UNIVERSITY DEPARTMENTS

ANNA UNIVERSITY CHENNAI : : CHENNAI 600 025

REGULATIONS - 2009

CURRICULUM I TO VI SEMESTERS (FULL TIME)

MASTER OF COMPUTER APPLICATIONS (M.C.A.)

SEMESTER I (5+2)

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	MA9112	Mathematical Foundations of Computer Science	3	1	0	4
2	CA9111	Fundamentals of Programming	3	0	0	3
3	CA9112	Data Structures and Algorithms	3	0	0	3
4	CA9113	Relational Database Management Systems	3	0	0	3
5	CA9114	Computer Organization and Design	3	0	0	3
PRACTICAL						
6	CA9116	Data Structures and Laboratory	0	0	3	2
7	CA9117	Database Management System Laboratory	0	0	3	2
		TOTAL	15	1	6	20

SEMESTER II (5+2)

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	CA9121	Computer Communication and Networks	3	1	0	4
2	CA9122	Operating Systems Concepts	3	0	0	3
3	CA9123	Fundamentals of Software Engineering	3	0	0	3
4	CA9124	Microprocessors	3	0	0	3
5	CA9125	Object Oriented Paradigm and Programming	3	0	0	3
PRACTICAL						
6	CA9127	Object Oriented Programming Laboratory	0	0	3	2

7	CA9128	Microprocessors Laboratory	0	0	3	2
		TOTAL	**15**	**1**	**6**	**20**

SEMESTER III (5+2)

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	CA9131	Advanced Database Technology	3	0	0	3
2	CA9132	System Software Internals	3	0	0	3
3	CA9133	Object Oriented System Design	3	0	0	3
4	CA9134	Internet Programming	3	0	0	3
5	E1	Elective – I	3	0	0	3
PRACTICAL						
6	CA9137	Internet Programming Laboratory	0	0	3	2
7	CA9138	Case Tools Laboratory	0	0	3	2
		TOTAL	**15**	**0**	**6**	**19**

SEMESTER IV (5+2)

Theory

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	CA9141	Software Project Management Techniques	3	0	0	3
2	CA9142	Visual Programming Techniques	3	0	0	3
3	CA9143	UNIX Network Programming	3	0	0	3
4	CA9144	Middleware Technologies	3	0	0	3
5	E2	Elective – II	3	0	0	3
PRACTICAL						

6	CA9146	Visual Programming Laboratory	0	0	3	2
7	CA9147	Network Programming Laboratory	0	0	3	2
		TOTAL	**15**	**0**	**6**	**19**

SEMESTER V (5+2)

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	CA9151	Service Oriented Architecture	3	0	0	3
2	CA9152	Software Quality Assurance	3	0	0	3
3	CA9153	Graphics and Multimedia Systems	3	0	0	3
4	E3	Elective – III	3	0	0	3
5	E4	Elective – IV	3	0	0	3
PRACTICAL						
6	CA9154	Software Testing Laboratory	0	0	3	2
7	CA9155	Graphics and Multimedia Laboratory	0	0	3	2
		TOTAL	**15**	**0**	**6**	**19**

SEMESTER VI (0+1)

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
PRACTICAL						
1	CA9161	Project Work	0	0	24	12
		TOTAL	**0**	**0**	**24**	**12**

Total No of Credits : 109

No of Theory courses : 25

No of Lab Courses : 10 + 01

List of Electives

MASTER OF COMPUTER APPLICATIONS (M.C.A.)

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
1	CA9171	Mobile Commerce	3	0	0	3
2	CA9172	Software Quality Management	3	0	0	3
3	CA9173	Software Reuse	3	0	0	3
4	CA9174	Software Reliability and Metrics	3	0	0	3
5	CA9175	Real Time Systems	3	0	0	3
6	CA9176	Distributed Systems	3	0	0	3
7	CA9177	High Speed Networks	3	0	0	3
8	CA9178	Digital Image Processing	3	0	0	3
9	CA9179	Visualization Techniques	3	0	0	3
10	CA9180	User Interface Design	3	0	0	3
11	CA9181	Bio Informatics	3	0	0	3
12	CA9182	Grid Computing	3	0	0	3
13	CA9183	Information System Planning and Development	3	0	0	3
14	CA9184	Data Warehousing and Data Mining	3	0	0	3
15	CA9185	Cryptography and Network Security	3	0	0	3
16	CA9186	XML and Web Services	3	0	0	3
17	CA9187	Geographical Information Systems	3	0	0	3
18	CA9188	Financial Management	3	0	0	3
19	CA9189	Human Resources Management	3	0	0	3
20	CA9190	TCP/IP Design and Implementation	3	0	0	3
21	CA9191	UNIX Internals	3	0	0	3
22	CA9192	Customer Relationship Management	3	0	0	3
23	CA9193	Healthcare Information Systems	3	0	0	3
24	CA9194	E – Learning Techniques	3	0	0	3

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
25	CA9195	Database Tuning	3	0	0	3
26	MA9110	Operation Research	3	1	0	4

MA 9112   MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE

L T P C
3 1 0 4

UNIT I   LOGIC   9

Statements – Connectives – Truth Tables – Normal Forms – Predicate Calculus – Inference Theory for Statement Calculus**.**

UNIT II   COMBINATORICS   9

Permutations and Combinations – Mathematical Induction – Pigeonhole principle – Principle of Inclusion and Exclusion – Recurrence relations – Solution by generating functions and characteristics equations.

UNIT III   ALGEBRAIC STRUCTURES   9

Groups – Cyclic group – Permutation group (S_n and D_n) – Substructures – Homomorphism – Cosets and Lagranges Theorem – Normal Subgroups – Rings and Fields (definition and examples).

UNIT IV   RECURSIVE FUNCTIONS   9

Recursive functions – Primitive recursive functions – Computable and Non-Computable functions.

UNIT V   LATTICES   9

Partial order relation – Posets – Hasse diagram – Lattices – Special Lattices – Boolean Algebra.

L + T: 45+15 =60

TEXTBOOKS

1. Trembley.J.P. and Manohar R. "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw – Hill Publishing Company Limited, New Delhi. Reprinted in 2007.

2. Grimaldi R.P. and Ramana B.V. "Discrete and Combinatorial Mathematics", Pearson Ediction, Reprinted in 2006. (5th Edition) – (for Section 2 only).

REFERENCES

1. Kenneth H. Rosen, "Discrete Mathematics and its Applications", Tata McGraw Hill Publishing Company Limited, New Delhi. Reprinted in 2007 (6th Edition).
2. Thomas Koshy, "Discrete Mathematics with Applications", Academic Press, Reprinted in 2005.

CA9111   FUNDAMENTALS OF PROGRAMMING

L T P C
3 0 0 3

UNIT I   INTRODUCTION TO COMPUTER PROBLEM SOLVING

Introduction – The Problem – Solving aspect – Top down design – Implementation of algorithm's – Program Verification – The efficiency of algorithm's – The analysis of algorithm's.

UNIT II   PROGRAMMING, ALGORITHMS AND FLOWCHARTS

Programs and Programming – Programming Languages - compiler – Interpreter, Loader and Linker - Program execution – Classification of Programming Language- Structured Programming Concept- Algorithm.

UNIT III   BASICS OF 'C', INPUT & OUTPUT

Introduction- A simple C Program – Identifier – Keywords- Variable – Data Types of C – Program Statement – Declaration of Variables – Constants – Printf - Assignment Operator- Initialization – Operators and Expressions – Elementary Arithmetic Operations and Oerators- Expression Revisted – Lvalues and Rvalues – Type Conversion in C – Basic screen and keyboard I/O in C – Non-formatted input and output functions.

UNIT IV   CONTROL STATEMENTS,ARRAYS & STRINGS AND FUNCTIONS

Introduction- Specifying Test Condition for Selection and Iteration- Conditional Execution and Selection – Iteration and Repetitive Execution- Which loop should be used? – goto Statements – Nested Loops – One dimensional Array- strings: One – dimensional Character Arrays- Multidimensional Arrays- Arrays of Strings: Two – dimensional character array - the concept of functions- using functions- scope – storage classes- recursion- comparing iteration and recursion- analysis of algorithms.

UNIT V   POINTERS,USER-DEFINED DATATYPES AND VARIABLES

Introduction- understanding memory addresses- address operator- pointer- use of pointers- arrays and pointers – pointers and strings- array of pointers- pointer to pointer- pointers to functions- dynamic memory allocation- memory leak and memory corruption- structures- union- enumeration types- bitfields.

TEXTBOOKS

1. How to solve it by computer , R.G.Dromey, pearson education , fifth edition, 2007.

2. Programming in C, Pradip Dey, Manas Ghosh, Oxford university press, 2007.

REFERNCES

1. Deitel and Deitel, "C How to Program", Pearson Education.

2. Cormen,Leiserson, Rivest, Stein, " Introduction to Algorithms", McGraw Hill Publishers, 2002

3. Kernigan Brian W., and Dennis M. Ritchie, " The C Programming Language", Second Edition, Prentice Hall, 1988.

CA9112   DATA STRUCTURES AND ALGORITHM DESIGN

                                                                      L T P C
                                                                      3 0 0 3
UNIT I   FUNDAMENTALS   9

Mathematical Induction - Asymptotic Notations – Properties of Big-oh Notation – Conditional Asymptotic Notation – Algorithm Analysis – Amortized Analysis – NP-Completeness – NP-Hard – Recurrence Equations – Solving Recurrence Equations – Memory Representation of Multi-dimensional Arrays – Time-Space Tradeoff.

UNIT II   DATA STRUCTURES   9

Min/Max heaps – Leftist Heaps – Skew Heaps – AVL Trees – Red-Black Trees – B-Trees – Splay Trees – Tries.

UNIT III   ALGORITHM DESIGN: I   9

Divide and Conquer strategy – Selection of k-th Smallest Elements – Convex Hull – Strassen's Matrix Multiplication – Greedy Approach – Container Loading – Tree Vertex Splitting – Optimal Merge Patterns.

UNIT IV   ALGORITHM DESIGN: II   9

Dynamic Programming Approach – Principle of Optimality – String Editing – Flow Shop Scheduling – Connected Components – Bi-Connected Components Graph Coloring using Backtracking Technique – Branch and Bound Methodology.

UNIT V   APPROXIMATION ALGORITHMS   9

Planar Graph Coloring – Maximum Program Stored Problem – Bin Packing – Scheduling Independent Tasks – 0/1 Knapsack – Rounding – Interval Partitioning.

                                                                TOTAL = 45

REFERENCES

1. E. Horowitz, S.Sahni and Dinesh Mehta, Fundamentals of Data structures in C++, Uiversity Press, 2007.
2. E. Horowitz, S. Sahni and S. Rajasekaran, Computer Algorithms/C++, Second Edition, University Press, 2007.
3. G. Brassard and P. Bratley, Algorithmics: Theory and Practice, Printice –Hall, 1988.

CA9113   RELATIONAL DATABASE MANAGEMENT SYSTEMS

L T P C
3 0 0 3

UNIT I   INTRODUCTION   9
An Overview of Database Management –Database System Architecture – Data Dictionary - An Introduction of Relational Databases – Relational Model - Relations – Relational Algebra – Relational Calculus – Integrity – Keys – SQL: Set Operations – Aggregate Functions – Null Values - Nested Sub Queries – Complex Queries - Views – Modification of the Database - Embedded SQL – Dynamic SQL– Triggers – Security.

UNIT II   DATABASE DESIGN   9
Functional Dependencies- Normalization: 1NF, 2NF, 3NF, BCNF - Higher Normal Forms - Semantic Modeling: The E/R Model – Database design with the E/R Model.

UNIT III   DATA STORAGE AND QUERYING   9
Physical Storage Media– File Organization – Indexing: Ordered Indices – B tree Indexing – B$^+$ tree Indexing – Static Hashing – Dynamic Hashing - Query Processing – Query Optimization.

UNIT IV   TRANSACTION MANAGEMENT   9
Transactions - Recovery – Two- Phase Commit- Concurrency Control – Three Concurrency Problems- Locking Protocols– Deadlock Handing – Serializability – Multi Granularity Locking – Dropping ACID.

UNIT V   FURTHER TOPICS   9
Distributed Databases - Case Studies: DB2 - Oracle – Microsoft SQL Server – Database Connectivity: ODBC - JDBC.

TOTAL = 45

REFERENCES

1. C.J.Date, A.Kannan and S.Swamynathan,"An Introduction to Database Systems", Eighth Edition, Pearson Education, 2006.
2. Henry F Korth, Abraham Silberschatz, S. Sudharshan, "Database System Concepts", Fifth Edition, McGraw Hill, 2006.
3. Raghu Ramakrishnan, Johannes Gehrke, "Database Management Systems", McGraw Hill, Third Edition 2004.
4. R. Elmasri, S.B. Navathe, "Fundamentals of Database Systems", Fifth Edition, Pearson Education/Addison Wesley, 2007.
5. Thomas Cannolly and Carolyn Begg, " Database Systems, A Practical Approach to Design, Implementation and Management", Third Edition, Pearson Education, 2007.

CA9114   COMPUTER ORGANIZATION AND DESIGN

L T P C
3 0 0 3

UNIT 1   BASICS OF LOGIC DESIGN   9

Basic Logic functions – synthesis of logic functions – Minimization of Logic Expressions – K Maps – Synthesis with NAND and NOR gates –Encoders / Decoders – Multiplexers/ Demultiplexer- Flipflops – Registers - Up down counters.

UNIT 2   ISA AND ALU DESIGN   9

Components of the Computer – ISA : Language of the computer - Hardware Software Interface – Assessing and understanding performance. Arithmetic for Computers - Fixed point and floating point operations - ALU design – Adder – Fast Adder – Multiplication – Division – Floating point operations.

UNIT 3   PROCESSOR DATA PATH AND CONTROL   9

Processor – Data path and control – Building a datapath – Simple and multicycle implementations – Instruction sequencing – Execution of Complete Instructions – Hard wired control – Microprogrammed control.

UNIT 4   PIPELINING   9

Pipelining – Pipelined data path – Pipelined control – Data hazards and forwarding – Branch hazards – Model of a pipeline – Exceptions – Advanced pipelining.

UNIT 5   MEMORY AND I/O   9

Memory technology – Memory systems – Virtual memory – Caches – Design methods – Associative memories – Input/Output systems – Programmed I/O – DMA and Interrupts – I/O Devices and Interfaces.

REFERENCES

1. David A Patterson and John L. Hennessy, " Computer Organization and Design, The Hardware/Software Interface", Morgan Kaufmann / Elsevier, Third Edition, 2005.
2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, "Computer Organization", Tata McGraw Hill, Fifth Edition, 2002
3. Morris Mano, "Digital Design", Prentice Hall of India, 1997
4. William Stallings, " Computer Organization and Architecture – Designing for Performance", Pearson Education, Seventh Edition, 2006.

CA9116   DATA STRUCTURES LABORATORY

Data Structures:

1. Implementation of multi-dimensional structures such as matrices, triangular matrices, diagonal matrices, etc into a one dimensional array (atleast any two)

2. Min/Max Heaps (Insertion, Deletemin/Delete Max)

3. Leftist Heap (All Meldable Priority Queue operations)

4. AVL Trees (Insertion, Deletion and Search)

5. Tries for any specified alphabet (Insertion, Deletion and Search)

Application of Data Structures:

1. Finding Convex-hull using divide & conquer strategy

2. Selection of k-th smallest element using divide and conquer strategy

3. Finding connected components of a graph

4. Finding bi-connected components of a graph

5. Graph coloring using backtracking technique

CA9117   DATABASE MANAGEMENT SYSTEM LABORATORY

1. Creation of base tables and views.
2. Data Manipulation
   INSERT, DELETE and UPDATE in tables
   SELECT, Sub Queries and JOIN
3. Data Control Commands
4. High level language extensions – PL/SQL. Or Transact SQL
5. Use of Cursors, Procedures and Functions
6. Embedded SQL or Database Connectivity.
7. Oracle or SQL Server Triggers.
8. Working with Forms, Menus and Reports.
9. Front-end tools – Visual Basic/Developer 2000

Total= 45

CA9121   COMPUTER COMMUNICATIONS AND NETWORKS

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                                                              3 1 0 4

UNIT I   INTRODUCTION   12

Communication model – Data communications networking – Data transmission concepts and terminology – Transmission media – Data encoding – Data link control.

UNIT II   NETWORK FUNDAMENTALS   12

Protocol architecture – OSI – TCP/IP – LAN architecture – Topologies – MAC – Ethernet, Fast ethernet, Token ring, FDDI, Wireless LANS – Bridges.

UNIT III   NETWORK LAYER   12

Network layer functions – Switching concepts – Circuit switching networks – Packet switching – Routing – Internetworking concepts – IP – Unreliable connectionless delivery – Datagrams – Routing IP datagrams – ICMP.

UNIT IV   TRANSPORT LAYER   12

Transport layer functions – User Datagram Protocol – Transmission Control Protocol – Reliable Delivery Service – Connection Establishment – Flow Control – Congestion Control – Queueing disciplines – Congestion Avoidance.

UNIT V   APPLICATIONS   12

Domain Name System(DNS) – Telnet – rlogin – FTP – SMTP – MIME – IMAP – HTTP – SNMP – Security.

                                                              TOTAL = 60

REFERENCES

1. Larry L. Peterson & Bruce S. Davie, "Computer Networks: A Systems Approach", Fourth Edition, Morgan Kaufmann Publishers, 2007.

2. William Stallings, "Data and Computer Communications", Seventh Edition, PHI, 2004.

3. James F. Kurose, Keith W. Ross, "Computer Networking: A Top-Down Approach", Fourth Edition, Addison-Wesley, 2008.

CA9122   OPERATING SYSTEM CONCEPTS

                                                                    L T P C
                                                                    3 0 0 3

UNIT I   OPERATING SYSTEMS OVERVIEW   9

Operating system – Types of Computer Systems - Computer-system operation – I/O
structure – Hardware Protection - System components – System calls – System
programs – System structure - Process concept – Process scheduling – Operations on
processes – Cooperating processes – Interprocess communication – Communication in
client-server systems - Multithreading models – Threading issues – Pthreads.

UNIT II   PROCESS MANAGEMENT   10

Scheduling criteria – Scheduling algorithms – Multiple-processor scheduling – Real time
scheduling – Algorithm Evaluation – Process Scheduling Models - The critical-section
problem – Synchronization hardware – Semaphores – Classic problems of
synchronization – critical regions – Monitors - System model – Deadlock characterization
– Methods for handling deadlocks – Recovery from deadlock

UNIT III   STORAGE MANAGEMENT   9

Memory Management – Swapping – Contiguous memory allocation – Paging –
Segmentation – Segmentation with paging. Virtual Memory: Background – Demand
paging – Process creation – Page replacement – Allocation of frames – Thrashing.

UNIT IV   I/O SYSTEMS   9

File concept – Access methods – Directory structure – File-system mounting –
Protection - Directory implementation – Allocation methods – Free-space management -
Disk scheduling – Disk management – Swap-space management.

UNIT V   CASE STUDY   8

The Linux System - History – Design Principles – Kernel Modules – Process
Management – Scheduling – Memory management – File systems – Input and Output –
Inter-process Communication – Network Structure – Security – Windows 2000 - History
– Design Principles – System Components – Environmental subsystems – File system –
Networking.

                                                            TOTAL = 45

TEXT BOOKS

1. Silberschatz, Galvin and Gagne, "Operating System Concepts", Sixth Edition,
   John Wiley & Sons Inc 2002.

REFERENCES

1. Andrew S. Tanenbaum, "Modern Operating Systems", Second Edition, Addison
   Wesley, 2001.
2. Gary Nutt, "Operating Systems", Second Edition, Addison Wesley, 2001.

3. H M Deital, P J Deital and D R Choffnes, "Operating Systems" , Pearson Education, 2004.

CA9123   FUNDAMENTALS OF SOFTWARE ENGINEERING

L T P C
3 0 0 3

UNIT I   INTRODUCTION   9
Software Engineering paradigms – Waterfall Life cycle model – Spiral Model – Prototype Model – fourth Generation Techniques – Planning – Cost Estimation – Organization Structure – Software Project Scheduling, – Risk analysis and management – Requirements and Specification – Rapid Prototyping.

UNIT II   SOFTWARE DESIGN   9
Abstraction – Modularity – Software Architecture – Cohesion – Coupling – Various Design Concepts and notations – Real time and Distributed System Design – Documentation – Dataflow Oriented design – Jackson System development – Designing for reuse – Programming standards.

UNIT III   SOFTWARE METRICS   9
Scope – Classification of metrics – Measuring Process and Product attributes – Direct and Indirect measures – Reliability – Software Quality Assurance – Standards.

UNIT IV   SOFTWARE TESTING AND MAINTENANCE   9
Software Testing Fundamentals – Software testing strategies – Black Box Testing – White Box Testing – System Testing – Testing Tools – Test Case Management – Software Maintenance Organization – Maintenance Report – Types of Maintenance.

UNIT V   SOFTWARE CONFIGURATION MANAGEMENT (SCM) & CASE
**   TOOLS   9**
Need for SCM – Version Control – SCM process – Software Configuration Items – Taxonomy – Case Repository – Features.

TOTAL = 45

REFERENCES:

1.   Roger S. Pressman, "Software Engineering: A Practitioner Approach", Sixth edition, McGrawHill, 2005.
2.   I. Sommerville, "Software Engineering", Sixth Edition, Addison Wesley-Longman, 2004.
3.   Pankaj Jalote, "An Integrated approach to Software Engineering", Second Edition, Springer Verlag, 1997.

CA9124   MICROPROCESSORS

                                                                            L T P C
                                                                            3 0 0 3

UNIT I   THE 8086 PROCESSOR - SOFTWARE ASPECTS   9

Evolution of Microprocessors - 8086 architecture – Addressing modes- Instruction set and assembler directives – Assembly language programming – Interrupts and interrupt service routines.

UNIT II   8086 SYSTEM DESIGN   9

8086 signals description – Basic configurations - System bus timing –System design using 8086 – Minimum mode /Maximum modes 8086 system and timings.

UNIT III   INTERFACING CONCEPTS   9

Memory Interfacing and I/O interfacing - Parallel communication interface – Serial communication interface – Timer – Keyboard /display controller – Interrupt controller – DMA controller – Programming and applications.

UNIT IV   ADVANCED PROCESSORS   9

Intel 80286 – Internal Architecture – Register Organization – Modes of operation – Real Address Mode – Protected Virtual Address mode – Privilege levels – Protection features - Architectural features and Register Organization of i386, i486 and Pentium processors.

UNIT V   BUILDING SYSTEMS   9

Bus Concepts – Bus Standards –The Peripheral Component Interconnect (PCI) Bus – Universal Serial Bus (USB) – Platform Architectures.

                                                        TOTAL = 45
REFERENCES

1. A. K. Ray & K. M. Bhurchandi, "Advanced Microprocessors and peripherals-Architectures, Programming and Interfacing", Tata McGraw Hill, 2002.
2. Barry B. Brey, " Intel Microprocessors, The 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, PentiumPro Processor, PentiumII, PentiumIII, PentiumIV, Architecture, Programming & Interfacing", Seventh Edition, PHI Learning / Pearson Education, 2006.
3. Peter Abel, "IBM PC Assembly language and programming", Prentice Hall of India Pvt. Ltd., 5th. Edition, 2001.

CA9125   OBJECT ORIENTED PARADIGM AND PROGRAMMING

L T P C
3 0 0 3

UNIT I   **9**

Introduction – Learning C++ - Design of C++ - History and Use – Programming Paradigms – Standard Library – Types and Declaration – Pointers, Arrays, Structures – Expressions and Statements – Functions – Namespaces and Exceptions – Source Files and Programs

UNIT II   **9**

Classes – User-Defined Types – Objects – Operator Overloading – Operator Functions – Complex Number

UNIT III   **9**

Type Conversion Operators – Friends – Large Objects – Essential Operators – Subscripting – Function Call – Dereferencing – Increment and Decrement – String Class – Derived Classes – Abstract Classes – Design of Class Hierarchies

UNIT IV   **9**

Templates – Function Templates – Error Handling – Grouping of Exceptions – Catching Exceptions –

UNIT V   **9**

Resource Management – Multiple Inheritance – Access Control – Run Time Type Information

TOTAL: 45

REFERENCES

1. Bjarne Stroustrup, "The C++ Programming Language", 3rd ed., Pearson Education, 2007.
2. Ira Pohl, "Object-Oriented Programming using C++", 2nd ed., Pearson Education, 1997.
3. Lafour Schildt, C++ Complete Reference,

CA9127   OBJECT ORIENTED PROGRAMMING LABORATORY

L T P C
0 0 3 2

1. ADT – Stack, Queue
2. Nesting of member functions
3. Function Overloading, Friend functions, Forward reference
4. Constructors, Destructors and Constructor Overloading
5. Operator Overloading – binary and unary operators as friend and member functions
6. Unary operator - Prefix and Postfix form
7. Overloading of subscripting operator, function call operator, Comma and indirection operator
8. Inheritance and its forms
9. Runtime Polymorphism – Virtual functions
10. Function templates
11. Class templates
12. Exception Handling

CA9128   MICROPROCESSORS LABORATORY

L T P C
0 0 3 2

Assembly Language Programming with 8086 using MASM / TASM to perform the following:

1. Arithmetic and String manipulation operations.
2. Study of DOS and BIOS function calls for keyboard and Monitor Interface.
3. File Manipulation.
4. Disk operations.
5. Interfacing of 8086 processors with peripheral devices like 8255, 8253, 8279 and 8251.
6. Mini project.

CA9131   ADVANCED DATABASE TECHNOLOGY

L T P C

3 0 0 3

UNIT I   PARALLEL AND DISTRIBUTED DATABASES
Database System Architectures: Centralized and Client-Server Architectures – Server System Architectures – Parallel Systems- Distributed Systems – Parallel Databases: I/O Parallelism – Inter and Intra Query Parallelism – Inter and Intra operation Parallelism – Distributed Database Concepts - Distributed Data Storage – Distributed Transactions – Commit Protocols – Concurrency Control – Distributed Query Processing – Three Tier Client Server Architecture- Case Studies**.**

UNIT II   OBJECT AND OBJECT RELATIONAL DATABASES
Concepts for Object Databases: Object Identity – Object structure – Type Constructors – Encapsulation of Operations – Methods – Persistence – Type and Class Hierarchies – Inheritance – Complex Objects – Object Database Standards, Languages and Design: ODMG Model – ODL – OQL – Object Relational and Extended – Relational Systems : Object Relational feature sin SQL/Oracle – Case Studies.

UNIT III   XML DATABASES
XML Databases: XML Data Model – DTD - XML Schema - XML Querying – Web Databases – JDBC – Information Retrieval – Data Warehousing – Data Mining

UNIT IV   MOBILE DATABASES
Mobile Databases: Location and Handoff Management - Effect of Mobility on Data Management - Location Dependent Data Distribution - Mobile Transaction Models - Concurrency Control - Transaction Commit Protocols- Mobile Database Recovery Schemes

UNIT V   MULTIMEDIA DATABASES
Multidimensional Data Structures – Image Databases – Text/Document Databases- Video Databases – Audio Databases – Multimedia Database Design.

TOTAL = 45

REFERENCES
1. R. Elmasri, S.B. Navathe, "Fundamentals of Database Systems", Fifth Edition, Pearson Education/Addison Wesley, 2007.
2. Thomas Cannolly and Carolyn Begg, " Database Systems, A Practical Approach to Design, Implementation and Management", Third Edition, Pearson Education, 2007.
3. Henry F Korth, Abraham Silberschatz, S. Sudharshan, "Database System Concepts", Fifth Edition, McGraw Hill, 2006.
4. C.J.Date, A.Kannan and S.Swamynathan,"An Introduction to Database Systems", Eighth Edition, Pearson Education, 2006.

5. V.S.Subramanian, "Principles of Multimedia Database Systems", Harcourt India Pvt Ltd., 2001.
6. Vijay Kumar, " Mobile Database Systems", John Wiley & Sons, 2006.

CA9132   SYSTEM SOFTWARE INTERNALS

L T P C
3 0 0 3

UNIT I   **9**
Preliminaries – System Software – Review of Computer Architecture – Machine Instructions and Programs – Assemblers – Basic Assembler Functions – Assembler Features – Assembler Design Options

UNIT II   **9**
Macro processors – Absolute Loader – Bootstrap Loader – Relocation – Program Linking – Automatic Library Search – Linkage Editors – Dynamic Linking

UNIT III   **10**
Basic Compiler Functions – Grammars – Lexical Analysis – Syntactic Analysis – Code Generation – Heap Management – Parameter Passing Methods – Semantics of Calls and Returns – Implementing Subprograms – Stack Dynamic Local Variables – Dynamic binding of method calls to methods – Review of Operating System Concepts – Overview of Memory Management, Virtual Memory, Process Creation – Overview of I/O Systems, Device Drivers, System Boot

UNIT IV   **8**
Introduction to Virtual Machines (VM) – Pascal P-Code VM – Object-Oriented VMs – Java VM Architecture – Common Language Infrastructure – Dynamic Class Loading – Security – Garbage Collection – Optimization

UNIT V   **9**
Emulation – Interpretation and Binary Translation – Instruction Set Issues – Process Virtual Machines – Profiling – Migration – Grids – Examples of real world implementations of system software

TOTAL : 45

TEXT BOOKS

1. Leland L. Beck, "System Software", 3rd ed., Pearson Education, 1997.
2. James E Smith and Ravi Nair, "Virtual Machines", Elsevier, 2005. (Units 4, 5) (Sections 1.0-1.6, 2.0-2.5, 2.8, 3.0-3.6, 4.2, 5.0-5.3, 5.5-5.6, 6.0-6.3, 6.5-6.6, 10.2, 10.3)
3. Robert W. Sebesta, "Concepts of Programming Languages", 7th ed., Pearson Education, 2006. (Unit 3) (Sections 6.9, 9.3, 9.5, 10.1-10.3, 12.10.2)

REFERENCES

1. Alfred V Aho, Ravi Sethi, Jeffrey D Ullman, "Compilers", Pearson Education, 1986.

2. Terrance W Pratt, Marvin V Zelkowitz, T V Gopal, "Programming Languages", 4th ed., Pearson Education, 2006.
3. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, "Computer Organization", 5th ed., McGraw Hill, 2002.
4. Silberschatz, Galvin, Gagne, "Operating System Concepts", 6th ed., Wiley, 2003.

CA9133   OBJECT ORIENTED SYSTEM DESIGN

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UNIT I   **10**

Introduction to System Concepts - Managing Complex Software — Properties – Object Oriented Systems Development – Object Basics – Systems Development Life Cycle - Rumbaugh Methodology - Booch Methodology - Jacobson Methodology – Unified Process

UNIT II   **8**

Unified Approach – Unified Modeling Language – Static behavior diagrams – Dynamic behavior diagrams – Object Constraint Language

UNIT III   **9**

Inception – Evolutionary Requirements – Domain Models – Operation Contracts - Requirements to Design – Design Axioms – Logical Architecture - Designing Objects with Responsibilities – Object Design – Designing for Visibility

UNIT IV   **9**

Patterns – Analysis and Design patterns – GoF Patterns - Mapping designs to code – Test Driven development and refactoring – UML Tools and UML as blueprint

UNIT V   **9**

More Patterns – Applying design patterns – Architectural Analysis – Logical Architecture Refinement – Package Design – Persistence framework with patterns

REFERENCES

1. Craig Larman. "Applying UML and Patterns – An introduction to Object-Oriented Analysis and Design and Iterative Development", 3rd ed, Pearson Education, 2005.
2. Fowler, Martin. UML Distilled. 3rd ed. Pearson Education. 2004.
3. Michael Blaha and James Rumbaugh, "Object-oriented modeling and design with UML", Prentice-Hall of India, 2005.
4. Booch, Grady. Object Oriented Analysis and Design. 2nd ed. Pearson Education. 2000.
5. Ali Bahrami, " Object Oriented Systems Development", Tata McGrawHill, 19

CA9134   INTERNET PROGRAMMING

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UNIT I 9

Java fundamentals – Class, Object – Inheritance – Polymorphism – Packages – Interfaces – Exception handling

UNIT II 9

I/O – AWT – Event handling – Introduction to Threads - Basics of Networking –TCP and UDP sockets – Connecting to the Web

UNIT III 9

Applets – JDBC – Swings – Remote Method Invocation

UNIT IV 9

World Wide Web – HTML – List –Tables – Frames – Forms – HTTP commands – XML – DTD, Schema – XSLT – XML Parser – Client side scripting

UNIT V 9

Server side scripting – JSP – Servlets – Session management – Cookies

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REFERENCES

1. Deitel and Deitel, "Java – How to program", 3rd ed., Pearson Education, 2001.
2. Robert W. Sebesta, "Programming the World Wide Web", 3rd ed., Pearson Education, 2006. (Units 4,5)
3. Herbert Schildt, "Java – The Complete Reference", 7th ed., Tata McGraw Hill, 2007.
4. Chris Bates, "Web Programming", 3rd ed., Wiley, 2006.
5. Black Book, "Java 6 Programming", Dreamtech Press, 2007.
6. Deitel, "Java How to Program", Pearson Education, 2003.
7. W Clay Richardson, et al, "Professional Java JDK 6 Edition", Wrox, 2007.

CA 9137   INTERNET PROGRAMMING LABORATORY

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1. Installing java and setting up path and class path
2. Simple java programs for reading keyboard inputs, Call by value, Call by reference, inheritance types, run-time Polymorphism
3. Implementing interfaces in a class
4. Creation of user defined packages
5. Writing user specific exceptions
6. Creation of window based GUI with frames and applets and handling various Event listeners
7. Example programs with threads
8. Implementing UDP, TCP and other protocols
9. Writing java program to retrieve web pages
10. Writing a java program to invoke a remote method
11. Creation of web pages with frames, lists, tables, forms and other controls
12. Creation of XML document, Creation of DTD and schema
13. Writing XSL to display XML content
14. Client side scripts for form validation and simple programs
15. Writing web based applications using Servlets and JSP with Sessions and Cookies

CA9138   CASE TOOLS LAB

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1. Practicing the different types of case tools such as (Rational Rose & other Open Source) used for all the phases of Software development life cycle.

2. Data modeling

3. Semantic data modeling

4. Source code generators

5. Re-engineering

6. Experimenting CASE Environments

    a. Toolkits
    b. Language-centered
    c. Integrated
    d. Fourth generation
    e. Process-centered

7. Implementation of the following using CASE Workbenches:

    a. Business planning and modeling
    b. Analysis and design
    c. User-interface development
    d. Programming
    e. Verification and validation
    f. Maintenance and reverse engineering
    g. Configuration management
    h. Project management

CA9141   SOFTWARE PROJECT MANAGEMENT TECHNIQUES

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UNIT I   INTRODUCTION TO SOFTWARE PROJECT MANAGEMENT   9
Project Definition – Contract Management – Activities Covered By Software Project Management – Overview Of Project Planning – Stepwise Project Planning.

UNIT II   PROJECT EVALUATION   9
Strategic Assessment – Technical Assessment – Cost Benefit Analysis – Cash Flow Forecasting – Cost Benefit Evaluation Techniques – Risk Evaluation.

UNIT III   ACTIVITY PLANNING   9

Objectives – Project Schedule – Sequencing And Scheduling Activities – Network Planning Models – Forward Pass – Backward Pass – Activity Float – Shortening Project Duration – Activity On Arrow Networks – Risk Management – Nature Of Risk – Types Of Risk – Managing Risk – Hazard Identification – Hazard Analysis – Risk Planning And Control.

UNIT IV   MONITORING AND CONTROL   9

Creating Framework – Collecting The Data – Visualizing Progress – Cost Monitoring – Earned Value – Prioritizing Monitoring – Getting Project Back To Target – Change Control – Managing Contracts – Introduction – Types Of Contract – Stages In Contract Placement – Typical Terms Of A Contract – Contract Management – Acceptance.

UNIT V   MANAGING PEOPLE AND ORGANIZING TEAMS   9

Introduction – Understanding Behavior – Organizational Behaviour: A Background – Selecting The Right Person For The Job – Instruction In The Best Methods – Motivation – The Oldman–Hackman Job Characteristics Model – Working In Groups – Becoming A Team – Decision Making – Leadership – Organizational Structures – Stress – Health And Safety – Case Studies.

TOTAL = 45

REFERENCES:

1. Bob Hughes and MikeCotterell "Software Project Management", Third Edition, TATA McGraw Hill Edition 2004.
2. Ramesh, Gopalaswamy: "Managing Global Projects ", Tata McGraw Hill, 2001.
3. Royce." Software Project Theory", Pearson Education, 1999.
   P.Jalote "Software Project Management In Practice", Pearson Education, 2000.

CA9142   VISUAL PROGRAMMING TECHNIQUES

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UNIT I

Windows, Visual C++ .NET - The Windows Programming Model - Visual C++ .NET Components - The MFC Application Wizard - .NET Support - The Microsoft Foundation Class Library Application Framework - MFC Essentials - Visual C++ .NET Wizards - Windows Message Mapping - Classic GDI Functions, Fonts, and Bitmaps

UNIT II

Modal and Modeless Dialog Boxes - Common Controls - ActiveX Controls - Menus, Keyboard Accelerators, the Rich Edit Control, and Property Sheets - Toolbars and Status Bars - ToolTips

UNIT III

Reading and Writing Documents - Printing and Print Preview - Splitter Windows and Multiple Views- Context-Sensitive Help - Win32 Core Memory Management - Windows Message Processing and Multi-Threaded Programming - SDI and MDI Applications

UNIT IV

Dynamic-Link Libraries - The Component Object Model – OLE – COM using Active Template Library ATL and ActiveX Controls - OLE DB

UNIT V

Internet Essentials - Introducing Dynamic HTML - ATL Server - Microsoft .NET

REFERENCES

1. George Shepherd; David Kruglinski, "Programming with Microsoft Visual C++ NET"

CA9143   UNIX NETWORK PROGRAMMING

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UNIT I   INTRODUCTION   9
Overview of UNIX OS - Environment of a UNIX process - Process control - Process relationships Signals – Interprocess Communication- overview of tcp/ip protocols

UNIT II   ELEMENTARY TCP SOCKETS   9
Introduction to Socket Programming –Introduction to Sockets – Socket address Structures – Byte ordering functions – address conversion functions – Elementary TCP Sockets – socket, connect, bind, listen, accept, read, write , close functions – Iterative Server – Concurrent Server.

UNIT III   APPLICATION DEVELOPMENT   9
TCP Echo Server – TCP Echo Client – Posix Signal handling – Server with multiple clients – boundary conditions: Server process Crashes, Server host Crashes, Server Crashes and reboots, Server Shutdown – I/O multiplexing – I/O Models – select function – shutdown function – TCP echo Server (with multiplexing) – poll function – TCP echo Client (with Multiplexing)

UNIT IV   SOCKET OPTIONS, ELEMENTARY UDP SOCKETS   9
Socket options – getsocket and setsocket functions – generic socket options – IP socket options – ICMP socket options – TCP socket options – Elementary UDP sockets – UDP echo Server – UDP echo Client – Multiplexing TCP and UDP sockets – Domain name system – gethostbyname function – Ipv6 support in DNS – gethostbyadr function – getservbyname and getservbyport functions.

UNIT V   ADVANCED SOCKETS   9
Ipv4 and Ipv6 interoperability – threaded servers – thread creation and termination – TCP echo server using threads – Mutexes – condition variables – raw sockets – raw socket creation – raw socket output – raw socket input – ping program – trace route program.

TOTAL = 45

REFERENCES:

1.W. Richard Stevens, "Advanced Programming in The UNIX Environment", Addison Wesley, 199

*2.   W. RICHARD STEVENS, "UNIX NETWORK PROGRAMMING - VOLUME 1",
PRENTICE HALL INTERNATIONAL, 1998.*

CA9144   **MIDDLEWARE TECHNOLOGIES**

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UNIT I   INTRODUCTION   7

Emergence of Middleware – Objects, Web Services – Middleware Elements – Vendor Architecture – Interoperability – Middleware in Distributed Applications – Types of Middleware – Transaction-Oriented Middleware – MOM – RPC.

UNIT II   OBJECT ORIENTED MIDDLEWARE   12

OOM – Developing with OOM – Heterogeneity – Dynamic Object Request – Java RMI – COM+.

UNIT III   COMPONENT OBJECT RESOURCE BROKER ARCHITECTURE
**   (CORBA)   12**

Naming – Trading – Life Cycle – Persistence – Security – CORBA.

UNIT IV   WEB SERVICES   7

Introduction – XML Web Services standards – Creating Web Services – Extending Web Services – Messaging Protocol – Describing – Discovering – Securing.

UNIT V   OTHER TYPES OF MIDDLEWARE   7

Real-time Middleware – RT CORBA – Multimedia Middleware **–** Reflective Middleware – Agent-Based Middleware – RFID Middleware.

TOTAL = 45

TEXT BOOKS
1.   Chris Britton and Peter Eye, "IT Architecture and Middleware", Pearson Education, 2nd Edition, 2004.
2.   Wolfgang Emmerich, "Engineering Distributed Objects", John Wiley, 2000.
3.   Keith Ballinger, ".NET Web Services – Architecture and Implementation", Pearson Education, 2003. (Unit IV)

REFERRENCES

1.   Qusay H. Mahmoud, "Middleware for Communications", John Wiley and Sons, 2004.
2.   Gerald Brose, Andreas Vogel, Keith Duddy, "JavaTM Programming with CORBATM: Advanced Techniques for Building Distributed Applications", Wiley, 3rd edition, January, 2004.
3.   Michah Lerner, "Middleware Networks: Concept, Design and Deployment of Internet Infrastructure", Kluwer Academic Publishers, 2000.

CA9146   **VISUAL PROGRAMMING LABORATORY**

VB

1. Form Design – Keyboard & Mouse events

2. Programs on usage of data types - variant, Control arrays

3. Simple applications using file system controls

4. Database applications using data control.

VC++

1. SDK type and MFC based programs for creating simple windows with different window styles

2. SDK type and MFC based programs code for keyboard and mouse events, GDI objects.

3. Simple Dialog Based application – eg. Calculator, interest computation, money conversions, etc.

4. Creating SDI & MDI applications, Modal and Modeless dialog.

5. Programming for reading and writing into documents.

6. Coding Dynamic controls – slider control, progress control, inheriting CtreeView and CricheditView.

7. Creating static and dynamic splitter windows

8. Creating DLLs and using them.

9. Winsock and WinInet & Internet Explorer common controls.

10. Data access through ODBC – Cdatabase, Crecordset.

11. Creating ActiveX control and using it.

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CA9147   NETWORK PROGRAMMING LABORATORY

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1. Socket Programming
   a. TCP Sockets
   b. UDP Sockets
   c. Applications using sockets

2. Simulation of ARP/RARP.

3. Simulation of Sliding Window Protocol.

4. Simulation Of Routing Protocols.

5. RPC.

6. DNS/HTTP.

TOTAL = 45

CA9151   SERVICE ORIENTED ARCHITECTURE

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UNIT I   **9**
        Software Architecture – Types of IT Architecture – SOA – Evolution – Key components – perspective of SOA – Enterprise-wide SOA – Architecture – Enterprise Applications – Solution Architecture for enterprise application – Software platforms for enterprise Applications – Patterns for SOA – SOA programming models

UNIT II   **9**
        Service-oriented Analysis and Design – Design of Activity, Data, Client and business process services – Technologies of SOA – SOAP – WSDL – JAX – WS – XML WS for .NET – Service integration with ESB – Scenario – Business case for SOA – stakeholder objectives – benefits of SPA – Cost Savings

UNIT III   **9**
        SOA implementation and Governance – strategy – SOA development – SOA governance – trends in SOA – event-driven architecture – software s a service – SOA technologies – proof-of-concept – process orchestration – SOA best practices

UNIT IV   **9**

Meta data management – XML security – XML signature – XML Encryption – SAML – XACML – XKMS – WS-Security – Security in web service framework - advanced messaging

UNIT V   **9**
Transaction processing – paradigm – protocols and coordination – transaction specifications – SOA in mobile – research issues

REFERENCES

1. Shankar Kambhampaly, "Service –Oriented Architecture for Enterprise Applications", Wiley India Pvt Ltd, 2008.
2. Eric Newcomer, Greg Lomow, "Understanding SOA with Web Services", Pearson Education.
3. Mark O' Neill, et al. , "Web Services Security", Tata McGraw-Hill Edition, 2003.

CA9152   SOFTWARE QUALITY ASSURANCE

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UNIT I   **9**
        Introduction to software quality - challenges – objectives – quality factors – components of SQA – contract review – development and quality plans – SQA components in project life cycle – SQA defect removal policies – Reviews

UNIT II   **9**
        Basics of software testing – test generation from requirements – finite state models – combinatorial designs - test selection, minimization and prioritization for regression testing – test adequacy, assessment and enhancement

UNIT III   **9**
        Testing strategies – white box and black box approach – integration testing – system and acceptance testing – performance testing – regression testing - internationalization testing – ad-hoc testing – website testing – usability testing – accessibility testing
        Test plan – management – execution and reporting – software test automation – automated testing tools

UNIT IV   **9**
        Hierarchical models of software quality – software quality metrics –function points - Software product quality – software maintenance quality – effect of case tools – software quality infrastructure – procedures – certifications – configuration management – documentation control.

UNIT V   **9**
        Project progress control – costs – quality management standards – project process standards – management and its role in SQA – SQA unit

TOTAL = 45

REFERENCES

1. 1.Daniel Galin, Software quality assurance – from theory to implementation , Pearson education, 2009.
2. Aditya Mathur, Foundations of software testing, Pearson Education, 2008
3. Srinivasan Desikan and Gopalaswamy Ramesh, Software testing – principles and practices , Pearson education, 2006
4. Ron Patton, Software testing , second edition, Pearson education, 2007
5. Alan C Gillies, "Software Quality Theory and Management", Cengage Learning, Second edition, 2003

CA9153   GRAPHICS AND MULTIMEDIA SYSTEMS

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UNIT I   INTRODUCTION   6

I/O devices – I/O primitives –Attributes of output primitives– DDA – Bresenham technique – Circle drawing algorithms – Interactive input methods.

UNIT II   2D GRAPHICS   9

2D Transformations – Window View port mapping – Clipping algorithms – polygons – Splines – Bezier carves – Basics.

UNIT III   3D GRAPHICS   12
3D concepts – Representations – 3D transformation - Projections – Hidden surface removal – Visualization and rendering – Color models – Textures .

UNIT IV   OVERVIEW OF MULTIMEDIA   9

Multimedia Hardware & Software – Components of multimedia – Text, Image – Graphics – Audio – Video – Animation – Authoring – Multimedia Project development.

UNIT V   MULTIMEDIA SYSTEMS AND APPLICATIONS   9

Multimedia Communication Systems – Database Systems – Synchronization issues – Presentation requirements – Applications – Video conferencing – Virtual reality – Interactive Video – Media on Demand.

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REFERENCES

1.   Donald Hearn, M. Pauline Baker, "Computer Graphics – C Version", second edition, Pearson Education, 2004.
2.   Ralf Steinmetz, Klara Steinmetz, "Multimedia Computing, Communications & Applications" Pearson education, 2004.
3.   Tay Vaughan, "Multimedia Making It Work", McGraw Hill, 2002.
4.   J. D. Foley, A. VanDam, S. K. Feiner, J. F. Hughes, "Computer Graphics Principles and Practice", Addison and Wesley Publications, 2002.
5.   Drew, " Fundamental Of Multimedia ", Feurun, 2004.

CA9154   **SOFTWARE TESTING LABORATORY**

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1. Study of various tools Study various tools such as WinRunner, LoadRunner, TestDirector, Rational Rose Suite etc.

2. Perform various types of testing:

    a. Unit Testing

    b. Regression Testing

    c. Integration Testing

    d. Validation Testing

    e. Acceptance Testing

    f. System Testing

    g. Performance Testing

3. Prepare test plan and develop test case hierarchy

4. Generate Test cases and Test Documentation in Mini Projects. Suggested Topics

    a. Library System

    b. Course Registration System

    c. Quiz System

    d. Student Marks Analyzing System

    e. Reservation Systems for Air lines, Railways etc.

    f. Stock Management System

CA9155   GRAPHICS AND MULTIMEDIA LABORATORY

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1. Implementation of the following algorithms
a) LINE b) CIRCLE c) ELLIPSE.

2. 2D Transformations:
a) Translation
b) Rotation
c) Scaling
d) Reflection
e) Shearing of Objects.

3. 2D line and polygon clipping.

4. 3D Transformations using **OpenGL**
a) Translation
b) Rotation
c) Scaling.

5. Text compression algorithms – RLE and Static Huffman .

6. Image compression algorithm - JPEG baseline encoding

7. Basic operations on image using any image editing software - Photoshop/GIMP /any equivalent animation software

8. Animation using any **2D** Animation software - Adobe's Flash/ Director**/** any equivalent animation software

9. Multimedia applications using VRML

CA9171   MOBILE COMMERCE

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UNIT I   ELECTRONIC COMMERCE   9
Traditional commerce and E commerce – Internet and WWW – Role of WWW – Value Chains – Strategic Business And Industry Value Chains – Role Of E Commerce. Packet Switched Networks – TCP/IP Protocol Script – Internet Utility Programmes – SGML, HTML And XML – Web Client And Servers – Web Client/Server Architecture – Intranet And Extranets – Web Based Tools For E Commerce – Security

UNIT II   MOBILE COMMERCE   9
Introduction – Infrastructure Of M– Commerce – Types Of Mobile Commerce Services – Technologies Of Wireless Business – Benefits And Limitations, Support, Mobile Marketing & Advertisement, Non– Internet Applications In M– Commerce – Wireless/Wired Commerce Comparisons

UNIT III   MOBILE COMMERCE: TECHNOLOGY   9
A Framework For The Study Of Mobile Commerce – NTT Docomo's I– Mode – Wireless Devices For Mobile Commerce – Towards A Classification Framework For Mobile Location Based Services – Wireless Personal And Local Area Networks –The Impact Of Technology Advances On Strategy Formulation In Mobile Communications Networks

UNIT IV   MOBILE COMMERCE: THEORY AND APPLICATIONS   9
The Ecology Of Mobile Commerce – The Wireless Application Protocol – Mobile Business Services – Mobile Portal – Factors Influencing The Adoption Of Mobile Gaming Services – Mobile Data Technologies And Small Business Adoption And Diffusion – M– Commerce In The Automotive Industry – Location– Based Services: Criteria For Adoption And Solution Deployment – The Role Of Mobile Advertising In Building A Brand – M– Commerce Business Models

UNIT V   BUSINESS– TO– BUSINESS MOBILE E– COMMERCE   9
Enterprise Enablement – Email And Messaging – Field Force Automation (Insurance, Real Estate, Maintenance, Healthcare) – Field Sales Support (Content Access, Inventory) – Asset Tracking And Maintenance/Management – Remote IT Support – Customer Retention (B2C Services, Financial, Special Deals) – Warehouse Automation – Security

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TEXT BOOKS:
1. Brian E. Mennecke, Troy J. Strader, "Mobile Commerce: Technology, Theory
and Applications", Idea Group Inc., IRM press, 2003.
2. Ravi Kalakota, Andrew B.Whinston "Frontiers of Electronic Commerce",
Pearson Education, 2003.

REFERENCES:
1. P. J. Louis, " M-Commerce Crash Course", McGraw- Hill Companies
February 2001.
2. Paul May, "Mobile Commerce: Opportunities, Applications, and Technologies of
Wireless Business" Cambridge University Press March 2001.

CA9172   SOFTWARE QUALITY MANAGEMENT

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UNIT I   FUNDAMENTALS OF SOFTWARE QUALITY ENGINEERING   9

Concepts Of Quality – Hierarchical Modeling – Quality Models – Quality Criteria And Its Interrelation – Fundamentals Of Software Quality Improvement – Concepts Of Quality Improvement – Concepts Of Process Maturity – Improving Process Maturity.

UNIT II   DEVELOPMENTS IN MEASURING QUALITY   9

Selecting Quality Goals And Measures – Principles Of Measurement – Measures And Metrics –   Quality Function Deployment – Goal/Question/Measure Paradigm – Quality Characteristics Tree – The FURPS Model And FURPS+ – Gilb Approach – Quality Prompts.

UNIT III   QUALITY MANAGEMENT SYSTEM   9

Elements Of A Quality Engineering Program – Quality Control, Assurance And Engineering – Reliability, Maintainability, Verifiability, Testability, Safety And Supportability – Historical Perspective Elements Of QMS – Human Factors – Time Management – QMS For Software–Quality Assurance – ISO9000 Series–A Generic Quality Management Standard – Tools For Quality.

UNIT IV   PRINCIPLES AND PRACTICES IN QMS   9

Process–Product–Project–People In Software Development And Management Spectrum – Principle And Critical Practices In QMS – ISO 9001 And Capability Maturity Models – Six Sigma, Zero Defects And Statistical Quality Control.

UNIT V   MEASURES AND METRICS IN PROCESS AND PROJECT DOMAINS 9

Key Measures For Software Engineers – Defects – Productivity   And   Quality   – Measuring And Improving The Development Process – Assigning Measures To Process Elements And Events – Isikawa Diagrams – Metrics For Software Quality – Integrating Metrics Within Software Engineering Process – Metrics For Small Organizations.

TOTAL = 45

REFERENCES:

1.   Brian Hambling, "Managing Software Quality", Tata McGraw Hill.
2.   Juran. J.M.Frank, M.Gyrna, "Quality Planning and Analysis (from product developmement through use)", Tata McGraw Hill.
3.   Alcon Gillies, "Software Quality: Theory and Management", International Thomson, Computer Press 1997.
4.   Stephen H.Kan, "Metrics and Models in Software Quality Engineering", Addison Wesley, 1955.
5.   Roger S. Pressman, "Software Engineering - A Practitioner's Approach", Fifth Edition, McGraw Hill, 2001.
6.   Humphrey Watts, "Managing the Software Process", Addison Wesley, 1986.

CA9173   SOFTWARE REUSE

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UNIT I   INTRODUCTION   9
Organizing Reuse – Introduction – Motivation for Reuse – *Framework for Reuse-Evolution of Reuse - Reuse in industry* – Managing a reuse project – *Software Reuse Products- Software Reuse Processes and paradigms* – Reuse tools.

UNIT II   REUSE MANAGEMENT   9
Managing a repository – The REBOOT component model – Classification – Configuration management of the repository – Managerial aspects of software Reuse– Software Reuse Metrics – Software Reuse Cost estimation – Forming a reuse Strategy – Assessing reuse maturity.

UNIT III   REUSABLE COMPONENTS   9
Practicing reuse – Reuse Techniques- Generic reuse development processes – Develop for reuse – Testing reusable components – Object oriented components – Object oriented development for reuse – Reuse Techniques- Reuse Technologies- Detailed design for reuse – Implementation for reuse – Verification, test and validation.

UNIT IV   REUSE PHASES   9
Development with reuse – with reuse specific activities – Common reuse processes – Phases of development with reuse – Impact of reuse on development cycle- Reuse Technologies.

UNIT V   CLEANROOM SOFTWARE ENGINEERNG   9
Re–engineering for reuse – Methodology – Retrieving objects in non–object oriented code–Measurements – Tools support for re–engineering – Overview of clean room software engineering – Phases in clean room method – Box structures algorithms – Adapting the box structures.

TOTAL = 45

REFERENCES:

1. Wayne C.Lim, " Managing Software Reuse", Prentice Hall, 2004.
2. Hafedh Mili , Ali Mili, Sherif Yacoub, "Reuse based Software Engineering: Techniques, Organizations and Controls", John Wiley and Sons, 2002.
3. Karma Mcclure, "Software Reuse Techniques – Additional Reuse To The Systems Development Process ", Prentice Hall, 1997.
4. Even-Andre Karisson, "Software Reuse – A Holistic Approach", John Wiley And Sons, 1996.

CA9174   SOFTWARE RELIABILITY AND METRICS

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UNIT I   INTRODUCTION TO SOFTWARE RELIABILITY   7
Basic Concepts – Failure and Faults – Environment – Availability –Modeling –uses.

UNIT II   SOFTWARE RELIABILITY MODELING   12
Concepts – General Model Characteristic – Historical Development of models – Model Classification scheme – Markovian models – General concepts – General Poisson Type Models – Binomial Type Models – Poisson Type models – Fault reduction factor for Poisson Type models.

UNIT III   COMPARISON OF SOFTWARE RELIABILITY MODELS   10
Comparison Criteria – Failure Data – Comparison of Predictive Validity of Model Groups – Recommended Models – Comparison of Time Domains – Calendar Time Modeling – Limiting Resource Concept – Resource Usage model – Resource Utilization – Calendar Time Estimation and confidence Intervals.

UNIT IV   FUNDAMENTALS OF MEASUREMENT   8
Measurements in Software Engineering – Scope of Software metrics – Measurements theory – Goal based Framework – Software Measurement Validation.

UNIT V   PRODUCT METRICS   8
Measurement of Internet Product Attributes – Size and Structure – External Product Attributes – Measurement of Quality –Reliability Growth Model – Model Evaluation

TOTAL = 45

REFERENCES:

1. John D. Musa, Anthony Iannino, Kazuhira Okumoto, "Software Reliability – Measurement, Prediction, Application, Series in Software Engineering and Technology", McGraw Hill, 1987.
2. John D. Musa, "Software Reliability Engineering", Tata McGraw Hill, 1999.
3. Norman E . Fenton, Shari Lawrence Pfleeger, "Software metrics", Second Edition, International Student Edition, 2003.

CA9175 REAL TIME SYSTEMS

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UNIT I INTRODUCTION 9
Introduction - Issues in Real Time Computing, Structure of a Real Time System. Task Classes, Performance Measures for Real Time Systems, Estimating Program Run times. Task Assignment and Scheduling - Classical Uniprocessor scheduling algorithms, UniProcessor scheduling of IRIS Tasks, Task Assignment, Mode Changes, and Fault Tolerant Scheduling.

UNIT II PROGRAMMING LANGUAGES AND TOOLS 9
Programming Language and Tools – Desired Language characteristics, Data Typing, Control structures, Facilitating Hierarchical Decomposition, Packages, Run-time (Exception) Error handling, Overloading and Generics, Multitasking, Low Level programming, Task scheduling, Timing Specifications, Programming Environments, Run-time Support.

UNIT III REAL TIME DATABASES 9
Real time Databases - Basic Definition, Real time Vs General Purpose Databases, Main Memory Databases, Transaction priorities, Transaction Aborts, Concurrency Control Issues, Disk Scheduling Algorithms, Two-phase Approach to improve Predictability, Maintaining Serialization Consistency, Databases for Hard Real Time systems.

UNIT IV COMMUNICATION 9
Real-Time Communication - Communications Media, Network Topologies Protocols, Fault Tolerant Routing. Fault Tolerance Techniques - Fault Types, Fault Detection. Fault Error containment Redundancy, Data Diversity, Reversal Checks, Integrated Failure handling.

UNIT V EVALUATION TECHNIQUES 9
Reliability Evaluation Techniques - Obtaining Parameter Values, Reliability Models for Hardware Redundancy, Software Error models. Clock Synchronization - Clock, A Nonfault-Tolerant Synchronization Algorithm, Impact of Faults, Fault Tolerant Synchronization in Hardware, Fault Tolerant Synchronization in Software.

TOTAL = 45

TEXT BOOKS:
1. C.M. Krishna, Kang G. Shin, "Real-Time Systems", McGraw-Hill International Editions, 1997.

REFERENCES:
1. Stuart Bennett, "Real Time Computer Control-An Introduction",Second edition, Prentice Hall PTR, 1994.
2. Peter D. Lawrence, "Real time Micro Computer System Design – An Introduction", McGraw Hill, 1988.
3. S.T. Allworth and R.N. Zobel, "Introduction to real time software design", Macmillan, II Edition, 1987.
4. R.J.A Buhur, D.L. Bailey, " An Introduction to Real-Time Systems", Prentice-Hall International, 1999.
5. Philip.A.Laplante "Real Time System Design and Analysis" PHI , III Edition, April 2004.

CA9176   **DISTRIBUTED SYSTEMS**

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UNIT I   **COMMUNICATION IN DISTRIBUTED ENVIRONMENT**   **8**

Introduction – Various Paradigms in Distributed Applications – Remote Procedure Call – Remote Object Invocation – Message-Oriented Communication – Unicasting, Multicasting and Broadcasting – Group Communication.

UNIT II   **DISTRIBUTED OPERATING SYSTEMS**   **12**

Issues in Distributed Operating System – Threads in Distributed Systems – Clock Synchronization – Causal Ordering – Global States – Election Algorithms –Distributed Mutual Exclusion – Distributed Transactions – Distributed Deadlock – Agreement Protocols .

UNIT III   **DISTRIBUTED RESOURCE MANAGEMENT**   **10**

Distributed Shared Memory – Data-Centric Consistency Models – Client-Centric Consistency Models – Ivy – Munin – Distributed Scheduling – Distributed File Systems – Sun NFS.

UNIT IV   **FAULT TOLERANCE AND CONSENSUS**   **7**

Introduction to Fault Tolerance – Distributed Commit Protocols – Byzantine Fault Tolerance – Impossibilities in Fault Tolerance.

UNIT V   **CASE STUDIES**   **8**

Distributed Object-Based System – CORBA – COM+ – Distributed Coordination-Based System – JINI.

Total= 45

REFERENCES:
1. George Coulouris, Jean Dollimore, Tim Kindberg, "Distributed Systems Concepts and Design", Third Edition, Pearson Education Asia, 2002.

2. Hagit Attiya and Jennifer Welch, "Distributed Computing: Fundamentals, Simulations and Advanced Topics", Wiley, 2004.

3. Mukesh Singhal, "Advanced Concepts In Operating Systems", McGrawHill Series in Computer Science, 1994.

4. A.S.Tanenbaum, M.Van Steen, "Distributed Systems", Pearson Education, 2004.

5. M.L.Liu, "Distributed Computing Principles and Applications", Pearson Addison Wesley, 2004.

CA9177   HIGH SPEED NETWORKS

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UNIT I   HIGH SPEED NETWORKS   9
Frame Relay Networks – Asynchronous transfer mode – ATM Protocol Architecture, ATM logical Connection, ATM Cell – ATM Service Categories – AAL. High Speed LAN's: Fast Ethernet, Gigabit Ethernet, Fibre Channel – Wireless LAN's.

UNIT II   CONGESTION AND TRAFFIC MANAGEMENT   9
Queuing Analysis- Queuing Models – Single Server Queues – Effects of Congestion – Congestion Control – Traffic Management – Congestion Control in Packet Switching Networks – Frame Relay Congestion Control.

UNIT III   TCP AND ATM CONGESTION CONTROL   10
TCP Flow control – TCP Congestion Control – Retransmission – Timer Management – Exponential RTO backoff – KARN's Algorithm – Window management – Performance of TCP over ATM. Traffic and Congestion control in ATM – Requirements – Attributes – Traffic Management Frame work, Traffic Control – ABR traffic Management – ABR rate control, RM cell formats, ABR Capacity allocations – GFR traffic management.

UNIT IV   INTEGRATED AND DIFFERENTIATED SERVICES   9
Integrated Services Architecture – Approach, Components, Services- Queuing Discipline, FQ, PS, BRFQ, GPS, WFQ – Random Early Detection, Differentiated Services.

UNIT V   PROTOCOLS FOR QoS SUPPORT   8
RSVP – Goals & Characteristics, Data Flow, RSVP operations, Protocol Mechanisms – Multiprotocol Label Switching – Operations, Label Stacking, Protocol details – RTP – Protocol Architecture, Data Transfer Protocol, RTCP.

TOTAL = 45

TEXT BOOKS:

1. William Stallings, "HIGH SPEED NETWORKS AND INTERNET", Pearson Education, Second Edition, 2002.

REFERENCES:

1. Warland & Pravin Varaiya, "HIGH PERFORMANCE COMMUNICATION NETWORKS", Jean Harcourt Asia Pvt. Ltd., II Edition, 2001.
2. Irvan Pepelnjk, Jim Guichard and Jeff Apcar, "MPLS and VPN architecture", Cisco Press, Volume 1 and 2, 2003.

CA9178   DIGITAL IMAGE PROCESSING

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UNIT I   FUNDAMENTALS OF IMAGE PROCESSING   9

Introduction – Elements of visual perception, Steps in Image Processing Systems – Image Acquisition – Sampling and Quantization – Pixel Relationships – Colour Fundamentals and Models, File Formats. Introduction to the Mathematical tools.

UNIT II   IMAGE ENHANCEMENT AND RESTORATION   9

Spatial Domain Gray level Transformations Histogram Processing Spatial Filtering – Smoothing and Sharpening. Frequency Domain: Filtering in Frequency Domain – DFT, FFT, DCT, Smoothing and Sharpening filters – Homomorphic Filtering., Noise models, Constrained and Unconstrained restoration models.

UNIT III   IMAGE SEGMENTATION AND FEATURE ANALYSIS   9

Detection of Discontinuities – Edge Operators – Edge Linking and Boundary Detection – Thresholding – Region Based Segmentation – Motion Segmentation, Feature Analysis and Extraction.

UNIT IV   MULTI RESOLUTION ANALYSIS AND COMPRESSIONS   9

Multi Resolution Analysis: Image Pyramids – Multi resolution expansion – Wavelet Transforms, Fast Wavelet transforms, Wavelet Packets.

Image Compression: Fundamentals – Models – Elements of Information Theory – Error Free Compression – Lossy Compression – Compression Standards – JPEG/MPEG.

UNIT V   APPLICATIONS OF IMAGE PROCESSING   9

Representation and Description, Image Recognition- Image Understanding – Image Classification – Video Motion Analysis – Image Fusion – **Steganography** – Colour Image Processing.

Total = 45

REFERENCES

1. Rafael C.Gonzalez and Richard E.Woods, "Digital Image Processing", Third Edition, Pearson Education, 2008.
2. Milan Sonka, Vaclav Hlavac and Roger Boyle, "Image Processing, Analysis and Machine Vision", Third Edition, Third Edition, Brooks Cole, 2008.
3. Anil K.Jain, "Fundamentals of Digital Image Processing", Prentice-Hall India, 2007.
4. Madhuri A. Joshi, 'Digital Image Processing: An Algorithmic Approach", Prentice-Hall India, 2006.
5. Rafael C.Gonzalez , Richard E.Woods and Steven L. Eddins, "Digital Image Processing Using MATLAB", First Edition, Pearson Education, 2004.

CA9179   VISUALIZATION TECHNIQUES

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UNIT I   VISUALIZATION   9

Introduction – Issues – Data Representation – Data Presentation - Interaction

UNIT II   FOUNDATIONS FOR DATA VISUALIZATION   9

Visualization stages – Experimental Semiotics based on Perception Gibson's Affordance theory – A Model of Perceptual Processing – Types of Data.

UNIT III   COMPUTER VISUALIZATION   9

Non-Computer Visualization – Computer Visualization: Exploring Complex Information Spaces – Fisheye Views – Applications – Comprehensible Fisheye views – Fisheye views for 3D data – Non Linear Magnificaiton – Comparing Visualization of Information Spaces – Abstraction in computer Graphics – Abstraction in user interfaces.

UNIT IV   MULTIDIMENSIONAL VISUALIZATION   9

One Dimension – Two Dimensions – Three Dimensions – Multiple Dimensions – Trees – Web Works – Data Mapping: Document Visualization – Workspaces.

UNIT V   CASE STUDIES   9

Small interactive calendars – Selecting one from many – Web browsing through a key hole – Communication analysis – Archival analysis

                                            TOTAL = 45

TEXT BOOKS:

1. Colin Ware, "Information Visualization Perception for Design" Margon Kaufmann Publishers, 2004, 2nd edition.
2. Robert Spence "Information visualization – Design for interaction", Pearson Education, 2 nd Edition, 2007

REFERENCES:

1. Stuart.K.Card, Jock.D.Mackinlay and Ben Shneiderman, "Readings in Information Visualization Using Vision to think", Morgan Kaufmann Publishers.

CA9180   USER INTERFACE DESIGN

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UNIT I   INTRODUCTION   8
Human–Computer Interface   – Characteristics Of Graphics Interface –Direct Manipulation Graphical System – Web User Interface –Popularity –Characteristic & Principles.

UNIT II   HUMAN COMPUTER INTERACTION   7
User Interface Design Process – Obstacles –Usability –Human Characteristics In Design – Human Interaction Speed –Business Functions –Requirement Analysis – Direct – Indirect Methods – Basic Business Functions – Design Standards – General Design Principles – Conceptual Model Design – Conceptual Model Mock-Ups

UNIT III   WINDOWS   12
Characteristics– Components– Presentation Styles– Types– Managements– Organizations– Operations– Web Systems– System Timings - Device– Based Controls Characteristics– Screen – Based Controls –– Human Consideration In Screen Design – Structures Of Menus – Functions Of Menus– Contents Of Menu– Formatting – Phrasing The Menu – Selecting Menu Choice– Navigating Menus– Graphical Menus. Operate Control – Text Boxes– Selection Control– Combination Control– Custom Control– Presentation Control.

UNIT IV   MULTIMEDIA   9
Text For Web Pages –   Effective Feedback– Guidance & Assistance– Internationalization– Accessibility– Icons– Image– Multimedia – Coloring.

UNIT V   EVALUATION   9
Conceptual Model Evaluation – Design Standards Evaluation – Detailed User Interface Design Evaluation

Total = 45

TEXT BOOKS:

1. Wilbent. O. Galitz ,"The Essential Guide To User Interface Design", John Wiley& Sons, 2001.
2. **Deborah Mayhew, The Usability Engineering Lifecycle,** Morgan Kaufmann, 1999Ben Shneiderman, "Design The User Interface", Pearson Education, 1998.

REFERENCES:

1. Alan Cooper, "The Essential Of User Interface Design", Wiley – Dream Tech Ltd., 2002. Sharp, Rogers, Preece, 'Interaction Design', Wiley India Edition, 2007

CA9181   BIO INFORMATICS

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UNIT I   INTRODUCTORY CONCEPTS   9

The Central Dogma – The Killer Application – Parallel Universes – Watson's Definition – Top Down Versus Bottom up – Information Flow – Convergence – Databases – Data Management – Data Life Cycle – Database Technology – Interfaces – Implementation – Networks – Geographical Scope – Communication Models – Transmissions Technology – Protocols – Bandwidth – Topology – Hardware – Contents – Security – Ownership – Implementation – Management.

UNIT II   SEARCH ENGINES AND DATA VISUALIZATION   9

The search process – Search Engine Technology – Searching and Information Theory – Computational methods – Search Engines and Knowledge Management – Data Visualization – sequence visualization – structure visualization – user Interface – Animation Versus simulation – General Purpose Technologies.

UNIT III   STATISTICS AND DATA MINING   9

Statistical concepts – Microarrays – Imperfect Data – Randomness – Variability – Approximation – Interface Noise – Assumptions – Sampling and Distributions – Hypothesis Testing – Quantifying Randomness – Data Analysis – Tool selection statistics of Alignment – Clustering and Classification – Data Mining – Methods – Selection and Sampling – Preprocessing and Cleaning – Transformation and Reduction – Data Mining Methods – Evaluation – Visualization – Designing new queries – Pattern Recognition and Discovery – Machine Learning – Text Mining – Tools.

UNIT IV   PATTERN MATCHING   9

Pairwise sequence alignment – Local versus global alignment – Multiple sequence alignment – Computational methods – Dot Matrix analysis – Substitution matrices – Dynamic Programming – Word methods – Bayesian methods – Multiple sequence alignment – Dynamic Programming – Progressive strategies – Iterative strategies – Tools – Nucleotide Pattern Matching – Polypeptide pattern matching – Utilities – Sequence Databases.

UNIT V   MODELING AND SIMULATION   9

Drug Discovery – components – process – Perspectives – Numeric considerations – Algorithms – Hardware – Issues – Protein structure – AbInitio Methods – Heuristic methods – Systems Biology – Tools – Collaboration and Communications – standards - Issues – Security – Intellectual property.

Total = 45

REFERENCES

1. Bryan Bergeron, "Bio Informatics Computing", Second Edition, Pearson Education, 2003.

2. T.K.Attwood and D.J. Perry Smith, "Introduction to Bio Informatics, Longman Essen, 1999.

CA9182   GRID COMPUTING

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UNIT I   CONCEPTS AND ARCHITECTURE   9
Introduction-Parallel and Distributed Computing-Cluster Computing-Grid Computing-Anatomy and Physiology of Grid- Web and Grid Services-Grid Standards - OGSA-WSRF - Trends, Challenges and applications.

UNIT II   GRID MONITORING   9
Grid Monitoring Architecture (GMA) - An Overview of Grid Monitoring Systems- R-GMA - GridICE – MDS- Service Level Agreements (SLAs) - Other Monitoring Systems-Ganglia, GridMon, Hawkeye and Network Weather Service.

UNIT III   GRID SECURITY AND RESOURCE MANAGEMENT   9
Grid Security-A Brief Security Primer-PKI-X509 Certificates-Grid Security-Grid Scheduling and Resource Management, Gridway and Gridbus Broker-principles of Local Schedulers- Overview of Condor, SGE, PBS, LSF-Grid Scheduling with QoS.

UNIT IV   DATA MANAGEMENT AND GRID PORTALS   9
Data Management-Categories and Origins of Structured Data-Data Management Challenges-Architectural Approaches-Collective Data Management Services-Federation Services-Grid Portals-Generations of Grid Portals.

UNIT V   GRID MIDDLEWARE   9
List of globally available Middlewares - Case Studies-Recent version of Globus Toolkit and gLite - Architecture, Components and Features. Features of Next generation grid.

REFERENCES:

1. Ian Foster, Carl Kesselman, The Grid 2: Blueprint for a New Computing Infrastructure, Elsevier Series, 2004.
2. Vladimir Silva, Grid Computing for Developers, Charles River Media, January 2006.
3. Parvin Asadzadeh, Rajkumar Buyya, Chun Ling Kei, Deepa Nayar, and Srikumar Venugopal, Global Grids and Software Toolkits: A Study of Four Grid Middleware Technologies, High Performance Computing: Paradigm and Infrastructure, Laurence Yang and Minyi Guo (editors), Wiley Press, New Jersey, USA, June 2005.
4. Jarek Nabrzyski, Jennifer M. Schopf, Jan Weglarz, Grid Resource Management: State of the Art and Future Trends , (International Series in Operations Research & Management Science), Springer; First edition, 2003
5. Srikumar Venugopal, Krishna Nadiminti, Hussein Gibbins and Rajkumar Buyya, Designing a Resource Broker for Heterogeneous Grids, Software: Practice and Experience, Wiley Press, New York, USA, 2008.
6. Fran Berman , Geoffrey Fox, Anthony J.G. Hey, Grid Computing: Making The Global Infrastructure a Reality,Wiley, 2003
7. Maozhen Li , Mark Baker , The Grid: Core Technologies, Wiley, 2005
8. Joshy Joseph , Craig Fellenstein Grid Computing, IBM Press, 2004
9. Borja Sotomayor , Lisa Childers, Globus Toolkit 4 : Programming Java Services , The Elsevier Series in Grid Computing, Morgan Kaufmann, 2005

CA9183   INFORMATION SYSTEM PLANNING AND DEVELOPMENT

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UNIT I   INFORMATION SYSTEM AND ORGANIZATION   9

Matching the Information System Plan to the Organizational Strategic Plan – Identifying Key Organizational Objective and Processes and Developing an Information System Development – User role in Systems Development Process – Maintainability and Recoverability in System Design.

UNIT II   REPRESENTATION AND ANALYSIS OF SYSTEM STRUCTURE   9

Models for Representing Systems: Mathematical, Graphical and Hierarchical (Organization Chart, Tree Diagram) – Information Flow – Process Flow – Methods and Heuristics – Decomposition and Aggregation – Information Architecture - Application of System Representation to Case Studies

UNIT III   SYSTEMS, INFORMATION AND DECISION THEORY   9

Information Theory – Information Content and Redundancy – Classification and Compression – Summarizing and Filtering – Inferences and Uncertainty – Identifying Information needed to Support Decision Making – Human Factors – Problem characteristics and Information System Capabilities in Decision Making.

UNIT IV   INFORMATION SYSTEM APPLICATION   9

Transaction Processing Applications – Basic Accounting Application – Applications for Budgeting and Planning – Other use of Information Technology: Automation – Word Processing – Electronic Mail – Evaluation Remote Conferencing and Graphics – System and Selection – Cost Benefit – Centralized versus Decentralized Allocation Mechanism.

UNIT V   DEVELOPMENT AND MAINTENANCE OF INFORMATION SYSTEMS 9

Systems analysis and design – System development life cycle – Limitation – End User Development – Managing End Users – off-the Shelf Software Packages – Outsourcing – Comparison of Different Methodologies.

TOTAL = 45

TEXT BOOKS:

1.   K. C. Laudon, J. P. Laudon, M. E. Brabston, "Management Information Systems: Managing the Digital Firm", Pearson Education 2002.
2.   K. C. Laudon, J. P. Laudon, "Management Information Systems, Organization and Technology in the Networked Enterprise," Sixth Edition, Prentice Hall, 2000.

REFERENCES:

1.   E.F. Turban, R.K., R.E. Potter. "Introduction to Information Technology", Wiley, 2004.
2.   M. E. Brabston, "Management Information Systems: Managing the Digital Firm", Pearson Education, 2002.
3.   Jeffrey A. Hoffer, Joey F. George, Joseph S. Valachich, "Modern Systems Analysis and Design", Third Edition, Prentice Hall, 2002.

CP9184 DATA WAREHOUSING AND DATA MINING

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UNIT I 9

Data Warehousing and Business Analysis: - Data warehousing Components –Building a Data warehouse – Mapping the Data Warehouse to a Multiprocessor Architecture – DBMS Schemas for Decision Support – Data Extraction, Cleanup, and Transformation Tools –Metadata – reporting – Query tools and Applications – Online Analytical Processing (OLAP) – OLAP and Multidimensional Data Analysis.

UNIT II 9

Data Mining: - Data Mining Functionalities – Data Preprocessing – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization and Concept Hierarchy Generation.

Association Rule Mining: - Efficient and Scalable Frequent Item set Mining Methods – Mining Various Kinds of Association Rules – Association Mining to Correlation Analysis – Constraint-Based Association Mining.

UNIT III 9

Classification and Prediction: - Issues Regarding Classification and Prediction – Classification by Decision Tree Introduction – Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods – Prediction – Accuracy and Error Measures – Evaluating the Accuracy of a Classifier or Predictor – Ensemble Methods – Model Section.

UNIT IV 9

Cluster Analysis: - Types of Data in Cluster Analysis – A Categorization of Major Clustering Methods – Partitioning Methods – Hierarchical methods – Density-Based Methods – Grid-Based Methods – Model-Based Clustering Methods – Clustering High-Dimensional Data – Constraint-Based Cluster Analysis – Outlier Analysis.

UNIT V 9

Mining Object, Spatial, Multimedia, Text and Web Data:

Multidimensional Analysis and Descriptive Mining of Complex Data Objects – Spatial Data Mining – Multimedia Data Mining – Text Mining – Mining the World Wide Web.

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REFERENCES

1. Jiawei Han and Micheline Kamber "Data Mining Concepts and Techniques" Second Edition,

2. Elsevier, Reprinted 2008.

3. Alex Berson and Stephen J. Smith "Data Warehousing, Data Mining & OLAP", Tata McGraw – Hill Edition, Tenth Reprint 2007.

4. K.P. Soman, Shyam Diwakar and V. Ajay "Insight into Data mining Theory and

Practice", Easter Economy Edition, Prentice Hall of India, 2006.

5. G. K. Gupta "Introduction to Data Mining with Case Studies", Easter Economy Edition, Prentice Hall of India, 2006.

6. Pang-Ning Tan, Michael Steinbach and Vipin Kumar "Introduction to Data Mining", Pearson Education, 2007.

CA9185   CRYPTOGRAPHY AND NETWORK SECURITY

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UNIT I   SYMMETRIC CIPHERS   9

Overview - Classical Encryption Techniques – Block Ciphers and the Data Encryption Standard – Introduction to Finite Fields – Advanced Encryption Standard – More on Symmetric Ciphers – Confidentiality using Symmetric Encryption.

UNIT II   PUBLIC-KEY ENCRYPTION AND HASH FUNCTIONS   9

Introduction to Number Theory – Public-Key Cryptography and RSA – Key Management - Diffie-Hellman Key Exchange – Elliptic Curve Cryptography – Message Authentication and Hash Functions – Hash and MAC Algorithms – Digital Signatures and Authentication Protocols.

UNIT III   NETWORK SECURITY PRACTICE   9

Authentication Applications – Kerberos – X.509 Authentication Service – Electronic mail Security – Pretty Good Privacy – S/MIME – IP Security – Web Security.

UNIT IV   SYSTEM SECURITY   9

Intruders – Intrusion Detection – Password Management – Malicious Software – Viruses and Related Threats - Viruses Countermeasures – Distributed Denial of Service Attacks - Firewalls – Firewall Design Principles – Trusted Systems.

UNIT V   WIRELESS SECURITY   9

Introduction to Wireless LAN Security Standards – Technology Comparisons -   Wireless LAN Security Factors – Issues in Wireless Security.

Total = 45

REFERENCES

1. William Stallings, "Cryptography And Network Security – Principles and Practices", Pearson Education, Fourth Edition, 2006.
2. Atul Kahate, "Cryptography and Network Security", Tata McGraw Hill, 2003.
3. Bruce Schneier, "Applied Cryptography", John Wiley & Sons Inc, 2001.
4. Stewart S. Miller, "Wi-Fi Security", McGraw-Hill 2003.
5. Charles B. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", Fourth Edition, Pearson Education, 2007.

CA9186   **XML AND WEB SERVICES**   **L T P C**
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UNIT I   XML TECHNOLOGY FAMILY   **9**
XML – benefits – Advantages of XML over HTML – EDL –Databases – XML based standards – DTD –XML Schemas – X- Files – XML processing – DOM –SAX-presentation technologies – XSL – XFORMS – XHTML – voice XML – Transformation – XSLT – XLINK – XPATH –XQ

UNIT II   ARCHITECTING WEB SERVICES   **9**
Business motivations for web services – B2B – B2C- Technical motivations – limitations of CORBA and DCOM – Service – oriented Architecture (SOA) – Architecting web services – Implementation view – web services technology stack – logical view – composition of web services – deployment view – from application server to peer to peer – process view – life in the runtime

UNIT III   WEB SERVICES BUILDING BLOCK   **9**
Transport protocols for web services – messaging with web services – protocols – SOAP – describing web services – WSDL – Anatomy of WSDL – manipulating WSDL – web service policy – Discovering web services – UDDI – Anatomy of UDDI- Web service inspection – Ad-Hoc Discovery – Securing web services.

UNIT IV   IMPLEMENTING XML IN E-BUSINESS   **9**
B2B - B2C Applications – Different types of B2B interaction – Components of e-business XML systems – ebXML – Rosetta Net Applied XML in vertical industry – Web services for mobile devices.

UNIT V   XML AND CONTENT MANAGEMENT   **9**
Semantic Web – Role of Meta data in web content – Resource Description Framework – RDF schema – Architecture of semantic web – content management workflow – XLANG –WSFL.

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TEXT BOOKS:
1. Ron schmelzer et al, "XML and Web Services", Pearson Education, 2002.
2. Sandeep Chatterjee and James Webber, "Developing Enterprise Web Services: An Architect's Guide", Prentice Hall, 2004.

REFERENCES:
1. Frank P. Coyle, "XML, Web Services and the Data Revolution", Pearson Education, 2002.
2. Keith Ballinger, ".NET Web Services Architecture and Implementation", Pearson Education, 2003.
3. Henry Bequet and Meeraj Kunnumpurath, "Beginning Java Web Services", Apress, 2004.
4. Russ Basiura and Mike Batongbacal, "Professional ASP.NET Web Services", Apress,2.
   ASP .NET Web Services", Apress, 2003.

CA9187   GEOGRAPHIC INFORMATION SYSTEM

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UNIT I   **7**
GIS – Definition - History of GIS - Basic Components of GIS – Hardware, Software, Data, Methods, People – List of GIS Software: Popular software, Open Source software

UNIT II   **10**
Data: Spatial and Non-Spatial Data – Spatial Data: Points, Lines, Polygons/Area and Surface - Non-Spatial Data - Levels of Measurement: Nominal, Ordinal, interval, ratio – Data Base – Functions - Data Base Structures – Hierarchical, Network, Relational- Relational Data Base Management System – Normalization, E-R Diagram

UNIT III   **10**
Raster Data Model – Grid Cell/Pixel - Tesselations – Regular, Irregular – Geometry of Regular Tesselations: Shape, Adjacency, Connectivity, Orientation - Size of Grid Cell – Data Encoding: Rule of dominance, Rule of importance, Centre of Cell - Data Compression: Runlength, Chain, Block and Quadtree coding - Vector Data Model – Topology - Euler Equation, Rules for Topological Consistency – Arc-Node Data Structure – Raster vs. Vector Comparison

UNIT IV   **9**
Vector Data Input – Digitizer: Principles, Co-ordinate transformation – Errors in digitizing – Scanner: Principles, On Screen Digitization, Georeferencing – Raster File Formats, Vector File formats – Import/Export Functionality – Linking Non-spatial data with Spatial data – Linking digital databases: ODBC – GPS data integration

UNIT V   **9**
Discrete and Continuous Surfaces – Interpolation Techniques - Digtial Elevation Models – Sources of DEM: Ground Survey, Photogrammetry, Stereo Satellite data, Airborne Laser Terrain Mapping- DEM representation – Gridded DEM, TIN structure – Extraction of Topographic Parameters: Slope, Aspect, Delienation of Watershed and Drainage Network – DEM Applications

Total = 45

TEXT BOOKS
1. Lo, C.P. and Yeung, Albert K.W., Concepts and Techniques of Geographic Information Systems Prentice Hall, 2/E,2006.

REFERENCES

1. Peter A. Burrough, Rachael A. McDonnell, Principles of GIS, Oxford University Press, 2000
2. Robert Laurini and Derek Thompson, Fundamentals of Spatial Information Systems, Academic Press, 1996
3. Paul Longley , Geographic Information Systems and Science, John Wiley & Sons Inc ,2001.

CA9188   FINANCIAL MANAGEMENT

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UNIT I   FOUNDATIONS OF FINANCE
Financial management – An overview, time value of money. Introduction to the concept of risk and return of a single asset and of a portfolio, valuation of bonds and shares option valuation.

UNIT II   INVESTMENT DECISIONS
Capital Budgeting: Principles and techniques, Nature of capital budgeting, Identifying relevant cash flows, Evaluation Techniques, Payback, Accounting Rate of Return, Net Present Value, Internal Rate of Return, Profitability Index, Comparison of DCF techniques, Project selection under capital rationing, Inflation and capital budgeting. Concept and measurement of cost of capital, Specific costs and overall cost of capital.

UNIT III   FINANCING AND DIVIDEND DECISION
Financial and operating leverage, capital structure,Cost of capital and revaluation, designing capital structure.Dividend policy, Aspects of dividend policy, practical consideration, forms of dividend policy, practical considerations, forms of dividends, share splits.

UNIT IV   WORKING CAPITAL MANAGEMENT
Principles of working capital: Concepts, need; Determinants, issues and estimation of working capital, Accounts Receivables Management and factoring, Inventory management, Cash management, Working capital finance, Trade credit, Bank finance and Commercial paper.

UNIT V   LONG TERM SOURCES OF FINANCE
Indian capital and stock market, New issues market. Long term finance: Shares debentures and term loans, lease, hire purchase, project financing, venture capital financing.

TEXT BOOKS:

1. I.M.Pandey - Financial Management, Vikas Publishing House Pvt. Ltd., 8th edition, 1999.
2. M.Y. Khan and P.K.Jain - Financial Management, Text, Problems and Cases - Tata McGraw Hill Publishing company Ltd., 4th edition, 2004.

REFERENCES:

1. Aswat Damodaran, Corporate Finance Theory and Practice, John Wiley & Sons, 2000.
2. Hrishikes Bhattacharya – Working Capital Management, Strategies and Techniques, Prentice – Hall of India Pvt. Ltd., New Delhi 2001.
3. James C.Vanhorne – Financial Management and policy – Pearson Education Asia, November 2004

CP9189   HUMAN RESOURCE MANAGEMENT

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UNIT I   PERSPECTIVES IN HUMAN RESOURCE MANAGEMENT   9

Evolution of human resource management – the importance of the human factor – objectives of human resource management – role of human resource manager – human resource policies – computer applications in human resource management.

UNIT II   THE CONCEPT OF BEST FIT EMPLOYEE   9
Importance of human resource planning – forecasting human resource requirement – internal and external sources. Selection process-screening – tests - validation – interview - medical examination – recruitment introduction – importance – practices – socialization benefits.

UNIT III   TRAINING AND EXECUTIVE DEVELOPMENT   9
Types of training, methods, purpose, benefits and resistance. Executive development programmes – common practices - benefits – self development – knowledge management.

UNIT IV   SUSTAINING EMPLOYEE INTEREST   9
Compensation plan – reward – motivation – theories of motivation – career management – development, mentor – protégé relationships.

UNIT V   PERFORMANCE EVALUATION AND CONTROL PROCESS   9
Method of performance evaluation – feedback – industry practices. Promotion, demotion, transfer and separation – implication of job change. The control process – importance – methods – requirement of effective control systems grievances – causes – implications – redressal methods.

                                                        TOTAL = 45
TEXT BOOKS:

1.   Decenzo and Robbins, Human Resource Management, Wilsey, 6th edition, 2001.
2. Biswajeet Pattanayak, Human Resource Management, Prentice Hall of India, 2001.

REFERENCES:
1. Human Resource Management, Eugence Mckenna and Nic Beach, Pearson Education Limited, 2002.
2. Dessler Human Resource Management, Pearson Education Limited, 2002.
3. Mamoria C.B. and Mamoria S.Personnel Management, Himalaya Publishing Company, 1997.
4. Wayne Cascio, Managing Human Resource, McGraw Hill, 1998.
5. Ivancevich, Human Resource Management, McGraw Hill 2002.

CA9190   TCP/IP DESIGN AND IMPLEMENTATION

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UNIT I   INTRODUCTION   9
Internetworking concepts and architectural model– classful Internet address – CIDR– Subnetting and Supernetting –ARP– RARP– IP – IP Routing –ICMP – Ipv6.

UNIT II   TCP   9
Services – header – connection establishment and termination– interactive data flow– bulk data flow– timeout and retransmission – persist timer – keep alive timer– futures and performance.

UNIT III   IP IMPLEMENTATION   9
IP global software organization – routing table– routing algorithms–fragmentation and reassembly– error processing (ICMP) –Multicast Processing (IGMP).

UNIT IV   TCP IMPLEMENTATION I   9
Data structure and input processing – transmission control blocks– segment format–comparison–finite state machine implementation–Output processing– mutual exclusion–computing the TCP data length.

UNIT V   TCP IMPLEMENTATION II   9
Timers–events and messages– timer process– deleting and inserting timer event– flow control and adaptive retransmission–congestion avoidance and control – urgent data processing and push function.

TOTAL = 45

TEXT BOOKS:

1. Douglas E.Comer, "Internetworking with TCP/IP Principles, Protocols and Architecture", Vol 1 & 2, fourth edition, Pearson Education Asia, 2003.
2. W.Richard Stevens "TCP/IP illustrated" Volume 1 Pearson Education, 2003.

REFERENCES:

1. Forouzan, "TCP/IP protocol suite" Second edition, Tata McGraw Hill, 2003.
2. W.Richard Stevens "TCP/IP illustrated" Volume 2, Pearson Education 2003.

CA9191   UNIX INTERNALS

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UNIT I   OVERVIEW   8

General Overview of the System : History – System structure – User perspective – Operating system services – Assumptions about hardware. Introduction to the Kernel : Architecture of the UNIX operating system – Introduction to system concepts. The Buffer Cache: Buffer headers – Structure of the buffer pool – Scenarios for retrieval of a buffer – Reading and writing disk blocks – Advantages and disadvantages of the buffer cache.

UNIT II   FILE SUBSYSTEM   8

Internal representation of files: Inodes – Structure of a regular file – Directories – Conversion of a path name to an Inode – Super block – Inode assignment to a new file – Allocation of disk blocks.

UNIT III   SYSTEM CALLS FOR THE FILE SYSTEM   10

 Open – Read – Write – File and record locking – Adjusting the position of file I/O – Lseek – Close – File creation – Creation of special files – Changing directory, root, owner, mode – stat and fstat – Pipes – Dup – Mounting and unmounting file systems – link – unlink.

UNIT IV   PROCESSES   10

Process states and transitions – Layout of system memory – The context of a process – Saving the context of a process – Manipulation of the process address space - Sleep. Process Control : Process creation – Signals – Process termination – Awaiting process termination – Invoking other programs – user id of a process – Changing the size of a process - Shell – System boot and the INIT process– Process Scheduling.

UNIT V   MEMORY MANAGEMENT AND I/O

Memory Management Policies : Swapping – Demand paging. The I/O Subsystem : Driver Interface – Disk Drivers   –   Terminal Drivers– Streams –   Inter process communication.

TOTAL = 45

TEXT BOOKS:

1. Maurice J. Bach, "The Design of the Unix Operating System", First Edition, Pearson Education, 1999.

REFERENCES:

1. B. Goodheart, J. Cox, "The Magic Garden Explained", Prentice Hall of India, 1986.
2. S. J. Leffler, M. K. Mckusick, M. J. .Karels and J. S. Quarterman., "The Design and Implementation of the 4.3 BSD Unix Operating System", Addison Wesley, 1998.

CA9192 CUSTOMER RELATIONSHIP MANAGEMENT

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UNIT I CUSTOMER RELATIONSHIP MANAGEMENT 9
Defined Technology – Strategy – CRM – CRM Success Factors – The Customer service/sales profile – The three levels of service/sales customer service/sales profile

UNIT II CUSTOMER SERVICE 9
Managing your customer service/sales profile – Content center – Brokerage managing initial – stand alone transaction managing for repeat business – Managing for customer advocacy – CRM strategy starting points - CRM strategy selection.

UNIT III MANAGING CUSTOMER DATA 9
Managing and sharing customer data – Returning to strategies – Data vs information – Managing customer information – Data vs ethics and legalities of data used tools for capturing customer information.

UNIT IV EFFECTIVE SLA'S 9
Service-level agreements – Keys to effective SLA's – Creating an SLA – Using SLA's to support internal customer relationships – Making SLA's work – E-commerce – Customer relationships on the internet.

UNIT V MANAGING CRM 9
Managing relationships through conflict – Managing the moment of conflict – Customer relationship management – Early warning system – Customer problems – Fighting complacency – Resetting CRM strategy – Ready, Set, Reset various phases.

Total=45

REFERENCE

1. Kristin Anderson & Carol Kerr, "Customer relationship management", Mc Graw Hill 2003.
2. Judith W Kincaid, " Customer relationship management: getting it right", Prentice Hall, 2002.

CA9193   HEALTH CARE INFORMATION SYSTEMS

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UNIT I   INTRODUCTION   9
Introduction to health care information – Health care data quality – Health care information regulations, laws and standards.

UNIT II   HEALTH CARE INFORMATION SYSTEMS   9
History and evolution of health care information systems – Current and emerging use of clinical information systems – system acquisition – System implementation and support.

UNIT III   INFORMATION TECHNOLOGY   9
Information architecture and technologies that support health care information systems – Health care information system standards – Security of health care information systems.

UNIT IV   MANAGEMENT OF IT CHALLENGES   9
Organizing information technology services – IT alignment and strategic planning – IT governance and management.

UNIT V   IT INITIATIVES   9
Management's role in major IT initiatives – Assessing and achieving value in health care information systems.

TEXT BOOK

1. Karen A Wager, Frances Wickham Lee, John P Glaser, " Managing Health Care Information Systems: A Practical Approach for Health Care Executives", Jossey-Bass/Wiley, 2005.

REFERENCE

1. Rudi Van De Velde and Patrice Degoulet, "Clinical Information Sytems: A Componenet based approach", Springer 2005.

CA9194   E-LEARNING TECHNIQUES

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UNIT I   INTRODUCTION   9

Definition – Benefits – Challenges & opportunities – ROI metrics & evaluation – E-Learning cycle – Learning strategy – Business drivers – E-learning strategy.

UNIT II   DESIGN AND IMPLEMENTATION   9

Role of tutor – Instructional design – Design issues – Types of learning engagements – Blended learning – Team – Infra structure – Vendor relationships – Learning management systems – Testing.

UNIT III   DELIVERY   9

Multi-channel delivery – Learner support – Developing curriculum – E-learning standards – Instructional design – Content development process – Case studies – Future directions

UNIT IV   WEB BASED TRAINING   9

Definition – Need for WBT – Choice of approach - types of courses – Technical standards – Metaphors – Course framework – registration – Running the course – resources – Feedback – Access.

UNIT V   LEARNING METHODOLOGY   9

Organizing learning sequences – Common lesson structures – Creating building blocks – Designing learning sequences – Learning activities – Test and exercise learning – Planning tests – Selecting questions – Sequencing test questions – Feedback – Improve testing – Prevent cheating.

Total=45

REFERENCES

1. John Gardner, Bryn Holmes, "E-Learning: Concepts and Practice", SAGE Publications Ltd, 2006.

2. Don Morrison, "E-learning Strategies: How to get Implementation and Delivery Right First Time", John Wiley and Sons Ltd, 2003.

3. William Horton, "Web-Based Training", John Wiley & Sons Inc, 2000.

4. M W Allen, "Michael Allen's Guide to E-learning: Building Interactive, Fun and Effective Learning Program for any Company", John Wiley & Sons Inc, 2003.

5. Marc J Rosenberg, "E-Learning: Strategies for Delivering Knowledge in the Digital Age", McGraw-Hill Education, 2000.

6. Brandon Hall, "Web-Based Training Cookbook", John Wiley & Sons, 1997.

CA9195   DATABASE TUNING

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UNIT I   FUNDAMENTALS OF TUNING   8
Review of Relational Databases – Relational Algebra - Locking and Concurrency Control – Correctness Consideration – Lock Tuning – Logging and the Recovery Subsystem – Principles of Recovery – Tuning the Recovery Subsystem – Operating Systems Considerations – Hardware Tuning.

UNIT II   INDEX TUNING   8
Types of Queries – Data Structures – B tree – B$^+$ Tree - Hash Structures – Bit Map Indexes – Clustering Indexes – Non Clustering Indexes – Composite Indexes – Hot Tables – Comparison of Indexing and Hashing Techniques.

UNIT III   QUERY OPTIMIZATION   10
Techniques - Tuning Relational Systems – Normalization – Tuning Denormalization – Clustering Two Tables – Aggregate Maintenance – Record Layout – Query Tuning – Triggers – Client Server Mechanisms – Objects, Application Tools and Performance – Tuning the Application Interface – Bulk Loading Data – Accessing Multiple Databases.

UNIT IV   TROUBLESHOOTING   10
Query Plan Explainers – Performance Monitors – Event Monitors – Finding "Suspicious" Queries – Analyzing a Query's Access Plan – Profiling a Query Execution – DBMS Subsystems.

UNIT V   CASE STUDIES   9
Transaction Chopping – Time Series Databases – Understanding Access Plans Configuration Parameters: Oracle; SQL Server; DB2UDB – Distributed Database - Implementation.

                                                                      Total = 45

REFERENCES

1. Dennis Shasha and Philippe Bonnet "Database Tuning, Principles, Experiments, and Troubleshooting Techniques", Elsevier Reprint 2005.

2. Thomas Connoly and Carlolyn Begg, "Database Systems, A Practical Approach to Design, Implementation and Management", Third Edition, Pearson Education 2003.

3. M.Tamer Ozsu, Patrick Valduriez and S.Sridhar "Principles of Distributed Database Systems", Pearson Education 2007.

MA9110   OPERATIONS RESEARCH

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UNIT I   QUEUEING MODELS   9
Poisson Process – Markovian Queues – Single and Multi-server Models – Little's formula – Machine Interference Model – Steady State analysis – Self Service Queue.

UNIT II   ADVANCED QUEUEING MODELS   9
Non- Markovian Queues – Pollaczek Khintchine Formula – Queues in Series – Open Queueing Networks –Closed Queueing networks.

UNIT III   SIMULATION   9
Discrete Even Simulation – Monte – Carlo Simulation – Stochastic Simulation – Applications to Queueing systems.

UNIT IV   LINEAR PROGRAMMING   9
Formulation – Graphical solution – Simplex method – Two phase method - Transportation and Assignment Problems.

UNIT V   NON-LINEAR PROGRAMMING   9
Lagrange multipliers – Equality constraints – Inequality constraints – Kuhn - Tucker conditions – Quadratic Programming.

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TEXT BOOKS:

1. Winston.W.L. "Operations Research", Fourth Edition, Thomson – Brooks/Cole, 2003.
2. Taha, H.A. "Operations Research: An Introduction", Ninth Edition, Pearson Education Edition, Asia, New Delhi, 2002.

REFERENCES:

1. Robertazzi. T.G. "Computer Networks and Systems – Queuing Theory and Performance Evaluation", Third Edition, Springer, 2002 Reprint.
2. Ross. S.M., "Probability Models for Computer Science", Academic Press, 2002.