P.G. Department of Computer Science
S.N.D.T. Women's University, Mumbai.
Syllabus- MCA. (w.e.f. from 2013-14 Batch)

Branch: MCA	Semester-I
Subject Code: 1101	**Lecture: 04** **Credit: 04**
Subject Title	**PROGRAMMING METHODOLOGY**

Modules	Sr.. No.	Topic and Details	No of Lectures Assigned	Marks Weight age %
UNIT-I	1	**Introduction:** Role of programming languages, Need to study programming languages, Characteristics of Programming Languages, Introduction to various Programming language paradigms: Procedural, Object-oriented, Functional, Logic, Concurrent, Parallel Programming, Data Types: properties of structured and non-structured data types and objects, variables, constants, derived and abstract data types, declaration, type checking, Type conversion, Binding and binding times, scalar data type, composite data type, implementation and storage representation of data types and control flow statement. Procedures: procedure call and return, recursive subprogram, different parameter passing methods, lifetime of variables, scope rules: static and dynamic scope, referencing environment: activation records (local, non-local, global), storage management (static and dynamic), exception and exception handling.	8	15
UNIT-II	2	**Procedural Programming** Design principles, control flow: statement-oriented and block-oriented structured programming, execution steps, Desirable and undesirable characteristics of procedural programming. **Procedural Programming with Pascal or C :** Program structure, lexical elements, data types, operators and punctuators, variable and type declarations, I/O, type conversion, control structures: conditional and iterative, arrays, procedures and functions, local and global variables, nested procedures and scope rules, pointers, parameter passing, user defined data types, comparative study of C and Pascal	10	20
	3	**Object Oriented Programming** Design principles: objects, classes, messages and methods, implementation of object based programming. Object Oriented Programming in Java : Program structure, Object and class declarations, constructors, inheritance, Polymorphism, access specification, interfaces, packages,	10	20

		exception handling, Java I/O, Java applications and applets, introduction to Java threads and multithreading, Socket programming, JDBC, Comparative study of C++ and JAVA		
UNIT-III	4	**Logic Programming Paradigm** Logic programming language model, logic statements, resolution, unification, search structures: backward and forward, applications, applications of logic programming. Logic programming with Prolog: program structure, logic variables, syntax structure, control structure, resolution and unification, depth-first-search, backtracking, cut operator recursive rules, Prolog facilities and deficiencies	8	15
UNIT-IV	5	**Functional Programming** Introduction to functional programming, lambda calculus: ambiguity, free and bound identifiers, reductions, typed lambda calculus, application of functional programming. Functional programming in LISP: Elements of functional programming, function declaration, expression evaluation, type checking.	4	10
	6	Introduction to .NET technology and C# Brief introduction to Microsoft .NET – The Microsoft .NET platform, .NET framework, advantages, introduction to C#, type system, classes, method, properties, arrays, interfaces, delegates and event handlers, assemblies and modules, late binding, creating and executing code at run time, multithreading patterns, exception handling.	10	20

Text Books:
1. Roosta Seyed, "Foundations of Programming Languages Design & Implementation", 3rd Edition, Cenage learning. ISBN-13:978-81-315-1062-9.
2. Sethi Ravi, "Programming Languages: Concepts and Constructs" Pearson Education, ISBN: 9788177584226
3. Sebesta R. W., "Concepts of programming languages", Pearson Education 2001, 4th edition.ISBN-81-317-0837-3

Reference Books:
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1. Herbert Schildt" The Complete Reference Java2", 5th edition, Tata McGraw Hill, ISBN-13: 978-0-07-049543-2.3.
2. Balagurusamy E., "Programming in C#", Tata McGraw Hill, 2002.
3. K. Venugopal, "Programming in Turbo PASCAL", Tata McGraw Hill
4. Winston P., Klaus B., Horn P. "LISP", 3rd Edition, Pearson Education.
5. Carl Townsend, "Programming in Turbo Prolog", Tata McGraw Hill.

Branch: MCA	Semester-I
Subject Code: 1102	Lecture: 04 Credit: 04
Subject Title	COMPUTER ORGANIZATION AND ARCHITECTURE

Modules	Sr.. No.	Topic and Details	No of Lectures Assigned	Marks Weight age %
UNIT-I	1	**Introduction:** Brief history of computers, basic building blocks of computer, organization & architecture, structure & functions, evolution of Pentium & power PC, various generations of computer evolutions, impact of VLSI on computer systems.	2	10
	2	**Buses:** Concept of buses, types of buses, concept of system bus, overview of various bus architectures used in computer, Peripheral Component Interconnect (PCI) bus, interconnection structures and bus interconnection, Bus control logic, bus arbitration techniques.	3	
UNIT-II	3	**Internal memory:** Concept of memory, size, unit, and its organization, computer memory systems overview, hierarchy of memory in computer, memory device characteristics, random access memory, serial access memory, multilevel memories, address translation, memory allocation, advanced DRAM organization. Cache memory: – concept of cache, performance of cache, types of cache architectures, memory mapping techniques, and page replacement policies	6	15
	4	**External memory:** Construction and working principles of magnetic memories, magnetic disk, hard disk, magnetic tape, optical memory..	6	10
UNIT-III	5	**I/O Devices:** Role of I/O devices in computer, overview of commonly used I/O devices such as keyboard, VDU, mouse. External devices, I/O module and its organization, various data transfer techniques – Programmed I/O, Interrupt driven I/O, Direct memory access (DMA), I/O channels and I/O Processors..	6	20
	6	**Operating System Support:** Operating system overview, role of operating systems in computer, scheduling, memory management, concept of virtual memory.	4	
	7	**CPU Organization:** The role of CPU, functions of CPU, CPU structure and CPU functions, processor organization, register organization inside CPU, instruction cycle, instruction pipelining, branch penalty, branch prediction, overview of Pentium processor	2	15

Modules	Sr. No.	Topic and Details	No of Lectures Assigned	Marks Weight age %
	8	**Data path design:** Concept of data processing unit, Fixed-point arithmetic: addition, subtraction, multiplication, and division.	6	
	9	Designing aspects related to arithmetic operations, combinational ALU and sequential ALU, advanced ALU.	2	3
UNIT-IV	10	**Control Circuit Design:** Basic concepts related to control unit, types and design of control circuit such as micro-programmed control unit, and hard wired control unit, microinstruction formats, microinstruction sequencing, microinstruction execution, applications of microprogramming.	6	12
	10	**System Organization:** Use of computer in communication, serial communications and parallel communication, network topologies, LAN and WAN in brief, various ways to improve the speed of computer, concept of parallel processing, Flynn's classification of parallel computers, benefits of parallel processing, multiprocessing.	6	15
	11	Introduction to Multicore Processor		

References:

1. William Stallings, Computer Organization and Architecture, 4th Edition, PHI, 1998
2. John P Hayes, Computer Architecture and Organization, 3rd Edition, McGraw Hill, 1998.
3. Andrew C. Tanenbaum, Structured Computer Organization, 3rd Edition, PHI.
4. M. Morris Maw, Computer System Architecture, 3rd Edition, PHI, 1998.

Branch: MCA	Semester-I
Subject Code: 1103	**Lecture: 04** **Credit: 04**
Subject Title	**DISCRETE MATHEMATICS**

Modules	Sr.. No.	Topic and Details	No of Lectures Assigned	Marks Weight age %
UNIT-I	1	**Logic:** Propositions and logical Operations, Conditional statements; Predicate Calculus-First order logic, universal and existential quantifiers; Proof Techniques- methods of proof, Mathematical induction, recurrence relations	6	10
	2	**Relation and Diagraphs-** Properties of relations, composition of relations, closure operation on relations, equivalence relations and partitions, paths in relation and diagraphs, Operations on relations, Transitive closure and Warshall's Algorithm.	6	10

Modules	Sr. No.	Topic and Details	No of Lectures Assigned	Marks Weight age %
UNIT-II	3	**Partial ordered sets (poset),** Hasse diagram, External elements of partially ordered sets Functions, Functions for computer science, Growth of functions, Permutation functions	8	20
UNIT-III	4	**Topics in Graph Theory:** Directed and undirected graphs, basic terminology, paths and circuits, Eulerian paths and circuits, Hamiltonian paths and circuits, Transport Network, Graph coloring.	10	20
	5	**Trees:** definition and properties, rooted trees, tree traversals— preorder, inorder, postorder.	10	20
UNIT-IV	6	**Algebraic Structures and Applications:** Binary operations, semi-groups and groups, subgroups, cosets, Lagrange's theorem, Product and quotient semi-groups and groups, Normal subgroup, Homomorphism; coding of binary information and error detection, group codes, decoding and error correction.	10	20

Reference Books:

1. Bernard **Kolman,** Robert Busby, Sharon C. Ross, "*Discrete Mathematical Structures*", Sixth Edition, 2008, Pearson Education Inc., New Delhi. / Prentice Hall of India (PHI) Pvt. Ltd., New Delhi.
2. Kenneth H. **Rosen, "***Discrete Mathematics and Its Applications*", Sixth Edition, 2008, Tata McGraw-Hill (TMH) Publications Pvt. Ltd., New Delhi.
3. D. S. **Malik** & M. K. Sen, "*Discrete Mathematical Structures*", First Edition, 2005, CENGAGE Learning India Pvt. Ltd., New Delhi.
4. Judith L. **Gersting**, "*Mathematical Structures for Computer Science: A Modern treatment to Discrete Mathematics*", Fifth / Sixth Edition (Asian Student Editions), 2008, W. H. Freeman & Company, New Delhi.
5. Richard **Johnsonbaugh**, "*Discrete Mathematics*", Seventh Edition, 2008, Pearson Education Inc., New Delhi.

Branch: MCA	Semester-I
Subject Code: 1104	**Lecture: 04** **Credit: 04**
Subject Title	**ADVANCED OPERATING SYSTEMS**

Modules	Sr.. No.	Topic and Details	No of Lectures Assigned	Marks Weight age %
UNIT-I	1	Introduction to Software Systems: Basics concepts of system software's in order to understand the steps undertaken to convert a program code into machine code and execution. Introduction to Compiler, Interpreter,	4	10

		Assembler, Loader, Linker etc.		
	2	**Introduction**: A brief description of its functional behavior & responsibilities as a resource manager and as an interface between hardware and user. Logical View and User View, Operating system need and services, Classification and Evolution and organization of OS, Hierarchical/Layered Organization of OS.		
UNIT-II	3	**Processor Management:** Process concept, Process Control Block, Process operations, Scheduling algorithms. Short terms and long term process scheduling policies, Scheduling criteria, multiple processor scheduling, scheduling Algorithm, FCFS, SJF, Priority and round robin scheduling, critical section, semaphores. Asynchronous parallel process, multithreading at system/user level, Inter process communication, Process Synchronization & Deadlock, Monitors, Deadlock prevention & avoidance, Deadlock Detection and deadlock Recovery	10	20
	4	**Memory Management:** Memory Management Techniques; Single partition allocation, multiple partition allocation, Swapping, paging and segmentation, segmentedpaged memory management techniques; logical and physical address space; address mapping. Demand paging, Virtual memory, protection and address mapping hardware, page fault, Page replacement and page removal algorithms.	10	20
UNIT-III	5	**Device Management and I/O Programming:** Classification of device according to speed, Disk structure, disk scheduling, FCFS scheduling SSTF scheduling, access method and storage capacity; sharable and non sharable devices and their management; spooling concept of virtual device, I/O Processor; CPU-IOP parallel operation, CPU-IOP Communication; Device drivers; I/O Programming.	10	20
	6	**Information Management & File System:** Information-an important system resource, stored and maintained in files. File organization and access methods, logical and physical file structure; physical file system realized with device management function; file allocation methods, linked and index allocation, logical file implemented on physical file system. File protection and security, Directory structure, single level, two level, tree structure, Free Space Management, Allocation Methods, Efficiency & Performance, Recovery, FAT32, & NTFS.	8	15

Modules	Sr.. No.	Topic and Details	No of Lectures Assigned	Marks Weight age %
UNIT-IV	7	**Distributed & Network Operating Systems:** Introduction to distributed systems, special functions supported by corresponding OS. Network OS; Remote login; remote file transfer. Distributed OS; Transparent migration of process & data; remote procedure call, Detection and recovery from failures. Distributed file system; mutual exclusion/synchronization using centralized and distributed approaches; concurrency control, majority protocols and time stamping; deadlock detection/prevention.	8	15

Reference Books:

1. Abraham Silberscatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", 7th Ed.John Wiley and Sons, Inc 2005.
2. Leland Beck, "System Software – An Introduction to Systems. Programming", Third Edition, Pearson Education Inc, 1985.
3. William Stallings, "Operating Systems: Internals and design Principles", 5th Ed Prentice Hall, 2005.
4. Andrew Tanenbaum, "Modern operating systems" 3rd Ed, Pearson Education.
5. D.M. Dhamdhere, "Systems Programming and Operating Systems", Tata. McGraw Hill Company, 1999.
6. John J. Donovan, "Systems Programming", Tata McGraw Hill
7. Reference book: Red Hat Bible Core Fedora Linux: Christopher Negus (Wiley Pub.)

Branch: MCA	Semester-I
Subject Code: 1105	**Lecture: 04** **Credit: 04**
Subject Title	**COMPUTER NETWORKS AND DATA COMMUNICATION**

Modules	Sr.. No.	Topic and Details	No of Lectures Assigned	Marks Weight age %
UNIT-I	1	**Introduction:** Computer Networks and its uses, Network categorization and Hardware : Broadcast and point-to-point networks, Local Area Network (LAN), Metropolitan Area Network (MAN), Wide Area Networks (WAN), Inter networks, Topologies, Wireless Networks, Network Software : Protocols, Services, network architecture, design issues, OSI Reference model, TCP/IP Reference model, Comparison of OSI and TCP/IP Models. Introduction to Example Networks: Internet, Connection-Oriented Networks – X.25, Frame Relay, ATM	6	15

	2	**Data Communication Model**, Digital and Analog data and signals, bit rate, baud, bandwidth, Nyquist bit rate, Guided Transmission Media – Twisted Pair, Coaxial cable, Optical fiber; wireless transmission – Radio waves, microwaves, infrared waves; Satellite communication.	4	10
UNIT-II	3	**Switching :** Circuit Switching, Packet switching; Multiplexing: Frequency Division Multiplexing, Time Division Multiplexing, Synchronous and Asynchronous TDM, Modems, Transmission impairments, Manchester and differential Manchester encoding, ADSL Versus Cable.	6	15
	4	**Error Detection and Correction:** Types of errors Redundancy, Detection Versus Correction, Error Detection, Error Correction, Hamming Code, Cyclic Redundancy Check, Checksum and Its idea.	8	15
UNIT-III	5	**Data Link Layer Design issues:** Framing, error control, Flow Control, Error Detection and correction; Elementary Data Link Protocols, Sliding Windows Protocols; Medium Access Control: Aloha, CSMA protocols, Collision free protocols, Limited Contention Protocols; Wavelength division Multiple access protocol, Wireless LAN Protocol: MACA; IEEE 802.3 Ethernet, IEEE 802.4 Token Bus; IEEE 802.5 Token ring, Binary Exponential Backcoft algorithm, Digital Cellular, Radio : Global System for Mobile Communication (GSM), Code Division Multiple Access(CDMA), Fiber Distributed Data Interface, Distributed Queue Dual Bus (DQDB).	14	25
UNIT-IV	6	**Network Layer, Design issues**, Virtual circuit and Datagram Subnet, Routing Algorithms, Optimality principle, Shortest path routing, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcast and Multi Cast Routing, Routing for Mobile hosts, Routing in Adhoc Networks, congestion Control Algorithm, General Principals Traffic Shaping, Leaky Bucket, Token Bucket, choke packets, Load Shedding	12	20

Reference Books:

1. Behrouz A. Forouzan. Data Communications and Networking (4th Edition). McGraw Hill. ©2007. ISBN: 0-07-296775-7.
2. Data and Computer Communications, 7th ed., by William Stallings, Prentice Hall of India, 2003
3. Computer Networks , Abndrew S. Tanenbaum 4e

Branch: MCA	Semester-I
Subject Code: 1201	Practical: 02 Credit: 02
Subject Title	PROGRAMMING LAB-I

Modules	Sr. No:	Topics and Details	No: of hours assigned	Marks Weight age %
UNIT-I	1	Control Statement: Selection Statements, if , Nested if, The if-else-if, The ? alternative, The Conditional, Expression, switch, Nested switch, Iteration Statements- The for loop, . The while loop, The do-while loop,Jump Statements- The goto & label ,The break & continue, The exit() function	1	02
UNIT-II	2	Pointers: The basics of Pointer, The Pointer operator, Application of Pointer,Pointer Expression, Declaration of Pointer, Initializing Pointer, De-referencing, void Pointer, Pointer Arithmatic,Precedence of &, * operators, Pointer to Pointer, Constant Pointer, Array & String , Single Dimension Arrays, Accessing array elements, Initializing an array, Multidimension Arrays, Intializing the arrays, Memory Representation, Accessing array elements, Passing Single Dimension array to Function.	2	12
	3	Array & Pointer , Array of Pointer , String Manipulation Functions, Function, Introduction, Arguments & local variables, Returning Function Results, Call by reference & Call by value, Recursion	4	
UNIT-III	4	Storage Classes: Automatic Storage Class, Extern Storage Class, Static Storage Class, Register Storage Class	2	12
	5	Structure ,Union, Enumeration & typedef: Structures, Declaration and Initializing Structure , Accessing Structure members, Structure Assignments, Arrays of Structure , Passing Structure to Function, Structure Pointer, Unions.	4	
UNIT-IV	6	File handling: Defining & Opening a File, Closing a File, Input/Output Operations on Files	4	24
	7	Error Handling During I/O, Operation, Random Access To Files, Command Line Arguments. Bitwise Operator: Bit Fields and simple arithmetic Operations	4	
	8	Graphics In C: Drawing Object in C, Line , Circle , Rectangle , Ellipse, Changing Foreground & Background, Filling Object by Color	4	

Branch: MCA			Semester-I	
Subject Code: 1202			Practical: 02 Credit: 02	
Subject Title			OPERATING SYSTEMS LAB	

Modules	Sr. No:	Topics and Details	No: of lectures assigned	Marks Weight age %
UNIT-I	1	**1. Files:** **Filename Substitution** Wild Cards? ***,** Character Class (c is any single character), Range **,**Home Directory ,Home Directory of Another User **~***user* List Files in Current Directory ,List Hidden Files , **Directories File Manipulation, File Properties,(Permission),**	4	5
	2	**I/O Redirection and Pipes and Filters: Searching with grep**	2	
UNIT-II	3	Introduction to Shells:What is shell? Different types of Linux shells, Bourne Again Shell (BASH), Shell variables, (environment and user defined), Shell files (.bashrc, .profile, .bash_profile, .bash_logout) Positional parameters, Get start with simple scripts (User variable, expr, multiple command) , Wild cards (* and ?), Command line arguments, Arithmetic in shell scripts,Basic Shell Commands-ls, grep,l, cat, man, touch, chmod,chown, chroot, pwd, mkdir, cd .., rm -rf, uptime, lspci,cp, mv, whereis, echo, find. Environment file- etc/environment, bashrc, etc/fstab, etc/passwd	6	15
UNIT-III	4	Read and echo commands in shell scripts, The tput command, Taking decisions: if-then-fi , if-then-else-fi, The test command (file tests, string tests), Nested if-elses, The case control structure, Functions Linux shell programming : The loop control structure:. The while, until and for loop structures b. The break and continue statements Command line expansion, Directory stacks manipulation, Job control, history and processes, Builtins, Shell Files.	9	20
UNIT-IV	5	**Any Other Shell**	4	10

Reference Book:

1. Advanced Linux Programming, Mark Mitchell, Jeffrey Oldham, and Alex Samuel, New Riders Publishing
2. Unix/Linux Programming by Sumitabha Dass, PHP

Branch: MCA	Semester-II
Subject Code: 2101	Lecture: 04 Credit: 04
Subject Title	STRUCTURED SYSTEMS ANALYSIS AND DESIGN

Modules	Sr. No:	Topics and Details	No: of lectures assigned	Marks Weight age %
UNIT-I	1	**Introduction:** System Definition and concepts: General Theory systems, Manual and automated systems, Reallife Business Sub-Systems. System Environments and Boundaries. Real-time and distributed systems. Basic principles of successful systems. Approach to system development: Structured System Analysis and Design, Prototype, Joint Application Development	4	20
	2	**Systems Analyst:** Role and Need of Systems Analyst. Qualifications and responsibilities. System Analysis as a Profession	2	
	3	**System Development Cycle:** Introduction to Systems Development Life Cycle (SDLC). Various phases of SDLC: Study, Analysis, Design, Development, Implementation, Maintenance Systems documentation consideration: Principles of Systems Documentation, Types of documentation and their importance, Enforcing documentation discipline in an organization	6	
UNIT-II	4	**System Planning:** Data and fact gathering techniques: Interviews, Group Communication Questionnaires, Presentations & Site Visits. Assessing Project Feasibility: Technical, Operational, Economic, Cost Benefits Analysis, Schedule, legal and contractual, Political. Modem Methods for determining system requirements: Joint Application, Development Program, Prototyping, Business Process Re-engineering. System Selection Plan and Proposal	10	20
	5	**Modular and Structured Design:** Module specifications. Top-down and bottom-up design. Module coupling and cohesion. Structure Charts	4	
UNIT-III	6	**System Design and Modeling:** Process Modeling, logical and physical design, Conceptual Data Modeling: Entity-Relationship Analysis, Entity-Relationship Modeling, EROs and DFDs, Concepts of Normalization, Process Description: Structured English, Decision Tree, Decision Tables. Documentation: Data Dictionary, Recording Data Descriptions	6	20

Modules	Sr. No.	Topic and Detail	No. of Lectures assigned	Marks Weight age %
	7	**Input and Output:** Classification of forms, Input/output forms design. User-interface design, Graphical interfaces. Standards and guidelines for GUI design. Designing Physical Files and Databases: Designing Fields, Designing Physical Records, Designing Physical Files, Designing Databases. Introduction to CASE Tools, Features, Advantages and Limitations of CASE Tools, Awareness about some commercial CASE Tools.	7	15
UNIT-IV	8	**System Implementation and Maintenance:** Planning considerations. Conversion methods, procedures and controls. System acceptance criteria. System Evaluation and Performance. Testing and Validation. Preparing User Manual. Maintenance Activities and Issues	7	15
	9	**Computer System Audit and Security:** Audit of Computer System Usage. Types of Threats to Computer System and Control Measures: Threat and Risk Analysis, Disaster Recovery and Contingency Planning, Viruses.	4	10

Books

1. J. Hoffer, "Modern Systems Analysis and Design", Joey George and Joseph Valacich, Pearson Education.
2. Dennis and B. H. Wixom, "Systems Analysis and Design", John Wiley & Sons, Inc.
3. J. Whitten, L. Bentley and K. Dittman, "Systems Analysis and Design Methods", TMH
4. K. C. Laudon and J. P. Laudon, "Management Information Systems", Seventh Edition, 2002

Branch: MCA	Semester-II
Subject Code: 2102	Lecture: 04 Credit: 04
Subject Title	DATABASE MANAGEMENT SYSTEMS

Modules	Sr. No.	Topic and Detail	No. of Lectures assigned	Marks Weight age %
UNIT-I	1	**Introduction :** Database System Applications ,Database Systems versus File Systems, View of Data, Data Models, Database Languages, Database Users and Administrators, Database System Structure	2	20
	2	**Entity –Relational Model :** Basic Concepts, Constraints, Keys, Entity-Relationship Diagram, Weak Entity Sets, Extended E-R features, Design of E-R Database Schema, Reduction of an E-R Schema to Tables.	2	

	3	**Relational Model :** Structure of Relational Databases, Relational Algebra, Tuple Relational Calculus, Domain Relational Calculus	4	
UNIT-II	4	**SQL :** SQL commands, Functions, Data Constraints, Grouping Data, Subqueries, Joins, Performance Tuning, Security Management, PL/SQL, Triggers.	8	15
	5	**Integrity & Security :** Domain Constraints, Referential Integrity, Assertions, Triggers, Privileges in SQL.	4	
	6	**Relational Database Design :** Functional Dependencies, Decomposition, Normalization – 1NF – 5NF , BCNF	4	
UNIT-III	7	**Storage & File Structure :** RAID , Improvement of Reliability & Performance Indexing & Hashing – Basic Concepts, Ordered Indices, B+ & B Tree Index Files, Static & Dynamic Hashing , Comparison of Ordered Indexing & Hashing.	8	15
	8	**Transactions:** Transaction Concept & State, Implementation of Atomicity & Durability, Serializability, Recoverability, Testing for Serializability.	4	20
UNIT-IV	9	**Concurrency Control:** Protocols- Lock Based, Timestamp-based, Validation Based, Deadlock Handling & Concurrency	6	20
	10	**Recovery System :** Failure Classification, Storage Structure, Recovery & Atomicity, Log based Recovery, Shadow Paging, Recovery with Concurrent Transactions, Buffer management, failure with loss of nonvolatile storage, advanced recovery techniques.	4	
	11	**Object – Oriented Databases :** New Database Applications, Object – Oriented Data Model, Object-Oriented Languages, Persistent Programming Languages, Persistent C++ Systems	4	10

Books:

1. Database System Concepts : Henry Korth, Silberschatz, Sudarshan 5th Edition, McGraw-Hill
2. Fundamentals of Database Systems: Elmasri & Navathe 3rd Edition , Pearson Education India, 01-Sep-2008 - 1168 pages
3. Database Management Systems; Raghu Ramakrishnan, Johannes Gehrke; McGraw-Hill International Edition, 2002 edition
4. Modern Database Management (Seventh Edition); Jeffrey A. Hoffer, Mary Prescott, Fred McFadden; Prentice Hall, 2004
5. Database systems: Design, Implementation and Management; Peter Rob, Carlos Coronel; Thomson Publication, 2004
6. Database Processing: Fundamentals, Design, Implementation (tenth Edition); D. M. Kroenke; Prentice-Hall, 2005
7. Data Base Principles Programming Performance (Second Edition); Patrick O.Neil; Morgan Kaufmann Publishers, Inc., 2000
8. Oracle 8i PL/SQL Programming : Scott Urman

		Branch: MCA		Semester-II	
		Subject Code: 2103		Lecture: 04 Credit: 04	
		Subject Title		**OBJECT ORIENTED PROGRAMMING USING C++**	

Modules	Sr. No:	Topics and Details	No: of lectures assigned	Marks Weight age %
UNIT-I	1	**Introduction to Object oriented paradigm** Classes and Objects: Relationships among objects, Relationships among classes Classification: Importance of Proper Classification, Identifying Classes and Objects. The Notation, Elements of the Notation, Class Diagrams, State Transition Diagrams, Object Diagrams, Interaction Diagrams, Module Diagrams, Process Diagrams, Applying the Notation, the Process, the Micro Development Process, the Macro Development Process	8	15
	2	**Moving from C to C++:** Features, Comparison, overloading etc.	2	
UNIT-II	3	Class, Class Components, Access Specifiers, Data abstraction, Encapsulation, Categories of Members Functions. Data Types and Ranges, derived Data Types, Functions, Members Functions, Inline functions, friend Functions.	8	10
	4	Pointers, Arrays , Pointers to functions and members of a class	8	15
UNIT-III	5	**Function Overloading:** Rules for function overloading	4	10
	6	**Constructor and Destructors:** Definition, Declaration, Features , types- default, parameterized, copy, instantiations of an objects , base member initialization	4	10
UNIT-IV	7	Operator Over loading and Rules for operator overloading, Type conversion functions	6	15
	8	Inheritance, Polymorphism.	6	15
	9	Exception Handling, I/O stream library, Standard template library, Templates and container classes	4	10

References:

1. Mastering C++: KR Venugopal, et al.
2. Programming in C++: Nell Dale, Chip Weems, Mark Headington, Narosa Publishing.
3. A Treatise on Object Oriented Programming using C++: B. Chandra, Narosa Publishing.

Branch: MCA	Semester-II
Subject Code: 2104	Lecture: 04 Credit: 04
Subject Title	INTRODUCTION TO MICROPROCESSORS

Modules	Sr. No:	Topics and Details	No: of lectures assigned	Marks Weight age %
UNIT-I	1	**History and overview:** Growth of microprocessor technology from SSI, MSI, LSI Traps and interrupts to VLSI, Current global trends, RISC architecture Intel microprocessors 8085 to Pentium-II performance and features comparisons 8085 Microprocessor, Internal architecture, Pinout, Memory addressing schemes, system bus structure, Data, address and control bus, multiplexing and demultiplexing Interrupts: Introduction, Purpose of interrupts, Interrupt vectors, 8259 – internal organisation, Pin out, Single and cascaded operation	12	20
UNIT-II	2	I/O Interface: Typical I/O interface, serial communication, 8251 A UART: Internal organisation and functioning, 8237 DMA: Internal organisation and functioning	12	20
UNIT-III	3	Memory: Type of memory ROM-PROM, EPROM, EEPROM (Flash ROM concept) RAM-SRAM, DRAM, EDO, ECC, SDRAM Packaging- DIP, SIMM, DIMM	10	20
UNIT-IV	4	Addressing, memory map, address decoding Programming Addressing modes, data movement, arithmetic and logic instructions, control instructions.	12	25
	5	Overview of 8086 / 8088 Overview of 80286, 80386, 80486, Pentium, Pentium II, Pentium III etc.	4	15

Reference Books:

1. "8085 Micro processor" Gaonkar
2. "Inside the PC": Peter Norton (Sixth Edition)
3. "Microprocessor System-The 8086/8088 Family": Yu-Cheng Liu & Glen A. Gibson
4. "The Intel Microprocessors: 8086/8088, 80286, 80386, 80486, Pentium, Pentium Pro, Pentium-II & III ": Barry Brey (Fourth Edition)

Branch: MCA	Semester-II
Subject Code: 2105	Lecture: 04 Credit: 04
Subject Title	TECHNICAL COMMUNICATION AND SOFT SKILLS

Modules	Sr. No.	Topic and Detail	No. of Lectures assigned	Marks Weight age %
UNIT-I	1	Technical communication , Fundamentals of technical communication, Oral and written communication, Preparing oral presentations and supporting materials, Standards of communication	8	15
UNIT-II	2	Written communication, Essays, Technical leaflets, Term papers, Research Papers ,White paper and technical summaries, Project proposals, Tenders, Contracts and quotations, Technical specifications, Monographs ,Dissertations and Thesis, Software project documentation of all kinds	10	20
	3	Self Development and Assessment Self-Assessment, Self-Awareness, Perception and Attitudes, Values and Belief System, Personal Goal Setting, Career Planning, Self-Esteem, Building of Self-Confidence	8	20
UNIT-III	4	Ethics and Etiquettes Business Ethics, Etiquettes in social as well as, Office settings, Email etiquettes, Telephone Etiquettes, Engineering ethics and ethics, as an IT professional, Civic Sense, Other Skills	8	15
UNIT-IV	5	Managing time, Meditation, Understanding roles of Engineer and their Responsibility, Exposure to work environment And culture in today's job Places	8	15
	6	Improving Personal Memory, Study skills that include Rapid reading, Notes taking, Complex problem solving, creativity.	8	15

References:

1. "Technical Communication", Minakshi Raman & Sharma
2. "Writing and Speaking in the Technology Professions": A Practical Guide, David F. Beer,
3. "Business Communication": Raymond V, Leiskar John D, Pettit J. V.
4. "Communications": Dr. C. S. Rayuder, Himalaya Publication.
5. "Communication Skills for Effective Management": Dr. Anjali Gnekar, Everest Publishing House.
6. "Powerful Presentation Skills": Career Press, USA.

Branch: MCA	Semester-II
Subject Code: 2201	Practical: 02 Credit: 02
Subject Title	PROGRAMMING LAB-II

Modules	Sr. No:	Topics and Details	No: of hours assigned	Marks Weight age %
UNIT-I	1	Practical based on Class, member function, user defined data types	2	05
	2	Practical based on Array, Pointers, Pointers to array, functions, member functions,	3	15
UNIT-II	3	Practical based on constant member functions, constant pointers and pointer to constant, Access specifiers ,	3	
	4	Practicals on inline function, friend function, function overloading	3	15
UNIT-III	5	Operator overloading, Function chaining, overriding, Type conversion function	4	
	6	Inheritance, polymorphism, virtual class, virtual functions,	4	15
UNIT-IV	7	Exception handling, file handling	3	
	8	Generic classes	3	

Branch: MCA	Semester-II
Subject Code: 2202	Practical: 02 Credit: 02
Subject Title	DATABASE MANAGEMENT SYSTEMS LAB

Modules	Sr. No:	Topics and Details	No: of lectures assigned	Marks Weight age %
UNIT-I	1	Database, Table Creation	2	05
	2	Defining Schema, Constraints, Normalisation	3	15
UNIT-II	3	SQL Basic Queries	2	
	4	Joining, and Clauses implementation	2	10
UNIT-III	5	Procedure, Function execution	4	
	6	PL SQL Script Execution	4	
UNIT-IV	7	Stored Procedure , Function, Packages Execution	4	20
	8	Cursor, Trigger Writing	4	

1. Oracle 8i The Complete Reference : Loney, Koch