & Data Structure	3 - 1 - 0	4	BCS 101/ BME 101	Programming & Data Structure/ Engg. Mechanicss	3 - 1 - 0	4
BEE 101/ BEC 101	Basic Electrical Engg./ Basic Electronics	3 - 1 - 0	4	BEC 101/ BEE 101	Basic Electronics/ Basic Electrical Engg	3 - 1 - 0	4
BHU 101/ BCE 101	English for Communication/Env. Science & Engg.	3 - 1 - 0	4	BCE 101/ BHU 101	Env. Science & Engg./ English for Communication	3 - 1 - 0	4
Sessionals				Sessionals			
BPH 191/ BCH 191	Physics Lab./Chemistry Lab	0 - 0 - 3	2	BCH 191/ BPH 191	Chemistry Lab/ Physics Lab	0 - 0 - 3	2
BHU 191/ BCS 191	Language Lab./ Programming Lab.	0 - 0 - 3	2	BCS 191/ BHU 191	Programming Lab./ Language Lab.	0 - 0 - 3	2
BCE 191/ BME 191	Engineering Drawing/ Work Shop Practice	0 - 0 - 3	2	BME 191/ BCE 191	Work Shop Practice/ Engineering Drawing	0 - 0 - 3	2
BEE 191/ BEC 191	BEE Lab./ BE Lab.	0 - 0 - 3	2	BEC 191/ BEE 191	BE Lab./ BEE Lab.	0 - 0 - 3	2
EAA	Extra Academic Activities (NCC/NSS/Yoga)	0 - 0 - 3	0	EAA	Extra Academic Activities (NCC/NSS/Yoga)	0 - 0 - 3	0
Total		15-5-15	28	Total		15-3-15	28

SECOND YEAR B.TECH
INFORMATION TECHNOLOGY

THIRD SEMESTER				FOURTH SEMESTER			
Theory		Contact Hrs.	CR	Theory		Contact Hrs.	CR
Course Code	Subject	L . T . P		Course Code	Subject	L. T. P	
BMA 201	Mathematics-III	3 - 1 - 0	4	BMA202	Mathematics-IV	3 - 1 - 0	4
BHU 201	Engg. Economics & Costing/OB	3 - 1 - 0	4	BHU 206	Organization Behavior/EEC	3 - 1 - 0	4
BCS 201	OOP	3 - 1 - 0	4	BCS 203	Computer Organization	3 - 1 - 0	4
BCS 202	Data and File structure	3 - 1 - 0	4	BCS 204	Data Base Engg.	3 - 1 - 0	4
BEC 201	Analog Electronics Circuits	3 - 1 - 0	4	BEC 205	Digital Electronics Circuits	3 - 1 - 0	4
Sessionals				Sessionals			
BCS 291	OOP Lab.	0 - 0 - 3	2	BCS 293	APL Lab.-II.	0 - 0 - 3	2
BCS 292	APL Lab.-I	0 - 0 - 3	2	BCS 293	DBE Lab.	0 - 0 - 3	2
BEC291	DFS Lab.	0 - 0 - 3	2	BCS 294	CO Lab.	0 - 0 - 3	2
BEC 292	Analog Electronics Lab.	0 - 0 - 3	2	BEC 294	Digital Electronics Lab.	0 - 0 - 3	2
Total		15-5-12	28	Total		15-3-12	28

**THIRD YEAR B.TECH
INFORMATION TECHNOLOGY**

FIFTH SEMESTER				SIXTH SEMESTER			
Theory		Contact Hrs.	CR	Theory		Contact Hrs.	CR
Course Code	Subject	L.T.P		Course Code	Subject	L. T. P	
BCS 301	Microprocessors & Microcomputer	3 - 1 - 0	4	BCS 305	Compiler Design	3 - 1 - 0	4
BMA 301	Discrete Mathematical Str.	3 - 1 - 0	4	BCS 306	Software Engg. & OOAD	3 - 1 - 0	4
BCS 302	Operating System	3 - 1 - 0	4	BIT 302	Social Network Analysis	3 - 1 - 0	4
BIT 301	Information Security	3 - 1 - 0	4	BCS 308	Internet & Web Technology-I	3 - 1 - 0	4
BCS 304	Data Communication & Computer Networks	3 - 1 - 0	4	BCS 309	Analysis & Design of Algorithms	3 - 1 - 0	4
Sessionals				Sessionals			
BCS 391	Operating System Lab.	0 - 0 - 3	2	BCS 395	Compiler Design Lab.	0 - 0 - 3	2
BCS 392	DCCN Lab.	0 - 0 - 3	2	BCS 396	Internet & Web Tech Lab.	0 - 0 - 3	2
BCS 393	Microprocessors & Microcomputer Lab.	0 - 0 - 3	2	BCS 397	Software Engg. Lab.	0 - 0 - 3	2
BCS 394	Computational Lab.	0 - 0 - 3	2	BCS 398	Algorithm Design Lab.	0 - 0 - 3	2
Total		15-5-12	28	Total		15-5-12	28

**FOURTH YEAR B.TECH
INFORMATION TECHNOLOGY**

SEVENTH SEMESTER				EIGHTH SEMESTER			
Theory		Contact Hrs.		Theory		Contact Hrs.	
Course Code	Subject	L . T . P	CR	Course Code	Subject	L. T. P	CR
BCS 401	Computer Graphics & Multimedia	3 - 1 - 0	4	BIT402	Internet & Web Technology-II	3 - 1 - 0	4
BCS 402	E-Commerce & ERP	3 - 1 - 0	4	BIT 401	Mobile Computing	3 - 1 - 0	4
BIT401	Information Theory & Coding	3 - 1 - 0	4				
	Elective – I (Any one)	3 - 1 - 0	4		Elective – III (Any one)	3 - 1 - 0	4
BCS 404	Artificial Intelligence			BCS411	Advanced computer architecture		
				BIT 414	Bio-Informatics		
BCS 405	Soft Computing			BEC 418	VLSI Design		
				BEC 416	Image Processing		
BCS 406	Distributed Computing			Elective-IV (Any one)			
BEC 419	Digital Signal Processing			BCS 417	Advanced Operating System		
BCS 407	Cloud Computing			BHU 302	Human Resource Management		
	Elective-II (Any one)			BCS 428	Knowledge Management		
BCS 403	Data Mining			BIT 415	Management Information Systems		
BEC 419	Pattern Recognition			BCS425	High Performance Computing		
BCS 410	Adv Data Structure & Algorithms			BCS 429	Intellectual Property Rights		
BEC 410	Nano Technology						
BCS 491	Sessionals	0 - 0 - 3	2	BCS 495	Comprehensive Viva Voce	0 - 0 - 3	2
BCS 492	Computer Graphics Lab.	0 - 0 - 3	2	BCS 497	Major Project	0 - 0 - 3	6
BCS 493	Simulation Lab.	0 - 0 - 3	2				
BCS 494	Seminar	0 - 0 - 3	2				
	Minor Project	15-3-12	28		Total	12-4-9	24
	Total						

1st SEMESTER B.Tech. / 2nd SEMESTER B.Tech
(Common to all branches)

BCS 101 PROGRAMING & DATA STRUCTURE (3-1-0)Cr.-4

Module 1: **(10 Lectures)**

C Language Fundamentals, Arrays and Strings
Character set, Identifiers, Keywords, Data Types, Constant and Variables, Statements, Expressions, Operators, Precedence of operators, Input – output Assignments, Control structures, Decision making and Branching, Decision making & looping. Declarations.

Module 2: **(10 Lectures)**

Monolithic vs Modular programs, User defined vs standard functions, formal vs Actual arguments, Functions category, function prototypes, parameter passing, Recursion, Storage Classes: Auto, Extern, Global, Static.Character handling in C. String handling functions.
Pointers, Structures, Union & File handling

Module 3: **(10 Lectures)**

Pointer variable and its importance, Pointer Arithmetic, passing parameters, Declaration of structures, pointer to pointer, pointer to structure, pointer to function, unions dynamic memory allocations, unions, file handling in C.

Module 4: **(10 Lectures)**

Development of Algorithms: Notations and Analysis, Storage structures for arrays-sparse matrices, Stacks and Queues:Applications of Stack:Prefix,Postfix and infix expressions.
Circular queue, Double ended queue.

Books:

1. E. Balaguruswamy “Programming in C”, Tata McGraw Hill
2. Data Structures Using C & C++, Yedidyah Langsam Moshe J, Augenstein, Aaron M.Tenenbaum, Prentice, Hall of India, New Delhi.

Reference Books:

1. Y.Kanetkar, “Let us C”, BPB Publications.
2. Fundamentals of Data Structure, in c by Hariwitz and Sahni & Anderson Freed, University Press.
3. Data Structures by S.Lipschutz, Schaum’s outline series in Computes
4. Data Structure and Algorithms, G.A.S Pai , TMH

1st SEMESTER B.Tech. / 2nd SEMESTER B.Tech.
(Common to all branches)

BCS 191 PROGRAMMING LABORATORY(0-0-3)Cr.-2

Introduction to OS: Linux/Unix, DOS, Windows,
Vi editor, Shell Programming (on Unix),
File handling , directory structures, file permissions, creating and editing simple C
programme, compilation and execution.

C Programming on variables and expression assignment, simple arithmetic
Loops, If-else, Case statements, break, continue, goto
Single and Multidimensional arrays

Functions, recursion, file handling in C

Pointers, address operator, declaring pointers and operators on pointers

Address of an array, structures, pointer to structure, dynamic memory allocation.

SECOND YEAR B.TECH
3RD SEMESTER

BCS-201 OBJECT ORIENTED PROGRAMMING (3-1-0) Cr.-4

Module – I (10 Lectures)

Introduction to object oriented programming, user-defined types, polymorphism, and encapsulation. Getting started with C++ syntax, data-type, various, functions, exceptions and statement, namespaces and exceptions, operators, flow control, functions, recursion. Arrays and pointers, structures.

Module – II (10 Lectures)

Abstraction mechanisms: Classes, private, public construction, member functions, static members, references etc. class hierarchy, derived classes.

Inheritance: simple inheritance, polymorphism, object slicing, base initialization virtual functions.

Module – III

(12 Lectures)

Prototypes, linkages, operator overloading, ambiguity, friends, member operators, operator function, I/O operator etc. Memory management: new delete, object copying copy constructors, assignment operator, this input/output. Exception handling: Exceptions and derived classes, function exception declarations, Unexpected exceptions, Exceptions when handling exceptions, resource capture and release etc.

Module – IV

(08 Lectures)

Templates and standard Template library: template classes, declaration, template functions, namespaces, string, iterates hashes, iostreams and other type.

Design using C++ design and development, design and programming, role of classes.

Text Books:

1. Bhav & Patemar- Object oriented Programming with C ++ , Pearson, Education.
2. Ashok N. Kamthane- Object oriented programming with ANSI & Turbo C ++., Pearso Education.
3. .Robort Lafore-Object-oriented programming in Microsoft C ++.
4. C.Balguru Swamy – C ++, TMH publication.
5. H.Schildt – C++, The Complete Reference, TMH.

BCS-202

DATA AND FILE STRUCTUR (3-1-0)

Credit-04

I. Introduction to Data & file structures (5 Lectures)

II. Non- Linear data structures (8 Lectures)

- General Trees , Binary Trees,
- Conversion of general tree to binary
- BST
- Red-Black trees
- Multi linked structures
- Heaps
- Spanning Trees
- Application of trees

III. Sorting(9 Lectures)

- Growth of function , 'O' notation
- Complexity of algorithms, classification
- Internal sorting
- Insertion sorting
- Selection Sort
- Bubble Sort
- Quick sort
- Heap sort
- Radix sort

- External sort
- Multi way merge
- IV. Searching (5 Lectures)**
 - Sequential Search
 - Binary Search
 - Search trees traversal
 - Threaded Binary search trees
 - AVL Tree – concept and construction
- V. Hashing (6 Lectures)**
 - Hashing techniques
 - Hash function
 - Address calculation techniques- common hashing functions
 - Collision resolution
 - Linear probing, quadratic probing
 - Double hashing
 - Bucket addressing
- VI. File Structures (7 Lectures)**
 - External storage devices
 - Records - Concepts and organization
 - Sequential file – structures and processing
 - Indexed sequential files – structures and processing
 - Direct files
 - Multi Key access

Text Books:

1. Data Structures Using C and C ++ - Tanenbum (PHI) (chapter – 5,6,7)
2. Introduction to Data Structures with Applications by Tremblay and Sorensens (TMH)(chapter – 7.1-7.6,7.7,7.9,7.13)
3. Data Structures and algorithm Analysis in C – Weiss (Pearson Education)
4. Data Base Organisation – by Geo Widerhold – TMH
5. Data and File structure – by Loomis – PHI.

BCS 291

OOP LABORATORY (0-0-3)

Credit – 02

1. Programs on concept of classes and objects.(1 class)
2. Programs using inheritance.(1 class)
 - i. Single inheritance
 - ii. Multiple inheritance
 - iii. Multi level inheritance
 - iv. Use of virtual base classes
3. Programs using static polymorphism.(1 class)
 - i. Function overloading
 - ii. Ambiguities while dealing with function overloading
4. Programs on dynamic polymorphism.(1 class)

- i. Use of virtual functions
 - ii. Use of abstract base classes
5. Programs on operator overloading.(1 class)
 - i. Operator overloading using member operator functions.
 - ii. Operator overloading using non member operator functions.
 - iii. Advantages of using non member operator functions.
 6. Programs on dynamic memory management using new, delete operators.(1 class)
 7. Programs on copy constructor and usage of assignment operator.(1 class)
 8. Programs on exception handling .(1 class)
 9. Programs on generic programming using template function and template class.(1 class)
 10. Programs on file handling.(1 class)

BCS 291

APL-I LAB.(0-0-3)

Credit – 02

Basics on JAVA

1. Introduction, Compiling & executing a java program.
2. Data types & variables, decision control structures: if, nested if etc.
3. Loop control structures: do, while, for etc.
4. Classes and objects.
5. Data abstraction & data hiding, inheritance, polymorphism.
6. Threads, exception handlings and applet programs
7. Interfaces and inner classes, wrapper classes, generics

BCS 296

DATA & FILE STRUCTURE LAB (0-0-3)

Credit-02

1. Write a C/C++ Program to create a stack using an array and perform – i) Push operation, ii) Pop operation
2. Write a C Program to create a queue and perform – i) Push, ii) Pop, iii) Traversal
3. Write a C Program that uses Stack Operations to perform the following :-
 - i) Converting an infix expression into postfix expression
 - ii) Evaluating the postfix expression
4. Write a C Program that uses functions to perform the following operations on a single linked list : Creation, ii) Insertion, iii) Deletion, iv) Traversal
5. Write a C Program that uses functions to perform the following operations on a double linked list : Creation, ii) Insertion, iii) Deletion
6. Write a C Program that uses functions to perform the following operations on a Binary Tree : i) Creation, ii) Insertion, iii) Deletion
7. Write a C Program to construct an AVL-Tree and delete the selective nodes.
8. C Programs on : i) Bubble sort, ii) Selection sort, iii) Insertion sort, iv) Quick sort, v) Radix sort vi) Heap sort, vii) 2 Way Merge Sort
9. C Programs on : i) Sequential Search, ii) Binary Search

4TH SEMESTER

BCS-203

COMPUTER ORGANIZATION –1 (3-1-0) Cr.-4

Module-I

Introduction: (05 Period)

Basic Organization of Computers, Classification Micro, Mini, Mainframe and Super Computer. System Bus and Interconnection, PCI, Computer Function, I-Cycle, Interrupt and Class of Interrupts, Von-Neumann M/c: Structure of IAS.

Computer Arithmetic: (05 Period)

Data Representation: Fixed Point Representation, Floating Point Representation. Addition and Subtraction, Multiplication Algorithm, Division Algorithm, Floating Point Arithmetic Operation, Decimal Arithmetic Operation,

CPU Organization: (05 Period)

Fundamental Concepts: Fetching and storing a word in Memory, Register Transfer, Performing an Arithmetic & Logic Operation, Execution of a Completes, Branching.

Module-II

General Register Organization: (13 Period)

Control word, Examples of Microsoft, Stack Organisation, Register Stack, Memory Stack, RPN, Evaluation of Arithmetic Expression using RPN, Instruction Format: Three Address, Two Address, One Address and Zero Address Instruction, Addressing Modes: Types of Addressing modes, Numerical Examples, Program Relocation, Compaction, Data Transfer & Manipulation: Data transfer, Data Manipulation, Arithmetic, Logical & Bit Manipulation Instruction, Program Control: Conditional Branch Instruction, Subroutine, Program Interrupt, Types of Interrupt, RISC & CISC Characteristic. Control Unit Operation: Hardware Control & Micro Programmed Control, Introduction to Pipelining.

Module-III

Input/Output Organization: (9 Period)

Peripheral Devices, Input – output Interface, I/O Bus, Interface Module, Asynchronous Data Transfer, Strobe Control, Handshaking, Asynchronous Serial Transfer, Asynchronous Communication Interface, Modes of Transfer: Programmed I/O, Interrupt Driven I/O, Direct Memory Access (DMA), DMA Controller, I/O Channel & Processor.

Priority Interrupt: Daisy Chaining Priority, Parallel Priority Interrupt.

Module-IV

Memory Organization: (13 Period)

Computers Memory System Overview, Characteristics of Memory System, The Memory Hierarchy, Semi Conductor Main Memory types, Organisation, Memory cell Operation. Cache Memory: Cache Principles, Elements of Cache Design, Cache Size, Mapping function, Replacement Algorithm, LRU, FIFO, LFU, Write policy. Number of Caches: Single versus two level caches, Pentium Cache Organisation. Associative Memory: Hardware Organisation, Match Logic. Read Operation, Write Operation, Auxiliary Memory: Magnetic Disks, Magnetic Tape. Virtual Memory: Paging, Paging h/w, Address Mapping using pages, Segmentation h/w, Demand Paging, Memory Management h/w.

Text Books:

1. Computer Organization & Architecture – William Stallings, 7th Edition, PHI
2. Computer System Architecture : Morris Mano, 3rd Edition, PHI

Reference Books:

1. Computer Organization – by V.Carl Hamacher, Z.G.Vranesic, and S.G.Zaky, 5th Edition. McGraw Hill,
1. Computer Architecture and Organization, by - John P. Hayes, 3rd Edition, McGraw Hill International Editions.
2. Computer Organization & Design, (3rd Edition) by – D.A.Patterson & J.L.Hennessy – Morgan Kaufmann Publishers (Elseviers)
4. Computer Architecture and Parallel Processing – Hwang And Briggs_Mcgraw Hill 1985.

BCS-204

DATABASE ENGINEERING (3-1-0)

Cr.-04

Module – I

(10 Lectures)

Database System Architecture – Data Abstraction, Data Independence, Data Definitions and Data Manipulation Languages.

Data models- Entity Relationship (ER), Mapping ER Model to Relational Model, Network, Relational and Object Oriented Data models, Integrity Constraints and Data Manipulation Operations.

Module – II

(08 Lectures)

Relation Query Language, Relational Algebra, Tuple and Domain Relational Calculus, SQL and QBE.

Relational Database Design: Domain and Data dependency, Armstrong's Axioms, Normal Forms, Dependency Preservation, Lossless design, comparison of oracle & DB2.

Module – III

(08 Lectures)

Query processing and Optimization: Evaluation of Relational Algebra Expression, Query Equivalence, Join strategies, Query optimization Algorithms.

Module – IV

(12 Lectures)

Storage Strategies : Indices, B-Trees, Hashing.

Transaction Processing : Recovery and concurrency control, Locking and Time-stamp based schedules, Multi-version and Optimistic Concurrency control schemes.

Advanced topics : Object- Oriented and object Relational databases. Logical Database, Web databases, Distributed Databases, Data Warehouse and Data Mining.

Books:

1. Elmaski & Navathe- Fundamentals of Database systems, 4th Edition, Pearson Education
2. C.J. Date- An introduction to Database Systems, Pearson Education
3. Bipin Desai- An introduction to Database System, Galgotia publication.
4. G.W.Hansen and J.V.Hansen, Database Management and Design, 2nd Edition, PHI
5. Patrick O'Neil and Elizabeth O'Neil – Data Base – Principles Programming and Performance, Morgan Kaufmann

BCS 292

APL-II LAB(0-0-3)

Credit-02

Basics of .NET

1. Study on Visual Studio 2008.(4 Classes)
2. Basic programs using Visual Studio command prompt.
3. Basic programs on Windows Programming.(5 Classes)
4. Simple programs on ADO.NET.(3 Classes)
5. Generation of Crystal Report using .NET.

BCS 293

DBE LAB (0-0-3)

Credit –02

1. Use of SQL Syntax for creation, insertion, updation, and deletion operation.
2. Use of SQL for Single table retrieval and group by clauses.
3. Use of SQL for sub-queries, set operations, and date manipulations.

8086 Instruction Set and ALP:- Machine Language Instruction Formats, Addressing Modes of 8086, Instruction Set of 8086, Assembler Directives and Operators, ALP

Module-IV

(8 Lectures)

Special Architectural Features and Related Programming:- Introduction to Stack, Stack structure of 8086, Interrupts and Interrupt Service Routines, Interrupt Cycle of 8086, Non Maskable Interrupt, Maskable Interrupt (INTR), Interrupt Programming, Passing Parameters, to Size More than 64K, MACROS, Timings and Delays;

Module – V

(8 Lectures)

General-Purpose Programmable Peripheral Devices:- The 8255A Programmable Peripheral Interface, Illustration: Interfacing Keyboard and Seven-Segment Display, Illustration: Bidirectional Data Transfer between Two Microcomputers, The 8259A Programmable Interrupt Controller, Direct Memory Access (DMA) and the 8257 DMA Controller

Text Books:

1. Advanced Microprocessor and Peripherals, by A.K. Roy & K.M. Bhurchandi – TMH Publication.
2. Microprocessors & Interfacing, by D.V.Hall, TMH Publication

Reference Books:

1. Microprocessor Architecture Programming and Application with 8085, by R.S.Gaonkar, Pernram International Publishing (India) (For Modules I, II, III & IV).
2. Microcomputers Systems: The 8086/8088 family – Architecture, Programming and Design, 2nd Edition by Liu and Gibson, PHI.

BMA – 301 DISCRETE MATHEMATICAL STRUCTURES (3-1-0) Cr.-04

Module-I

(12 Lectures)

Logic, Propositional Equivalence, Predicates and Quantifiers, Methods of Proofs, Proof strategy, Sequences and Summations, Mathematical Induction, Recursive Definitions and Structural Induction, Program Correctness.

Module-II

(6 Lectures)

The Basics of counting, the Pigeonhole Principles, Permutations and Combinations, Generalized Permutations and Combinations, Recurrence Relations, Solving Recurrence Relations, Generating functions, Inclusion- Exclusion, Applications of Inclusion-Exclusion.

Relations and their Properties, n-ary relations and their Applications, Representing relations, Closures of Relations, Equivalence of Relations, Partial Orderings,

Module-III**(10 Lectures)**

Introduction to Graphs , Graph Terminology, Representing Graphs and Graph Isomorphism, Connectivity, Euler and Hamilton paths, Planner Graphs, Graph coloring, Introduction to trees, Applications of Trees.

Module-IV**(12 Lectures)**

Groups, Subgroups, Generators and Evaluation of powers, cosets and Lagrange's theorem, Permutation Groups and Burnside's theorem, Isomorphism and Automorphisms and Homomorphisms and Normal Subgroups, Rings, Integral Domains and fields.

Lattices and Algebras Systems, Principles of Duality, Basic properties of Algebraic Systems defined by Lattices, Distributive and complimented Lattices, Boolean Lattices and Boolean Algebras, Uniqueness of finite Boolean Expressions, Propositional calculus.

Coding of Binary Information and Error Detection, Decoding and Error Correction.

Text Books

1. K.H. Rosen : Discrete Mathematics and its application 5th Edition Tata Mc GrawHill,
Chapter : 1 (1.1-1.5) 3(3.1 – 3.4, 3.6), 4 (4.1 4.3, 4.5) 6 (6.1, 6.2, 6.4- 6.6), 7 (7.1 – 7.6 _), 8 (8.1-8.5, 8.7, 8.8) 9(9.1, 9.2) .
2. C.L. Liu – Elements of Discrete Mathematics 2nd Edition TMH 2000.Chapters : 11 (11.1- 11.10)(except 11.7) , 12 (12.1 – 12.8)
3. Bernand Kalman : : Discrete Mathematical structures , 3rd edition Chapters : 11 (11.1- 11.2)

BCS-302**OPERATING SYSTEMS (3-1-0) Cr.-4****Module – I****(10 Lectures)**

Introduction: What is an Operating Systems?

Simple Batch Systems, Multiprogramming and Time-Sharing systems. Personal Computer Systems, Parallel Systems, Distributed systems and Real time Systems.

Operating Systems structures: systems components, protection system, O.S. Services, system calls.

Process Management: Process concept, process scheduling, Operation on process, Cooperating Processes, Inter process communication. Threads CPU Scheduling: Basic concepts, scheduling algorithms.

Process Synchronization :Critical Section Problem,Synchronization Mechanism:software and hardware,semaphores,monitors

Module – II

(10 Lectures)

Deadlocks: System model, Deadlock Characterization Methods for Handling Deadlocks, Deadlock Prevention, Deadlock avoidance, Deadlock Detection, recovery from Deadlock.

Memory management: Background, Logical versus Physical Address space, swapping, contiguous Allocation. Paging, Segmentation.

Virtual memory: Background, Demand paging, performance of Demand paging, Page Replacement, page Replacement Algorithms. Allocation of frames, Thrashing, Demand Segmentation.

Module – III

(10 Lectures)

File – system Interface : file concept, Access Methods Directory implementation, Recovery.

Module – IV

(10 Lectures)

I/O systems: Overview, I/O Hardware, Application of I/O interface, Kernel I/O – subsystem Transforming I/O requests to Hardware operations.

Secondary storage Structure: Disk Structure. Disk scheduling, Disk management, Swap space management, Disk Reliability,

Protection and Security: Breaches, solutions, mechanisms, inside attack, outside attack.

Case Studies: LINUX, WINDOW NT.

Text Book:

Operating System Concepts: Abraham Silberschatz and Peter Bear Galvin, Addison Wesley -7th Edition 2008

Chapter – 1, Chapter –3 (3.1,3.2,3.3), Chapter – 4, chapter – 5 (5.1, 5.2, 5.3) , Chapter – 7 (7.1,-7.7), Chapter-8, chapter – 8, Chapter – 9, Chapter-10, Chapter- 11, Chapter-12, (12.1-12.5), Chapter-13(13.1-1.35)

Reference Book :

1. Operating System, McGraw Hill, Madnik & Donovan.
2. Operating Systems and system programming, SCITECH, P. Blkeiahn Prasad.
3. Moswen O.S. – PHI, Andrew, S. Tannenbaum

INFORMATION SECURITY (3-1-0)Cr.-4

BCS-303

Module I

(10 LECTURES)

The Security Problem in Computing:

The meaning of computer Security, Computer Criminals, Methods of Defense, Elementary Cryptography: Substitution Ciphers, Transpositions, Making “Good” Encryption algorithms, The Data Encryption Standard, The AES Encryption Algorithms, Public Key Encryptions, Uses of Encryption.

Module II**(10 LECTURES)**

Program Security:

Secure Programs, Nonmalicious Program Errors, viruses and other malicious code, Targeted Malicious code, controls Against Program Threats, Protection in General-Purpose operating system protected objects and methods of protection memory and addmens protection, File protection Mechanisms, User Authentication Designing Trusted O.S: Security polices, models of security, trusted O.S design, Assurance in trusted O.S. Implementation examples.

Module III**(10 LECTURES)**

Data base Security:

Security requirements, Reliability and integrity, Sensitive data, Inference, multilevel database, proposals for multilevel security.

Security in Network:

Threats in Network, Network Security Controls, Firewalls, Intrusion Detection Systems, Secure E-Mail.

Module IV**(10 LECTURES)**

Administering Security:

Security Planning, Risk Analysis, Organizational Security policies, Physical Security. Legal Privacy and Ethical Issues in Computer Security: Protecting Programs and data, Information and the law, Rights of Employees and Employers, Software failures, Computer Crime, Praia, Ethical issues in Computer Security, case studies of Ethics.

Text Books:

1. Security in Computing – (3rd Edition) Charles P.Pfleeger, Shari Lawrence Pfleeger. PHI.
2. Cryptography and Network Security – by A. Kahate – TMH.

Reference Book:

1. Cyber Security Operations Handbook – by J.W.Rittiaghouse and William M.Hancock – Elseviers.

DATA COMMUNICATION & COMPUTER NETWORKS (3-1-0) Cr.-4**BCS 304****Module – I****(12 Lectures)**

Overview of Data Communications and Networking.

Physical Layer : Analog and Digital, Analog Signals, Digital Signals, Analog versus Digital, Data Rate Limits, Transmission Impairment, More about signals.

Digital Transmission: Line coding, Block coding, Sampling, Transmission mode.

Analog Transmission: Modulation of Digital Data; Telephone modems, modulation of Analog signals. Multiplexing : FDM , WDM , TDM ,
Transmission Media: Guided Media, Unguided media (wireless)
Circuit switching and Telephone Network: Circuit switching, Telephone network.

Module –II

(12 Lectures)

Data Link Layer

Error Detection and correction: Types of Errors, Detection, Error Correction

Data Link Control and Protocols:

Flow and Error Control, Stop-and-wait ARQ. Go-Back-N ARQ, Selective Repeat ARQ, HDLC.

Point-to –Point Access: PPP

Point –to- Point Protocol, PPP Stack,

Multiple Access

Random Access, Controlled Access, Channelization.

Local area Network: Ethernet.

Traditional Ethernet, Fast Ethernet, Gigabit Ethernet. Token bus, token ring

Wireless LANs: IEEE 802.11, Bluetooth virtual circuits: Frame Relay and ATM.

Module – III

(8 Lectures)

Network Layer:

Host to Host Delivery: Internetworking, addressing and Routing

Network Layer Protocols: ARP, IPV4, ICMP, IPV6 ad ICMPV6

Transport Layer: Process to Process Delivery: UDP; TCP congestion control and Quality of service.

Module-IV

(8 Lectures)

Application Layer :

Client Server Model, Socket Interface, Domain Name System (DNS): Electronic Mail (SMTP) and file transfer (FTP) HTTP and WWW.

Text Books:

1. Data Communications and Networking: Behrouz A. Forouzan, Tata McGraw-Hill, 4th Ed

3. Computer Networks: A. S. Tannenbum, D. Wetherall, Prentice Hall, Imprint of Pearson 5th Ed

Reference Book : .

1. Computer Networks:A system Approach:Larry L, Peterson and Bruce S. Davie,Elsevier, 4th Ed

2. Computer Networks: Natalia Olifer, Victor Olifer, Willey India

3. Data and Computer Communications: William Stallings, Prentice Hall, Imprint of Pearson, 9th Ed.

4. Data communication & Computer Networks: Gupta, Prentice Hall of India

5. Network for Computer Scientists & Engineers: Zheng, Oxford University Press

6. Data Communications and Networking: White, Cengage Learning

1. Study of Unix/Linux Commands.(2 classes)
2. Write a program to allocate blocks of memory.
3. Write a program to implement best fit algorithm in paging memory.
4. Write a program to implement the bit vector for free space management.
5. Write a program to implement first fit algorithm in paging memory.
6. Write a program to implement worst fit algorithm in paging memory.
7. Write a program to create a unique file name by the user or by the system.
8. Write a program to implement DEKKERS ALGORITHM for mutual exclusion problem.
9. Write a program to implement DINING PHILOSOPHER problem.
10. Write a program for FCFS cpu scheduling algorithm.
11. Write a program for FIFO page replacement algorithm.
12. Write a program for LRU page replacement algorithm.
13. Write a program for Optimal page replacement algorithm.
14. Write a program to implement paging scheme.
15. Write a program for ROUND ROBIN cpu scheduling algorithm.
16. Write a program for SJF cpu scheduling algorithm.
17. Write a program to implement producer-consumer problem of IPC.
18. Write a program for to create two processes and wait for them to complete.
19. Write a program to make packaging and sending as in IPC.
20. Write a program to illustrate the function of a dispatcher.

8085

1. Addition, subtraction, multiplication and division of two 8 bit numbers
2. Smallest/largest number among n numbers in a given data array, Binary to Gray code, Hexadecimal to decimal conversion

Interfacing

1. Generate square wave on all lines of 8255 with different frequencies
2. Study of stepper motor and its operations

Optional (any two)

1. Study of traffic light controller
2. Study of elevator simulator
3. Generation of square, triangular and saw tooth wave using D to A Converter
4. Study of 8253 and its operation(Mode0, Mode2, Mode3)
5. Study of Mode0, Mode1 and BSR Mode operation of 8255
6. Study of 8279 (keyboard and display interface)
7. Study of 8259 Programmable Interrupt Controller

8051 Microcontroller

1. Initialize data to registers and memory using immediate, register, direct and indirect Addressing mode.

Optional (any one)

1. Addition and subtraction of 16 bit numbers
2. Multiplication and division of two 16 bit numbers
3. Transfer a block of data to another memory location using indexing
4. Operation of 8255 using 8051 microcontroller

8086

1. Addition, subtraction, multiplication and division of 16 bit numbers, 2's complement of a 16 bit number

Optional (any one)

1. Finding a particular data element in a given data array
2. Marking a specific bit of a number using look-up table
3. Largest/smallest number of a given data array
4. To separate the odd and even numbers from a given data array
5. Sorting an array of numbers in ascending/descending order

BCS 392

DCCN LAB(0-0-3)

Credit-02

Some Network protocol simulation using NetSim, NS2, etc. for

1. Analysing number of transmitting nodes vs. collision count, mean delay for Ethernet LAN.
2. Analysing bus vs. star-switch with respect to number of collisions (for a fixed number of transmitting nodes) for Ethernet LAN
3. Analysing performance of token ring with number of nodes vs. response time, mean delay using NetSim.
4. Comparing the throughput and normalized throughput for token ring and token bus for different transmitting nodes.
5. Comparing the CSMA/CD vs. CSMA/CA protocols (for a fixed number of transmitting nodes).
6. Analysing the difference between unicast and broadcast transmission (for a fixed number of transmitting nodes).
7. Verification of stop-and-wait protocol.
8. Verification of Go-back-N protocol.
9. Verification of Selective repeat protocol.
10. Verification of distance vector routing algorithm.
11. Verification of link state routing algorithm.

BCS 394

COMPUTATIONAL LAB(0-0-3)

Credit-02

1. Construction of NFA.
2. Construction of DFA.
3. Checking ambiguity of a context free grammar.
4. Construction of PDA.
5. Construction of TM

6TH SEMESTER

BCS-305

COMPILER DESIGN (3-1-0)

Credit-04

Module-I

(10 Lectures)

Introduction to Compiling:

Compilers, Analysis of the source program, The phases of a compiler, Cousins of the compiler, The grouping of phases, Compiler-construction tools

A Simple One-Pass Compiler:

Overview, Syntax definition, Syntax-directed translation, Parsing, A translator for simple expressions, Lexical analysis, Incorporating a symbol table, Abstract stack machines, Putting the techniques together

Lexical Analysis:

The role of the lexical analyzer, Input buffering, Specification of tokens, Recognition of tokens, A language for specifying lexical analyzers, Finite automata, From a regular expression to an NFA, Design of a lexical analyzer generator, Optimization of DFA-based pattern matchers

Module-II

(15 Lectures)

Syntax Analysis:

The role of the parser, Context-free grammars, Writing a grammar, Top-down parsing, Bottom-up parsing, Operator-precedence parsing, LR parsers, Using ambiguous grammars, Parser generators

Syntax-Directed Translation:

Syntax-directed definitions, Construction of syntax trees, Bottom-up evaluation of S-attributed definitions, L-attributed definitions, Top-down translation, Bottom-up evaluation of inherited attributes, Recursive evaluators, Space for attribute values at compile time, Assigning space at compile time, Analysis of syntax-directed definitions

Module-III

(6 Lectures)

Type Checking:

Type systems, Specification of a simple type checker, Equivalence of type expressions, Type conversions, Overloading of functions and operators, Polymorphic functions, An algorithm for unification

Run-Time Environments:

Source language issues, Storage organization, Storage-allocation strategies, Access to nonlocal names, parameter passing, Symbol tables, Language facilities for dynamic storage allocation, Dynamic storage allocation techniques, Storage allocation in Fortran

Module-IV

(9 Lectures)

Intermediate Code Generation:

Intermediate languages, Declarations, Assignment statements, Boolean expressions, Case statements, Back Patching, Procedure calls

Code generation:

Issues in the design of a code generator, The target machine, Run-time storage management, Basic blocks and flow graphs, Next-use information, A Simple code generator, Register allocation and assignment, The dag representation of basic blocks, Peephole optimization, Generating code from dags, Dynamic programming code-generation algorithm, Code-generator generators

Code Optimization:

Introduction, The Principal sources of optimization, Optimization of basic blocks, Loops in flow graphs, Introduction to global data-flow analysis, Iterative solution of data-flow equations, Code-improving transformations, Dealing with aliases, Data-flow analysis of structured flow graphs, Efficient data-flow algorithms, A tool for data-flow analysis, Estimation of types, Symbolic debugging of optimized code.

Text Book:

1. Compilers Principles, Techniques, & Tools, by A.V.Aho, R.Sethi & J.D.Ullman, Pearson Education
2. Principle of Compiler Design, A.V.Aho and J.D. Ullman, Addison – Wesley

BCS-306

SOFTWARE ENGINEERING & OOAD (3-1-0) Cr.-4

Module I

(10 Lectures)

Introductory concepts: Introduction, definition, objectives, Life cycle – Requirements analysis and specification.

Design and Analysis: Cohesion and coupling, Data flow oriented Design: Transform centered design, Transaction centered design. Analysis of specific systems like Inventory control, Reservation system.

Module II**(10 Lectures)**

Object-oriented Design: Object modeling using UML, use case diagram, class diagram, interaction diagrams: activity diagram, unified development process.

Module III**(12 Lectures)**

Implementing and Testing: Programming language characteristics, fundamentals, languages, classes, coding style efficiency. Testing: Objectives, black box and white box testing, various testing strategies, Art of debugging. Maintenance, Reliability and Availability: Maintenance: Characteristics, controlling factors, maintenance tasks, side effects, preventive maintenance – Re Engineering – Reverse Engineering – configuration management – Maintenance tools and techniques. Reliability : Concepts, Errors, Faults, Repair and availability, reliability and availability models, Recent trends and developments.

Module IV**(8 Lectures)**

Software quality: SEI CMM and ISO-9001. Software reliability and fault-tolerance, software project planning, monitoring, and control. Computer-aided software engineering (CASE), Component model of software development, Software reuse.

Text Book:

1. Mall Rajib, Fundamentals of Software Engineering, PHI.
2. Pressman, Software Engineering Practitioner's Approach, TMH.

BIT 416 SOCIAL NETWORK ANALYSIS (3-1-0) Cr. 04

Module-I**(10 Lectures)**

Introduction: Motivation, different sources of network data, types of networks, tools for visualizing network data, review of graph theory basics.

Module-II**(10 Lectures)**

Structural properties of networks: Notions of centrality, cohesiveness of subgroups, roles and positions, structural equivalence, equitable partitions, stochastic block models.

Module-III**(10 Lectures)**

Cascading properties of networks: Information/influence diffusion on networks, maximizing influence spread, power law and heavy tail distributions, preferential attachment models, small world phenomenon.

Module-IV

(10 Lectures)

Mining Graphs: Community and cluster detection: random walks, spectral methods; link analysis for web mining.

Text Books:

1. Stanley Wasserman, Katherine Faust. Social network analysis: methods and applications. Cambridge University Press, 1994.
2. David Easley and Jon Kleinberg. Networks, Crowds, and Markets: Reasoning About a Highly Connected World. Cambridge University Press, 2010.

References

1. Peter R. Monge, Noshir S. Contractor, Theories of communication networks. Oxford University Press, 2003.
2. Duncan Watts. Six degrees: the science of a connected age. Norton, 2004.
3. Various research papers.

BCS-309

ANALYSIS & DESIGN OF ALGORITHMS (3-1-0)Cr.-4

Module – I

(10 Lectures)

Introduction to design and analysis of algorithms, Growth of Functions (Asymptotic notations, standard notations and common functions), Recurrences, solution of recurrences by substitution, recursion tree and master methods worst case analysis of Merge sort, Quick sort and Binary search Design & Analysis of Divide and conquer algorithms.

Heapsort :

Heaps, Building a heap, The heapsort algorithm, priority Queue, Lower bounds for sorting

Module – II

(10 Lectures)

Dynamic programming algorithms (Matrix-chain multiplication, Elements of dynamic programming, Longer common subsequence)

Greedy Algorithms- (Activity selection problem, Elements of Greedy strategy, fractional knapsack problem, Huffman codes).

Module – III

(10 Lectures)

Data structure for disjoint sets:- Disjoint set operations, Linked list representation Disjoint set forests.

Graph Algorithm: Breadth first and depth first search, Minimum spanning Trees, Kruskat and prim' s algorithms, single – source shortest paths (Bellman-ford and dijkstra's algorithms).

Module- IV

(10 Lectures)

Fast Fourier Transform, string matching (Rabin – Karp algorithm), NP- Completeness (Polynomial time verification, NP- Completeness and reducibility , NP complete problems (without proofs), Approximation algorithms (Traveling Salesman Problem).

Text Book:

T.H. Cormen, C.E. Leiserson, R.L. Rivest,
C. Stein: Introduction to algorithms – 2nd edition, PHI , 2002.

Chapters : 1,2,3,4 (excluding 4.4), 6,7 (7.4.1), 8 (8.1)15 (15.2,15.3,15.4), 16 (16.1,16.2,16.3), 21 (21.1, 21.2, 21.3), 22(22.222.3), 23,24 (24.1,24.2,24.3), 30,31 (31.131.2)34,35 (35.2).

BCS-308

INTERNET & WEB TECHNOLOGY - I (3-1-0)Cr.-4

Module I

(10 Lectures)

Internet architecture: Internet overview, evolution of internet. Internet components – Local Area Networks, Access Networks, Core Networks, Routers, Transmission infrastructure, ISPs. Packet switching fundamentals-Packet Switching versus Circuit Switching, Connectionless packet switching (IP). Internet Standards: Standards bodies and the standards process, IETF, ITU, IEEE, ATM Forum.

Module II

(10 Lectures)

Networking protocols: Network Protocol Overview: What are networking protocols, and what do they do? Key protocol architectures. IP Network Overview: What are the key IP network capabilities? How will these capabilities adapt to future network? IP protocol operation. IP addressing: IP address classes. Why are IP addresses under pressure, and what fixes are in place? TCP Fundamentals: How does TCP shield end users from IP network problems? TCP protocol operation and capabilities. TCP/IP: routing.

Module III

(10 Lectures)

Access Methods and Internet working: Access Network Architectures: Access network characteristics. Differences between Access Networks, Local Area Networks and Wide Area Networks. Access Technologies: Why there is an upper limit on modem speeds. Voice grade modems, ADSL, Cable Modems, Frame Relay. DNS: Domain Names. Resolving Domain Names to IP addresses (DNS operation). Registering Domain Names

and solving Domain name disputes. Routing: How the key IP routing protocols (OSPF and BGP4) operate. Implications of future Internet growth on routing protocol performance.

Module IV

(10 Lectures)

Internet applications: FTP, Telnet, Email, Chat. World Wide Web: HTTP protocol. Search Engines. E-Commerce and security issues including symmetric and asymmetric key, encryption and digital signature, and authentication. Emerging trends, Internet telephony, virtual reality over the web, etc. Intranet and extranet, firewall.

Books:

1. Data & Computer Communications, By William Stallings
2. Computer Networks, A system approach By Larry L.Peterson, Bruce S. Davie
3. Internetworking with TCP / IP, Principles, Protocols & Architecture, By Douglas E.Comer.
4. TCP / IP – clearly Explained – by Pete Loshin, Morgan Kaufmann Publishers.
5. TCP / IP Network Administration by Craig Hunt, Shroff Publishers & Distributors Pvt.Ltd.
6. The Internet and its protocols – A Comparative Approach, by A.Farrel I Elseviers, (Morgan Kaufmann Publishers).

BCS 395

COMPILER DESIGN LAB (0-0-3)

Credit –02

1. Write a program in C to design a weighted directed graph.
2. Write a program in C for accepting and validating floating point and fixed point numbers.
3. Write a program in C for tokenizing the C program. The program will output a file with list of all the tokens and the types of tokens for classification.
4. Write a program to pick up comment lines in a C/C++/JAVA Program.
5. Convert a simple file automation (e.g: All strings ending with abb) into a program.
6. Design of a recursive descent parser.
7. Implementation of FIRST & FOLLOW functions.
8. Simulation of LL(1) parsing techniques.
9. Develop a rudimentary C Processor capable of handling the “ define, ifdef, ifndef, include “ directives.
10. Case studies on some basic compilers.

BCS 496

INTERNET WEB TECHNOLOGY LAB(0-0-3)

Credit-02

1. Introduction to major internet protocol- SFTP
2. HTML- Basics of HTML., text, image, other MIME types, lists, tables, HTTP methods, forms.
3. Multimedia on the Web- Embedding audio and video files in HTML
4. Java Script- Introduction to Java Script for client side validation.
5. Server side scripting – Introduction to fundamentals concepts of ASP or JSP or PHP (any one platform depending on instructor). Basics of CGI scripting using Perl or C. Simple examples of request/ response objects. Basic introduction to web solutions architecture.

BCS 397

SOFTWARE ENGINEERING LAB.(0-0-3)

Credit – 02

1. Time management software of a company
2. Hotel automation software
3. Judiciary information system software
4. Restaurant automation software
5. Supermarket automation software
6. Newspaper agency automation software
7. Medicine shop software
8. Bookshop automation software
9. Road tax information management system
10. Railway reservation system
11. Electricity billing system
12. Inventory control system
13. Library management system
14. Payroll management system
15. Banking system

BCS 398

ADA LAB (0-0-3)

Credit – 02

Elementary Problems

1. Implement polynomial addition using a single linked list.

Attributes of Output Primitives: Line Curve, Color, Area fill and Character Attributes, Bundled Attributes, Antialiasing.

Module II

(10 Lectures)

Two Dimensional Geometric Transformation: Basic Transformation (Translation, rotation, Scaling) Matrix Representation and Homogeneous coordination, Composite Transformations, Reflection Shears, Transformation between coordinate system.

Two Dimensional Viewing: the viewing Pipeline Viewing coordinate Reference frame, window-to view port coordinate Transformation.

Line Clipping (Cohen-Sutherland Algorithm) and Polygon Clipping (Sutherland-Hodgeman Algorithm)

Module III

(10 Lectures)

Three Dimensional Object Representation: Polygon Surface, quadratic Surface, Spline Representative, Bezier Curves and Surface B-Spline Curves and surfaces.

Fractal Geometry Methods: Fractal Generation Procedure, Classification of Fractals Dimension, geometric Construction of Deterministic self-similar.

Three Dimensional Geometric and Modeling Transformations: Translation Rotation, Scaling, Reflections, shear, Composite Transformation, Modeling and Coordinate Transformation.

Three Dimensional Viewing: Viewing Pipeline, Viewing Coordinates, Projections (Parallel and Perspective) Clipping Implementation of above using open GL

Module IV

(10 Lectures)

Visible Surface Detection Method: Backface Detection, Depth Buffer, A Buffer, Scan line and Depth sorting

Illumination Models: Basic Models, Displaying Light Intensities, Halftone Pattern and Dithering Techniques

Surface Rendering Methods: Polygon Rendering Methods, Gouraud and Phong Shading

Quick Introduction to Computer Animation
Implementation of above using Open GL

Text Books:

1. Computer Graphics, D.Hearn and M.P.Baker (C Version), Prentice Hall, 1999
2. Open GL Super Bible, R.S.Wright and M.Sweet, Tech Media.

Reference Books:

1. Computer Graphics Principle and Practice, J.D.Foley, A.Dam, S.K.Feiner, Addison, Wesley.
2. Edward Angel- Interactive Computer Graphics-A Top Down Approach with Open GL.

BCS-402**E-COMMERCE & ERP (3-1-0)****Cr.-04****Module – I****(10 Lectures)**

Electronic Commerce: Overview, Definitions, Advantages & Disadvantages of E-Commerce, Threats of E-Commerce, Managerial Prospective, Rules & Regulations for Controlling E-Commerce, Cyber Laws.

Technologies: Relationship between E-Commerce and Networking, Different Types of Networking for E-Commerce, internet, intranet, EDI Systems.

Wireless Application Protocol: Definition, Hand Held Devices, Mobility & Commerce. Mobile Computing, Wireless Web, Web Security, Infrastructure Requirement for E-Commerce.

Business Models of E-Commerce; Model Based on Transaction Type, Model Based on Transaction Party – B2B, B2C, C2B, C2C, E-Governance.

Module – II**(10 Lectures)**

E-strategy: Overview, Strategic Methods for developing E-Commerce.

Four Cs (Convergence, Collaborative Computing, Content Management & Call Centre). Convergence: Technological Advances in Convergence – Types, Convergence and its implications, Convergence and Electronic Commerce.

Collaborative Computing: Collaborative product development, contract as per CAD, Simultaneous Collaboration, Security.

Content Management: Definition of content, Authoring Tools and Content Management, Content – partnership, repositories, convergence, providers Web Traffic & Traffic management: Content Marketing.

Call Centre: Definition, Need, Tasks Handled, Mode of Operation, Equipment, Strength & Weaknesses of Call Centre, Customer Premises Equipment (CPE). [6L]

Supply Chain Management: E-logistics, Supply Chain Portal, Supply Chain planning Tools (SCP Tools), Supply Chain Execution (SCE), SCE – Framework, Internet's effect on Supply Chain Power.

Module – III**(10 Lectures)**

E-Payment Mechanism; Payment through card system, E-Cheque, E-Cash, E-Payment Threats & Protections,

E-Marketing: Home – shopping, E-Marketing, Tele-Marketing

Electronic Data Interchange (EDI): Meaning, Benefits, Concepts, Application, EDI Model, protocols (UN EDI FACT / GTDI, ANSIX – 12, Data Encryption (DES / RSA)

Risk of E-Commerce: Overview, Security for E-Commerce, Security Standards, Firewall, Cryptography, Key Management, Password Systems, Digital Certificates, Digital Signatures.

Module – IV

(10 Lectures)

Enterprise Resource Planning (ERP): Features, capabilities and Overview of Commercial Software, re-engineering work processes for IT applications, Business Process Redesign , Knowledge Engineering and Data Warehouse.

Business Modules: Finance, Manufacturing (Production), Human Resources, Plant Maintenance, Materials, Management, Quality Management Sales & Distribution ERP Package.

ERP Market: ERP Market Place, SAP AG, People Soft, BAAN, JD Edwards, Oracle Corporation.

ERP-Present and Future: Enterprise Application Integration (EAI).

ERP and E-Commerce, ERP and Internet, Future Directions in ERP.

Reference Book:

1. E-Commerce, MM Oka, EPH
2. Kalakotia, Whinston: Frontiers of Electronic Commerce, Pearson Education.
3. Bhaskar Bharat : Electronic Commerce – Technologies & Applications, TMH
4. Loshin Pete, Murphy P.A.: Electronic Commerce, Jaico Publishing Housing

BCS-403

DATA MINING & DATA WARE HOUSING (3-1-0) Cr.-04

Module-I

(8 Lectures)

Data Mining Functionalities – What Kinds of Patterns Can Be Mined? Classification of Data Mining Systems, Major Issues in Data Mining, Summary.

Data Warehouse and OLAP Technology for Data Mining – What is a Data Warehouse? Differences between Operational Database Systems and Data Warehouses, But, Why have a separate Data Warehouse, A Multidimensional Data Model, Data Warehouse Architecture, Steps for the Design and Construction of Data Warehouses, A Three-Tier Data Warehouse Architecture, Types of OLAP Servers: ROLAP versus MOLAP versus HOLAP, Data Warehouse Implementation, Efficient Computation of Data Cubes, Indexing OLAP Data, Efficient Processing of OLAP Queries, Metadata Repository, Data Warehouse Back-Eng Tools and Utilities, Further Development of Data Cube Technology, Discovery-Driven Exploration of Data Cubes, Complex Aggregation at Multiple Granularities: Multifeature Cubes, Other Developments, From Data Warehousing to Data Mining.

Modules-II

(8 Lectures)

Data Preprocessing – Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

Data Mining Primitives, Languages, and System Architectures: Data Mining Primitives: What Defines a Data Mining Task? Task-Relevant Data, The Kind of Knowledge to be Mined, Background Knowledge: Concept Hierarchies, Interestingness Measures, Presentation and

Visualization of Discovered Patterns, A Data Mining Query Language, Syntax for Task-Relevant Data Specification, Syntax for Specifying the Kind of Knowledge to be Mined, Syntax for Concept Hierarchy Specification, Syntax for Interestingness Measure Specification, Syntax for Pattern Presentation and Visualization Specification, Putting it All Together-An Example of a DMQL Query, Architectures of Data Mining Systems.

Module-III

(12 Lectures)

Concept Description: Characterization and Comparison, What is Concept Description, Data Generalization and Summarization-Based Characterization, Attribute-Oriented Induction, Efficient Implementation of Attribute-Oriented Induction, Presentation of the Derived Generalization, Analytical Characterization: Analysis of Attribute Relevance, Why Perform Attribute Relevance Analysis? Methods of Attribute Relevance Analysis, Analytical Characterization: An Example, Mining Class Comparisons: Discriminating between Different Classes, Class Comparison Methods and Implementations, Presentation of Class Comparison Descriptions, Class Description: Presentation of Both Characterization and Comparison, Mining Descriptive Statistical Measures in Large Database, Measuring the Central Tendency, Measuring the Dispersion of Data, Graph Displays of Basic Statistical Class Descriptions.

Mining Association Rules in Large Databases, Association Rule Mining, Market Basket Analysis: A Motivating Example for Association Rule Mining, Basic Concepts, Association Rule Mining A Road Map, Mining Single-Dimensional Boolean Association Rules from Transactional Database, The Apriori Algorithm: Finding Frequent Itemsets Using Candidate Generation, Generating Association Rules from Frequent Itemsets, Improving the Efficiency of Apriori, Mining Frequent Itemsets without Candidate Generation, Iceberg Queries, Mining Multilevel Association Rules from Transaction Databases, Multilevel Association Rules, Approaches to Mining Multilevel Association Rules, Checking for Redundant Multilevel Association Rules, Mining Multidimensional Association Rules for Relational Database and Data Warehouses, Multidimensional Association Rules, Mining Multidimensional Association Rules Using Static Discretization of Quantitative Attributes, Mining Quantitative Association Rules, Mining Distance-Based Association Rules, From Association Mining to Correlation Analysis, Strong Rules Are Not Necessarily Interesting: An Example, From Association Analysis to Correlation Analysis, Constraint-Based Association Mining, Metarule-Guided Mining of Association Rules, Mining Guided by Additional Rule Constraints.

Module-IV

(12 Lectures)

Classification and Prediction – What is Classification? What Is Prediction? Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Decision Tree Induction, Tree Pruning, Extracting Classification Rules from Decision Trees, Enhancements to Basic Decision Tree Induction, Scalability and Decision Tree Induction, Integrating Data Warehousing Techniques and Decision Tree Induction, Bayesian Classification, Bayes Theorem, Naïve Bayesian Classification, Bayesian Belief Networks, Training Bayesian Belief Networks, Classification by Backpropagation, A Multilayer Feed-Forward Neural Network, Defining a Network Topology, Classification Based on Concepts from Association Rule Mining, Other Classification Methods, k-Nearest Neighbor Classifiers, Case-Based Reasoning, Genetic Algorithms, Rough Set Approach, Fuzzy Set Approaches, Prediction, Linear and Multiple Regression, Nonlinear Regression, Other Regression Models, Classifier Accuracy, Estimating Classifier Accuracy, Increasing Classifier Accuracy, Is Accuracy Enough to Judge a Classifier.

Cluster Analysis – What Is Cluster Analysis, Types of Data in Cluster Analysis, Interval-Scaled Variables, Binary Variables, Nominal, Ordinal, and Ratio-Scaled Variables, Variables of Mixed Types, A Categorization of Major Clustering Methods, Classical Partitioning Methods: k-Means and k-Medoids, Partitioning Methods in Large Databases: From k-Medoids to CLARANS,

Hierarchical Methods, Agglomerative and Divisive Hierarchical Clustering, BIRCH: Balanced Iterative Reducing and Clustering Using Hierarchies, CURE: Clustering Using Representatives, Chameleon: A Hierarchical Clustering Algorithm Using Dynamic Modeling, Density-Based Methods, DBSCAN: A Density-Based Clustering Method Based on Connected Regions with Sufficiently High Density, OPTICS: Ordering Points To Identify the Clustering Structure, DENCLUE: Clustering Based on Density Distribution Functions, Grid-Based Methods, STING: Statistical Information Grid, Wave Cluster: Clustering Using Wavelet Transformation, CLIQUE: Clustering High-Dimensional Space, Model-Based Clustering Methods, Statistical Approach, Neural Network Approach.

Module-V

(10 Lectures)

Multidimensional Analysis and Descriptive Mining of Complex Data Objects – Generalization of Structured Data Aggregation and Approximation in Spatial and Multimedia Data Generalization of Object Identifiers and Class/Subclass Hierarchies, Generalization of Class Composition Hierarchies, Construction and Mining of Object Cubes, Generalization-Based Mining of Plan Databases by Divide-and-Conquer, Mining Spatial Databases, Spatial Data Cube Construction and Spatial OLAP, Spatial Association Analysis, Spatial Clustering Methods, Spatial Classification and Spatial Trend Analysis, Mining Multimedia Databases, Similarity Search in Multimedia Data, Multidimensional Analysis of Multimedia Data, Classification and Prediction Analysis of Multimedia Data, Mining Time-Series and Sequence Data, Mining Text Databases, Mining the World Wide Web.

Applications and Trends in Data Mining – Data Mining Applications, Data Mining System Products and Research Prototypes, Additional Themes on Data Mining, Social Impacts of Data Mining, Trends in Data Mining.

TEXT BOOKS:

1. Data Mining: – Concepts and Techniques by Jiawei Han and Micheline Kamber, -- Morgan Kaufmann Publisher (Elseviers)
2. Data Mining Techniques: - by A.K. Pujari,, Tenth Edition, Universities Press.

BCS-404

ARTIFICIAL INTELLIGENCE (3-1-0)

Cr.-04

Module - I

(10 Lectures)

Formalized symbolic logic: Propositional logic-first order predicate logic, wff conversion to clausal form, inference rules, the resolution principle, Dealing with inconsistencies and uncertainties, fuzzy logic.

Module - II

(10 Lectures)

Probabilistic Reasoning Structured knowledge, graphs, frames and related structures, Knowledge organization and manipulation.

Module - III

(10 Lectures)

Matching Techniques, Knowledge organizations, Management.

Module - IV

(10 Lectures)

Natural Language processing, Pattern recognition, expert systems.

Text Book:

1. Artificial Intelligence, Dan W Patterson, Prentice Hall of India (1999) Chapter-4, 5,7,9,10,11,12,13,15.

Reference Books:

1. Artificial Intelligence, Nils J.Nilsson, ELSEVIER.
2. E.Rich and K.Knight, Artificial Intelligence, - TMH

BCS-405

SOFT COMPUTING (3-1-0)

Cr.-4

Module I

(10 Lectures)

Neural Networks: Fundamentals of Neural Networks: Models of an artificial Neuron, Neural Network Architecture, Learning methods

Back Propagation Networks: Architecture of a Back propagation Network: back propagation, Learning Effect of Tuning parameters of the Back propagation Neural Network, variation of standard Back Propagation Algorithms.

Module II

(10 Lectures)

Associative memory: Auto correlators, Kosko's Discrete BAM, Exponential BAM, Associative memory for Real-coded Pattern Pairs, Applications.

Adaptive Resonance Theory:

ART1, ART2, Applications

Module III

(10 Lectures)

Fuzzy Logic:

Fuzzy set theory: crisp sets, fuzzy sets, crisp relations, fuzzy relations, Fuzzy Systems: Crisp logic predicate logic, fuzzy logic, fuzzy Rule based system, Defuzzification Methods.

Genetic Algorithms:

Fundamentals of genetic algorithms: Encoding, Fitness functions, Reproduction.

Genetic Modeling:

Cross over, Inversion and deletion, Mutation operator, Bit-wise operators, Bitwise operators used in GA. Convergence of Genetic algorithm. Applications, Real life Problems.

Module IV

(10 Lectures)

Hybrid Systems:

Hybrid system, neural Networks, fuzzy logic and genetic algorithms hybrids.

Genetic Algorithm based Back propagation Networks: GA based weight determination applications: Fuzzy Back Propagation Networks, Fuzzy Associative Memories: Single Association FAM, Fuzzy Hells FAMS, Fuzzy logic controlled genetic Algorithms soft computing tools, Fuzzy constraints, GA in fuzzy logic controller design, Applications.

Text Books:

1. Neural Networks, Fuzzy Logic, and Genetic Algorithm (Synthesis and Application) S.Rajasekaran, G.A. Vijayalakshmi Pai, PHI

Reference Book:

1. Neuro Fuzzy and Soft Computing, J.S.R.JANG, C.T.Sun, E.Mitzutani, PHI
- 2.

BCS 406

DISTRIBUTED COMPUTING (3-1-0)

Cr.-4

Module – I

(10 Lectures)

Definition of a Distributed System: Making Resources Accessible, Distribution Transparency, Openness, Scalability, Pitfalls, Types of Distributed Systems; Distributed Computing Systems, Distributed Information Systems, Distributed Pervasive Systems.

Architectures: Architectural Styles; System Architectures, Centralized Architectures, Decentralized Architectures, Hybrid Architectures, Architectures Versus Middleware; Interceptors, General Approaches to Adaptive Software, Discussion, Self-Management in Distributed Systems; The Feedback Control Model, Systems Monitoring with Astrolabe, Differentiating Replication Strategies in Globule, Automatic Component Repair Management in Jade.

Module – II

(10 Lectures)

Processes: Threads; Introduction to Threads, Threads in Distributed Systems, Virtualization; The Role of Virtualization in Distributed Systems, Architectures of Virtual Machines, Clients; Networked User Interfaces, Client-Side Software for Distribution Transparency, Servers; General Design Issues, Server Clusters, Managing Server Clusters, Code Migration; Approaches to Code Migration, Migration and Local Resources, Migration in Heterogeneous Systems.

Communication: Fundamental; Layered Protocols, Types of Communication, Remote Procedure Call; Basic RPC Operation, Parameter passing, Asynchronous RPC, DCE RPC, Message-Oriented Communication; Message-Oriented Transient Communication, Message-Oriented Persistent Communication, Stream-Oriented Communication; Support for Continuous Media, Streams and Quality of Service, Stream Synchronization, Multicast Communication; Application-Level Multicasting, Gossip-Based Data Dissemination.

Module – III

(10 Lectures)

Naming: Names, Identifiers and Addresses; Flat Naming; Simple Solutions, Home-Based Approaches, Distributed Hash Tables, Hierarchical Approaches, Structured naming; Name Spaces, Name Resolution, The Implementation of a Name Space, Attribute-Based Naming; Directory Services, Hierarchical Implementations: LDAP, Decentralized Implementations,

Synchronization: Clock Synchronization; Physical Clocks, Global Positioning System, Clock Synchronization Algorithms, Logical Clocks; Lamport's Logical Clocks, Vector Clocks, Mutual Exclusion; Overview, A Centralized Algorithm, A Decentralized Algorithm, A Distributed Algorithm, A Token Ring Algorithm, A Comparison of the Four Algorithms, Global Positioning of Nodes; Election Algorithms; Traditional Election Algorithms, Elections in Wireless Environments, Election in Large-Scale Systems.

Module – IV

(10 Lectures)

Consistency and Replication: Introduction; Reasons for Replication, Replication as Scaling Technique, Data-Centric Consistency Models; Continuous Consistency, Consistent Ordering of Operations, Client-Centric consistency Models; Eventual Consistency, Monotonic Reads, Monotonic Writes, Read Your Writes, Writes Follow Reads, Replica Management; Replica-Server Placement, content Replication and Placement, Content Distribution, Consistency Protocols; Continuous Consistency, Primary-Based Protocols, Replicated-Write Protocols, Cache-Coherence Protocols, Implementing Client-Centric Consistency.

Security: Introduction to Security; Security Threats, Policies, and Mechanisms, Design Issues, Cryptography, Secure Channels; Authentication, Message Integrity and Confidentiality, Secure Group Communication, Access Control; General Issues in Access Control, Firewalls, Secure Mobile Code, Denial of service, Security Management; Key Management, Secure Group Management, Authorization Management.

Reference Books:

1) Distributed Systems, 2nd Edition by Andrew S. Tanenbaum, Maarten Van Steen, Pearson Prentice Hall.

BEC 419

PATTERN RECOGNITION (3-1-0)

Cr. 04

Module –I

(12 Lectures)

Introduction

Features, Feature Vectors and Classifiers, Supervised vs. unsupervised pattern

Classifier

Classifier based on Bayes Decision Theory, Linear classifier: Least square methods, Mean square estimation, Support vector machines, nonlinear classifier: Two layer & three layer perceptron, Back propagation algorithm, combining classifiers

Module –II

(12 Lectures)

Feature Selection

Preprocessing, Statistical hypothesis testing, Class separability measures

Feature Generation

Linear transforms, Discrete Fourier transform (DFT), Hadamard transform, Discrete Time Wavelet transform (DTWT)

Fourier feature, Moment-based features

Fractals: Self similarity, Fractional Brownian Motion (FBM), Fractal dimension

Module –III

(12 Lectures)

Template Matching

Based on optimal path searching techniques, correlations

Clustering

Sequential algorithms: Estimation of number of clusters

Hierarchical algorithms: Agglomerative algorithms

Textbooks

1. Pattern Recognition, Sergios Theodoridis & Konstantinos Koutroumbas, Elsevier

BEC 420 INFORMATION THEORY & CODING (3-1-0) Cr. 04

Module-I

(10 Lectures)

Probability and Random Processes: Axioms of probability; random variables; statistical averages

Information Theory Basics: Definition: uncertainty, information, entropy; relation between uncertainty, information and entropy

Module-II

(10 Lectures)

Source-Coding: Shannon's source coding theorem; Uniquely decodable codes; instantaneous codes; Kraft inequality; McMillan's inequality, Lempel- Ziv algorithm for source coding; run-length coding; design of optimal quantiser

Optimal Codes: Optimality; Huffman codes, r-ary Huffman codes, Shannon- Fano codes; entropy and optimal codes

Module-III

(15 Lectures)

Information Channels: Shannon's channel coding theorem; redundancy; binary symmetric channel; system entropy; mutual information; Shannon's channel capacity theorem; channel capacity and coding

Error-Control coding: discrete-memoryless channels; error detection and error correction codes; linear block codes: Hamming codes, optimal linear codes; basic finite field theory; Reed-Solomon codes; Berlekamp Massey Algorithm; cyclic codes: Golay, CRC; convolutional codes: tree, trellis codes; Viterbi decoding of convolution codes; turbo codes

Module-IV

(05 Lectures)

Information theory and security: Perfect security, Unicity distance; Diffusion and confusion; DES; Public Key Cryptography

Text Books

1. WB Davenport Probability and Random Processes: An Introduction for Applied Scientists and Engineers, McGraw Hill Classic Textbook Reissue, 1970.
2. San Ling and Chaoping Coding Theory: A first Course, Cambridge University Press, 2004.
2. Michael Artin Algebra, Pearson Education, 1991.
3. G A Jones J M Jones, Information and Coding Theory, Springer Verlag, 2004.
4. Simon Haykin, Communication Systems, 4th Edn, John Wiley, 2001.
5. Thomas M Cover and Joy A Thomas, Elements of Information Theory John Wiley, 1991.
6. Ranjan Bose, Information theory coding and cryptography, TMH, 2002.
7. C E Shannon, "A Mathematical Theory of Communication", Bell Systems Technical Journal, vol. 27, pp. 379-423 and 623-656, July and October, 1948.
8. C E Shannon, "Communication Theory of Secrecy Systems", Bell Systems Technical Journal, vol.28(4), pp. 656-715, 1949.

BCS-417

ADVANCED OPERATING SYSTEM (3-1-0)

Cr-4

Fundamentals: What is a Distributed computing system , Evolution of Distributed Computing Systems, Distributed Computing Systems models, What are Distributed Computing Systems Gaining Popularity, What is a Distributed Operating Systems, Issues in Designing a Distributed Operating System, Introduction to distributed Computing Environment (DCE) .

Message Passing : Introduction, Desirable Features of Good Message-Passing System, Issues in IPC by Message Passing, Synchronization, Buffering, Multidatagram Messages, Encoding and Decoding of Message Data, Process Addressing , Failure Handling , Group communication.

Remote Procedure Calls:- Introduction, The RPC Model, Transparency of RPC, Implementing RPC Mechanism, Stub Generation, RPC Messages Marshaling Arguments and Results, Server Management, Parameter-Passing Semantics , Call Semantics, Communication protocols for RPCs. Complicated RPCs, Client-Server Binding, Exception handling, Security, Some Special types of RPCs, RPC in Heterogeneous Environments, Lightweight RPC,

Distributed Shared Memory: Introduction, General Architecture of DSM Systems, Design and Implementation issues of DSM, Granularity, Structure of Shared Memory Space, Consistency Models, Replacement Strategy, Thrashing , Other Approaches to DSM, Heterogeneous DSM, Advantages of DSM,

Synchronization: Introduction, Clock Synchronization , Event ordering, Mutual Exclusion, Deadlock, Election Algorithms.

Resources Management : Introduction , Desirable Features of a Good Global Scheduling Algorithm, Task Assignment Approach, Load Balancing Approach, Load sharing Approach

Process Management: Introduction, Process Migration, Threads

Distributed file Systems: Introduction, Desirable Features of a good Distributed file Systems, File Models, File Accessing Models, File-Sharing Semantics, File-Caching Schemes, File Replication, fault Tolerance, Atomic Transactions, Design principles,

Naming: Introduction, Desirable Features of a Good Naming Systems, Fundamentals Terminologies and Concepts, System-Oriented Names, Object-Locating Mechanisms, Human-Oriented Names, Name Caches, Naming and Security,

Security: Introduction, Potential Attacks to Computer Systems, Cryptography, Authentication, Access control, Digital Signatures, Design principles,

Text Books:

1. Distributed Operating System – Concept & Design, by – P.K.Sinha, PHI

Reference Books:

1. Operating System Concepts & Design, Milan Milenkovic, TMH
2. Operating System, H.M.Beitel, Pearsons

8th SEMESTER

BCS 411

ADVANCED COMPUTER ARCHITECTURE (3-1-0) Cr.-4

Module-I

(10 lectures)

Parallel Processing: Definition, Theory of Parallelism. Parallel Computer Models, Parallelism in Uni-processor computers, Implicit Parallelism vs. explicit parallelism, Levels of parallelism. Soft ware Parallelism, Hardware Parallelism.

Conditions of Parallelism: Data and Resource Dependencies, Control Dependence, Resource dependence, Berrnstein’s condition, Hardware and software parallelism, Flow dependence, Anti dependence, output dependence, I/O dependence, unknown dependence.

Module-II**(10 lectures)**

Program flow Mechanism: Control flow versus data flow, Demand-driven mechanism, Comparison of flow mechanisms, Dataflow computer Architecture, Static dataflow and dynamic dataflow computer, Communication Latency, grain packing and scheduling in parallel programming environment, program partitioning, fine grain program, coarse grain program graph.

Module-III**(10 lectures)**

Parallel Interconnection Systems: Static and Dynamic Networks, Linear Array, Ring, Star, Tree, Mesh, Systolic Array, Chordal ring, Completely connected network, Cube connected cycles, Torus, K-ary-n cube, Barrel shifter, single stage interconnection network, Multistage Interconnection Networks, Control Structure, Node degree, diameter, Bisection width, symmetric, functionality, Network Latency, Bandwidth, Scalability, Data routing functions:- Permutation, Perfect shuffle exchange, Hypercube Routing function.

Pipelining: Linear pipe line processor, Asynchronous and Synchronous models, speed up, Efficiency, Throughput, Non linear pipe line processor, Instruction pipeline, pipeline hazards, Arithmetic pipeline.

Module-IV**(10 lectures)**

Multiprocessor and multicomputers: Hierarchical bus system, crossbar and multi port memory, cross point switch, Flynn's classification: SISD, SIMD, MISD, MIMD, message passing, Loosely coupled and tightly coupled system.

Vector processor, memory hierarchy, CISC scalar processor, RISC scalar processor, C-access and S-access memory organization. Basic ideas on parallel algorithm, SIMD algorithm for matrix multiplication.

Fault-tolerance and reliability, Availability, System Performance attributes of parallel Computers.

Text Books:

1. Advanced Computer Architecture, by Kai Hwang Mc Graw Hill.
2. Introduction to Parallel Computing, 2nd Edition, Pearson Education by Ananth Grama, Anshul Gupta, George Karypis, Vipin Kumar.

Reference Books:

1. Computer Architecture – A quantitative approach By J.L Hennessy and D.A.Patterson (Morgan)
2. Computer Architecture and Parallel Processing, by K.Hwang and F.A. Briggs. Mc Graw Hill, International

Module – I**(10 Lectures)**

Introduction to Personal Communications Services (PCS): PCS Architecture, mobility management, Networks signaling, Global System for Mobile Communication (GSM) System overview: GSM Architecture, Mobile management, Network signaling.

General Packet Radio Services (GPRS): GPRS Architecture, GPRS Network Nodes, Mobile Data Communication; WLANs (Wireless LANs) IEEE 802.II standard, Mobile IP.

Module – II**(10 Lectures)**

Wireless Application Protocol (WAP): The Mobile Internet standard, WAP Gateway and Protocols, wireless mark up Languages (WML), Wireless Local Loop (WLL): Introduction to WLL Architecture, wireless Local Loop Technologies.

Third Generation (3G) Mobile Services: Introduction to International Mobile Telecommunications 2000 (IMT 2000) Vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000, Quality of services in 3G.

Module – III**(10 Lectures)**

Global Mobile Satellite Systems: case studies of the IRIDIUM and GLOBALSTAR systems. Wireless Enterprise Networks: Introduction to Virtual Networks,VPN, Blue tooth technology, Blue tooth Protocols,Mobile adhoc networks.

Module – IV**(10 Lectures)**

Server-side programming in Java, Pervasive web application architecture, Device Independent example application.

Text Books:

1. Mobile computing, Talukder, TMH,2010.
2. “Mobile Communication”, J.Schiller, Pearson,2010.

Reference Book:

1. “Guide to Designing and Implementing Wireless LANs”, Mark Ciampa, Thomson learning, Vikas Publishing House, 2001
2. “Wireless Web Development”, Ray Rischpater, Springer Publishing
3. “The Wireless Application Protocol”, Sandeep Singhal, Pearson
 4. “Third Generation Mobile Telecommunication Systems”, by P.Stavronlakis, Springer Publishers.
 5. “Pervasive Computing”, Burkhardt, Pearson

BCS-415

INTERNET & WEB TECHNOLOGY-II (3-1-0)Cr.-4

TCP/ IP:

TCP/IP Overview, TCP/IP and Internet, Layers of TCP/IP, Network Layer: Addressing, Sub netting, concepts of ARP, RARP, ICMP, IGMP. Transport Layer: UDP & TCP, Application Layer: Client server model, BOOTP, DHCP, DNS, TELNET, FTP, SMTP model, HTTP, idea of WWW and CGI.

Core JAVA:

JAVA fundamentals, overview of JAVA operators, control statements, introducing classes, inheritance, exception handling, AWT, working with window graphics and text, AWT controls, Layout manager.

Advanced JAVA:

Introducing threading, advantages, Multi-threading, JAVA and networking, TCP/IP client sockets, Whois, URL, Server sockets, Overview of a caching Proxy HTTP server.

Applets and JDBC:

Introducing Applets, Architecture of an applet, skeleton, HTML APPLET tag, Event Handling, JDBC, Connecting to a database, transactions and executing SQL query, JDBC interface, Callable and prepared statements, Introduction to swing.

CGI Programming

Introduction to Web Architecture, Apache Web Server, Perl programming, CGI programming with Perl.

Network Security:

Network security basics and needs, cryptography, encryption and decryption, Ciphertext, types of cryptography: symmetric and asymmetric, RSA algorithm, Digital Signature, Organizational security issues and firewall architecture.

Reference Books:

1. *TCP/IP – Forouzan (TMH)*
2. *Internet and World Wide Web, How to Program, Dietel and Dietel, Pearson Education.*
3. *Complete Reference JAVA - Naughton Schildt*
4. *Web Technologies – Achyut S Godbole and Atul Kahate*

BIT-414

BIO INFORMATICS (3-1-0)

Cr.-4

Module - I

(10 Lectures)

Introduction to Genomic data and Data Organization: Sequence Data Banks – introduction to sequence data banks – protein sequence data bank. NBRF-PIR. SWISSPORT. Signal peptide data bank, Nucleic acid sequence data bank – GenBank, EMBL nucleotide sequence data bank. AIDS virus sequence data bank. PRNA data bank,

structural data banks- protein Data Bank (PDB). The Cambridge Structural Database (CSD) : Genome data bank – Metabolic pathway data; Microbial and Cellular Data Bank.

Module - II

(10 Lectures)

Introduction to MSDN (Microbial Strain Data Network) : Numerical Coding Systems of Microbes, Hibridoma Data Bank Structure, Virus Information System Cell line information system; other important Data banks in the area of biotechnology/life sciences/biodiversity.

Sequence analysis: Analysis Tools for Sequence Data Bank: Pair wise alignment – NEEDLEMAN and Wunsch algorithm, Smith Waterman, BLAST, FASTA algorithms to analyze sequence data; Sequence patterns motifs and profiles.

Module – III

(10 Lectures)

Secondary Structure Predictions; prediction algorithms; Chao-Fasman algorithm. Hidden-Markov model, Neural Networking.

Tertiary Structure predictions; prediction algorithms; Chao-Fasman algorithm. Hidden-Markov model, Neural Networking.

Module- IV

(10 Lectures)

Application in Biotechnology : Protein classifications, Fold libraries, Protein structure prediction : Fold recognition's (threading), protein structure predictions : Comparative modeling (Homology), Advanced topics : Protein folding, Protein-ligand interactions, Molecular Modeling & Dynamics, Drug Designing.

Text Books:

1. Lesk, Introduction to Bio Informatics, OUP
2. Introduction to Bio-informatics, Atwood, Pearson Education
3. Developing Bio-informatics Computer Skills, Cynthia Gibas andd Per Jambeck. 2001 SPD
4. Murty CSV, Bioinformatics, Himalaya

BEC-418

INTRODUCTION TO VLSI DESIGN (3-1-0)

Cr.-4

Module – I

(10 Lectures)

Introduction, Historical perspective, VLSI Design methodologies, VLSI Design Flow, Design Hierarchy, Design Styles, CAD Technology. Fabrication of MOSFETS, Fabrication processes, NMOS Fabrication, CMOS n-well process, Layout Design rules, Stick Diagrams, Full Custom Mark Layout Design, MOS Transistor, Review of structure

and operation of MOSFET (n-MOS enhancement type), CMOS, MOSFET v-I characteristics, MOSFET scaling and small geometry effects, MOSFET capacitances, Modeling of MOS Transistors – Basic concept the SPICE level-1 models, the level-2 and level-3 model equations.

Module – II

(10 Lectures)

MOS Inverters: Basic NMOS Inverters, characteristics, Inverters with resistive load and with n-type MOSFET load, CMOS Inverter and characteristics.

MOS inverters: Switching characteristics and interconnect effects: Delay time definitions and calculation, inverter design with delay constraints, estimation of parasitic switching power of CMOS inverters.

Module – III

(10 Lectures)

Combinational MOS logic circuits, CMOS logic circuits, state style, complex logic circuits, pass transistor logic, sequential logic circuit – introduction, SR latch, clocked latch and flip-flop circuits, CMOS D latch and edge triggered flip-flop.

Dynamics logic circuits: Dynamic logic, basic principles, high performance dynamics CMOS circuits, Dynamic Ram, SRAM, flash memory.

Module – IV

(10 Lectures)

Systems Design method, design strategies, concept of FPGA, standard cell based design, design capture tools, hardware definition languages such as VHDL and packages. Xilinx (Introduction), introduction to IRSIM and GOSPL (open source packages), design verification and testing, simulation at various levels including timing verification, faults models, Design strategies for testing chip level and system level test techniques.

Text Books:

1. CMOS Digital integrated Circuits – Analysis & Design – Sung Mo-Kang & Yussuf Leblebici, TMH.
2. VHDL Programming by example – Perry TMH.
3. Digital Integrated Circuit, J.M.Rabey, Chandrasan, Nicolic, Pearson
4. CMOS Digital Integrated Circuit, B.M.Kang & Leblebici, TMH
5. Modern VLSI Design, Wayne Wolf, Pearson
6. Algorithm for VLSI Design and Automation, N.Sherwani, Kluwer
7. VHDH, Bhaskar, PHI

Reference Books:

1. Digital Integrated Circuits: A Design Perspective – Rabey et.al. Pearson Education.
2. VLSI design Techniques for analog and digital circuits- Geiger et. Al. McGraw Hill.

Module-I**(12 Lectures)**

Fundamentals: What is a Distributed computing system , Evolution of Distributed Computing Systems, Distributed Computing Systems models, What are Distributed Computing Systems Gaining Popularity, What is a Distributed Operating Systems, Issues in Designing a Distributed Operating System, Introduction to distributed Computing Environment (DCE) .

Message Passing : Introduction, Desirable Features of Good Message-Passing System, Issues in IPC by Message Passing, Synchronization, Buffering, Multidatagram Messages, Encoding and Decoding of Message Data, Process Addressing , Failure Handling , Group communication.

Remote Procedure Calls:- Introduction, The RPC Model, Transparency of RPC, Implementing RPC Mechanism, Stub Generation, RPC Messages Marshaling Arguments and Results, Server Management, Parameter-Passing Semantics , Call Semantics, Communication protocols for RPCs. Complicated RPCs, Client-Server Binding, Exception handling, Security, Some Special types of RPCs, RPC in Heterogeneous Environments, Lightweight RPC,

Module-II**(8 Lectures)**

Distributed Shared Memory:Introduction, General Architecture of DSM Systems, Design and Implementation issues of DSM, Granularity, Structure of Shared Memory Space, Consistency Models, Replacement Strategy, Thrashing , Other Approaches to DSM, Heterogeneous DSM, Advantages of DSM,

Module-III**(10 Lectures)**

Synchronization: Introduction, Clock Synchronization , Event ordering, Mutual Exclusion, Deadlock, Election Algorithms.

Resources Management : Introduction , Desirable Features of a Good Global Scheduling Algorithm, Task Assignment Approach, Load Balancing Approach, Load sharing Approach

Process Management: Introduction, Process Migration, Threads

Module-IV**(10 Lectures)**

Distributed file Systems: Introduction, Desirable Features of a good Distributed file Systems, File Models, File Accessing Models, File-Sharing Semantics, File-Caching Schemes, File Replication, fault Tolerance, Atomic Transactions, Design principles,

Naming: Introduction, Desirable Features of a Good Naming Systems, Fundamentals Terminologies and Concepts, System-Oriented Names, Object-Locating Mechanisms, Human-Oriented Names, Name Caches, Naming and Security,

Security: Introduction, Potential Attacks to Computer Systems, Cryptography, Authentication, Access control, Digital Signatures, Design principles,

Text Books:

1. Distributed Operating System – Concept & Design, by – P.K.Sinha, PHI

Reference Books:

1. Operating System Concepts & Design, Milan Milenkovic, TMH
2. Operating System, H.M.Beitel, Pearsons

BCS 428

KNOWLEDGE MANAGEMENT (3-1-0)

Cr.-4

Module – I

(10 Lectures)

Principles and Case Studies:

Overview of Knowledge Management, The Nature of Knowledge, Knowledge Management Solutions, Organizational Impacts of Knowledge Management, Factors Influencing Knowledge management, Knowledge Management Assessment of an Organization.

Module - II

(10 Lectures)

Technologies:

Technologies to Manage Knowledge: Artificial Intelligence, Digital Libraries, Repositories, etc., Preserving and Applying Human Expertise: Knowledge-Based Systems, Using Past History Explicitly as Knowledge: Case-Based Systems, Knowledge Elicitation: Converting Tacit Knowledge to Explicit, Discovering New Knowledge: Data Mining

Text KM and Text Mining.

Module - III

(10 Lectures)

Systems:

Knowledge Discovery: Systems that Create Knowledge, Knowledge Capture Systems: Systems that Preserve and Formalize Knowledge; Concept Maps, Process Modeling, RSS, Wikis, Delphi Method, etc., Knowledge Sharing Systems: Systems that Organize and Distribute Knowledge; Ontology Development, Systems, Categorization and

Classification Tools, XML-Based Tools, etc., Knowledge Application Systems: Systems that Utilize Knowledge.

Module – IV

(10 Lectures)

Advanced Topics:

Knowledge Engineering, Knowledge Ecosystems, Meta Knowledge, Knowledge Management Softwares

The Future of Knowledge Management.

Textbook:

1. Irma Becerra-Fernandez, Avelino Gonzalez, Rajiv Sabherwal (2004). *Knowledge Management Challenges, Solutions, and Technologies* (edition with accompanying CD). Prentice Hall. ISBN: 0-13-109931-0.

Reference books/materials:

1. Elias M. Awad, Hassan M. Ghaziri (2004). *Knowledge Management*. Prentice Hall. ISBN: 0-13-034820-1.
2. Ian Watson (2002). *Applying Knowledge Management: Techniques for Building Corporate Memories*. Morgan Kaufmann. ISBN: 1558607609.
3. Madanmohan Rao (2004). *Knowledge Management Tools and Techniques: Practitioners and Experts Evaluate KM Solutions*. Butterworth-Heinemann. ISBN: 0750678186.
4. Amrit Tiwana (2002). *The Knowledge Management Toolkit: Orchestrating IT, Strategy, and Knowledge Platforms* (2nd Edition). Prentice Hall. ISBN: 013009224X.
5. Stuart Barnes (ed) (2002). *Knowledge Management Systems Theory and Practice*. Thomson Learning.

BIT 415

MANAGEMENT INFORMATION SYSTEMS (3-1-0)

Cr.-4

Module – I

(10 Lectures)

Fundamentals of Information Systems, Systems approach to problem solving, Developing is solutions.

Module – II

(10 Lectures)

Corporate databases and database management, Data Organization, Data models, Data security and Information quality.

Module – III

(10 Lectures)

Transaction Processing Systems, Executive Information Systems, Decision Support Systems, Expert Systems, Information Systems in marketing, manufacturing, HRM, Accounting and Finance.

Module – IV

(10 Lectures)

Information Resource Management, Planning implementing and controlling Information Systems, Computer crime, Ethics and Society.

Books:

1. Brein James O – Management Information Systems.
2. Murdick & Ross – Information Systems for Modern Management.
3. Parker C.S. – Management Information Systems – Strategy and Action.
4. Aktas A.Ziya – Structured Analysis and Design of Information Systems.