



SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL (M.P.)

Scheme of Examination

Second Semester-Master of Computer Application

S.No	Subject Code	Subject Name	Periods per week			Credits	Maximum Marks (Theory Slot)			Maximum Marks (Practical Slot)		Total Marks
			L	T	P		End Sem. Exam	Tests (Two)	Assignments /Quiz	End Sem. Practical/ Viva	Practical Record/Assignment/Quiz/Presentation	
1	MCA 201	Operating System	3	1	-	4	70	20	10	-	-	100
2	MCA 202	Data Base Mgmt. System	3	1	-	4	70	20	10	-	-	100
3	MCA 203	Computer Arch.	3	1	-	4	70	20	10	-	-	100
4	MCA 204	Computer oriented Numerical & Stat. Methods	3	1	-	4	70	20	10	-	-	100
5	MCA 205	System Software	3	1	-	4	70	20	10	-	-	100
6	MCA 206	Prog. Lab in RDBMS	-	-	8	8	-	-	-	120	80	200
7	MCA 207	Assembly lang. Prog Lab	-	-	2	2	-	-	-	30	20	50
		Total	15	5	10	30	350	100	50	150	100	750

L: Lecture - T: Tutorial - P: Practical



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MCA-201 Operating System

Unit-I

Introduction: Evolution of operating systems (History of evolution of OS with the generations of computers), Types of operating systems, Multitasking, Timesharing, Multithreading, Multiprogramming and, Real time operating systems, Different views of the operating system, System Programmer's view, User's view, Operating system concepts and structure, Layered Operating Systems, Monolithic Systems. **Processes:** The Process concept, The process control block, Systems programmer's view of processes, Operating system services for process management, Scheduling algorithms, First come first serve, Round Robin, Shortest runtime next, Highest response ratio next, Multilevel Feedback Queues, Performance evaluation of scheduling algorithms stated above

Unit-II

Memory Management : Memory management without swapping or paging, Concepts of swapping and paging, Page replacement algorithms namely, Least recently used, Optimal page replacement, Most recently used, Clock page replacement, First in First out (This includes discussion of Belady's anomaly and the category of Stack algorithms), Modeling paging algorithms, Design issues for paging system, Segmentation, Segmented Paging, Paged Segmentation

Unit-III

Inter-process Communication and Synchronization: The need for inter-process synchronization, Concept of mutual exclusion, binary and counting semaphores, hardware support for mutual exclusion, queuing implementation of semaphores, Classical problems in concurrent programming, Dining Philosopher's problem, Bounded Buffer Problem, Sleeping Barber Problem, Readers and Writers problem, Critical section, critical region and conditional critical region, Monitors and messages. **Deadlocks:** Concepts of deadlock detection, deadlock prevention, deadlock avoidance. Banker's Algorithm.

Unit-IV

File System: File systems, directories, file system implementation, security protection mechanisms.

Input/output: Principles of I/O Hardware: I/O devices, device controllers, direct memory access.

Principles of I/O software: Goals interrupt handlers, device drivers, and device independent I/O software. User space I/O Software. **Disks:** Disk hardware, Disk scheduling algorithms (namely First come first serve, shortest seek time first, SCAN, C-SCAN, LOOK and C-LOOK algorithms) Error handling, track-at-a-time caching, RAM Disks. **Clocks:** Clock hardware, memory-mapped terminals, I/O software

Unit-V

Processes and Processors in Distributed Systems: Threads, System models, processor allocation, Scheduling. Distributed File Systems: Design, Implementation, and trends. .Performance Measurement, Monitoring and evaluation Introduction, important trends affecting performance issues, why performance monitoring and evaluation are needed, performance measures, evaluation techniques, bottlenecks and saturation, feedback loops.

Books

1. Milenkovic, M., "Operating Systems - concepts and Design" McGraw Hill International Edition- Computer Science series 1992.
2. Abraham Silberschatz Peter B. Galvin, G. Gagne, "Operating System Concepts", Sixth Edition, Addison Wesley Publishing Co., 2003.
3. Tanenbaum, A.S. "Modern Operating System", Prentice Hall of India Pvt. Ltd.1995



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MCA-202 DBMS

Unit-I

Introduction: Advantage of DBMS approach, various view of data, data independence, schema and subschema,

Primary concepts of data models, Database languages, transaction management, Database Administrator and users, data dictionary, overall system architecture.

ER model: basic concepts, design issues, mapping constraint, keys, ER diagram, weak and strong entity Sets, specialization and generalization, aggregation, inheritance, design of ER schema, reduction of ER Schema to tables.

Unit-II

Domains, Relations and Keys: domains, relations, kind of relations, relational database, various types of Keys, candidate, primary, alternate and foreign keys.

Relational Algebra & SQL: The structure, relational algebra with extended operations, modifications of Database, idea of relational calculus, basic structure of SQL, set operations, aggregate functions, null Values, nested sub queries, derived relations, views, modification of Database, join relations, DDL in SQL.

Unit-III

Functional Dependencies and Normalization: basic definitions, trivial and non trivial dependencies, Closure set of dependencies and of attributes, irreducible set of dependencies, introduction to normalization, non loss decomposition, FD diagram, first, second, third Normal forms, dependency Preservation, BCNF, multivalued dependencies and fourth normal form, Join dependency and fifth normal Form.

Unit-IV

Database Integrity: general idea. Integrity rules, domain rules, attribute rules, relation rules, Database Rules, assertions, triggers, integrity and SQL.

Transaction, concurrency and Recovery: basic concepts, ACID properties, Transaction states, Implementation of atomicity and durability, concurrent executions, basic idea of serializability, basic idea Of concurrency control, basic idea of deadlock, failure classification, storage structure types, stable Storage implementation, data access, recovery and atomicity- log based recovery, deferred Database Modification, immediate Database modification, checkpoints.

Distributed Database: basic idea, distributed data storage, data replication, data fragmentation horizontal, Vertical and mixed fragmentation

Unit-V

Emerging Fields in DBMS: object oriented Databases-basic idea and the model, object structure, object Class, inheritance, multiple inheritance, object identity, data warehousing- terminology, definitions, Characteristics, data mining and its overview, Database on www, multimedia Databases-difference with Conventional DBMS, issues, similarity based retrieval, continuous media data, multimedia data formats, Video servers.

Storage structure and file organizations: overview of physical storage media, magnetic disks performance And optimization, basic idea of RAID, file organization, organization of records in files, basic Concepts of indexing, ordered indices, basic idea of B-tree and B+-tree organization

Network and hierarchical models: basic idea, data structure diagrams, DBTG model, implementations, tree structure diagram, implementation techniques, comparison of the three models



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Books

1. A Silberschatz, H.F Korth, Sudersan “Database System Concepts” –, MGH Publication.
2. C.J Date “An introduction to Database Systems” –6th ed.
3. Elmasri & Navathe “Fundamentals of Database systems” – III ed.



SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL (M.P.)

MCA-203 Computer Architecture

Unit-I

Introduction to organization and architecture: Computer Components, Computer Function, Interconnection Structures, Bus Interconnection, PCI. Input/output - External Devices, I/O Modules, Programmed I/O, Interrupt-Driven I/O, Direct Memory Access, I/O Channels and Processors, The External Interface. Integer Representation, Integer Arithmetic, Floating Point Representation, Floating-Point Arithmetic.

Unit-II

Computer memory organization - Computer Memory System Overview, Semiconductor Main Memory, Advanced DRAM Organization. Cache Memory, Hit ratio, mapping techniques, writing into cache, Magnetic Disk, RAID, Optical Memory, Magnetic Tape. Auxiliary Memory, memory Hierarchy, Associative memory, Virtual memory, Address space & memory space, Address mapping, page table, Page replacement, segmentation

Unit-III

Computer Instructions - The Arithmetic and Logic Unit (ALU), Instruction sets - Machine Instruction Characteristics, Types of Operands, Types of Operations, Assembly Language. Addressing Modes and Formats, Addressing, Instruction Formats

Unit-IV

CPU structure and function: Processor Organization, Register Organization, The Instruction Cycle, Instruction Pipelining, The Pentium Processor

Unit-V

Control Unit Operation - Micro - operations, Control of the CPU, Hardwired Implementation. Basic concepts of Micro programmed Control.

Books

- 1 . COMPUTER ORGANIZATION AND ARCHITECTURE BY WILLIAM STALLINGS TMH PUBLICATION
- 2 . COMPUTER SYSTEM ARCHITECTURE: BY M. MORRIS MANO
- 3 .DIGITAL LOGIC AND COMPUTER DESIGN BY M. MORRIS MANO



MCA-204 Computer Oriented Numerical & Statistical Methods

UNIT-I

Numerical approximation, Representation of integers and real numbers in computers, fixed and floating Point arithmetic, normalized floating point numbers, Round off and truncation errors, relative and absolute Errors. Iterative methods: Zeros of single transcendental equations and zeros of polynomials using Bisections, false position, Newton Raphson methods. Convergence of solutions.

UNIT-II

Interpolation: Forward, Backward, central (Stirling's) and divided difference formulas, Lagrange's Interpolation, Inverse interpolation for equal and unequal intervals.

UNIT-III

Numerical Integration: Newton Cotes's formula, Simpson's 1/3rd and 3/8th rule. Gauss Legendre (two and Three points) integration formula.

Simultaneous linear equations: Solutions of simultaneous linear equations – Gauss elimination method And pivoting, ill conditioned equations and refinement of solutions, Gauss-Seidel iterative methods.

UNIT-IV

Solution of differential equation: Runge-Kutta fourth order method. Euler's method, Picard's, Taylor's Series.

UNIT-V

Distributions: Binomial distribution, Poisson distribution and normal distribution, χ^2 distribution, Rectangular distribution, hyper geometric distribution

BOOKS:

1. E. Balaguruswamy "Numerical Methods" , TMH, ISBN – 07-463311-2, 1999.
2. B.S. Grewal "Numerical Methods in Engineering & Science".
3. V. Rajaraman "Computer Oriented Numerical Methods".



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MCA-205 System Software

UNIT-I

INTRODUCTION: Introduction – System software and machine architecture – The Simplified Instructional Computer (SIC) – Machine Architectures (SIC and SIC/XE) – Data and Instruction Formats – Addressing Modes – Instruction sets – I/O Programming.

UNIT-II

ASSEMBLERS: Basic assembler functions – A simple SIC assembler – Assembler algorithms and data structures – Machine dependent assembler features, Instruction formats and addressing modes – Program relocation – Machine independent assembler features – Literals – Symbol-defining statements – Expressions– Program Blocks – Control Sections and Program Linking – One Pass Assembler and Multipass Assemblers– Implementation examples MASM assembler.

UNIT-III

LOADERS AND LINKERS: Basic loader functions: Design of an Absolute Loader – A Simple Bootstrap Loader Machine dependent loader features Relocation – Program Linking – Algorithm and Data Structures for Linking Loader. Machine-independent loader features – Automatic Library Search – Loader Options Loader design options – Linkage Editors – Dynamic Linking – Bootstrap Loaders. Implementation examples: MSDOS linker.

UNIT-IV

MACRO PROCESSORS :Basic macro processor functions – Macro Definition and Expansion – Macro Processor Algorithm and data structures – Machine – independent macro processor features – Concatenation of Macro Parameters – Generation of Unique Labels – Conditional Macro Expansion – Keyword Macro Parameters – Macro Processor Design Options Recursive Macro Expansion – Algorithm – General Purpose macro Processors – Macro Processing within Language Translators - Implementation examples: MASM Macro Processor – ANSI C macro language.

UNIT-V

OTHER SYSTEM SOFTWARE :Text editors – Overview of Editing Process - User Interface – Editor Structure –Interactive Debugging Systems – Debugging functions and capabilities – Relationships with Other parts of the system – User Interface Criteria.

BOOKS:

1. Leland Beck - "System Software – An Introduction to Systems Programming", Third Edition, Pearson Education, Inc., 1999.
2. D. M. Dhamdhere, "Systems Programming and Operating Systems", Tata McGraw Hill Company, 1999.
3. John J. Donovan, "Systems Programming", Tata McGraw Hill Company, 1991.