

**MAHATMA GANDHI  
UNIVERSITY**

**B.TECH. DEGREE COURSE**

**5<sup>TH</sup> SEMESTER**

**SCHEME  
&  
SYLLABUS**

**2002**

**COMPUTER SCIENCE  
&  
ENGINEERING BRANCH**

# COMPUTER SCIENCE & ENGINEERING

## SCHEME

### 5<sup>TH</sup> SEMESTER

Course Code	Course No.	Subject	Teaching Periods			Uty. Exam duration (hours)	Marks			
			L	T	P		Sessional	Theory	Practical	Total
A	RT501	Engineering Mathematics IV	3	1	-	3	50	100	-	150
B	R 502	Operating Systems	3	1	-	3	50	100	-	150
C	RT503	Database Management Systems	3	1	-	3	50	100	-	150
D	R 504	File Structures and Algorithms	2	1	-	3	50	100	-	150
E	RT505	Language Processors	3	1	-	3	50	100	-	150
F	RT506	Data Communication	2	1	-	3	50	100	-	150
G	R 507	Microprocessor Lab	0	0	4	3	50	-	100	150
H	R 508	Database Lab	0	0	4	3	50	-	100	150
		Total	16	6	8	-	400	600	200	1200

# SYLLABUS

## ENGINEERING MATHEMATICS - IV

RT 501

3+1+0

### Module 1

QUEUEING THEORY: General Concepts - Arrival pattern - service pattern - Queue disciplines - The Markovian model M/M/1/\$, M/M/1/N - steady state solutions – Little's formula.

### Module 2

NUMERICAL METHODS: Introduction - solution of algebraic and transcendental equations - Bisection method - Method of false position - Newton's method - Approximate solution of equations – Horner's method solutions of linear simultaneous equations - Iterative methods of solution-Jacobi's method - Gauss Seidal method.

### Module 3

FINITE DIFFERENCES: Meaning of operators –  $\Delta, \nabla, \mu, \delta, E$  - interpolation using Newton's forward and backward formula - Langrange's and Newton's divided difference interpolation formula - numerical differenciation - first and second order derivatives using forward and backward formula - numerical integration - trapizoidal rule - Simpson's 1/3 and 3/8 rules.

### Module 4

LINEAR PROGRAMMING PROBLEM : graphical solution of LPP- general problem - solution of LPP using simplex method - Big M method – duality in LPP.

### Module 5

TRANSPORTATION AND ASSIGNMENT PROBLEM: Balanced transportation problem - initial basic feasible solution -Vogel's approximation method - optimum solution by Modi method - Assignment problem - Hungarian techniques

### References

1. Operations Research - P.K. Gupta & D.S. Hira, S.Chand & Co. Ltd
2. Advanced Engg Mathematics - Ervin Kreyszig, Wiley Eastern Ltd.
3. Higher Engg. Mathematics - Dr. B.S. Grewal, Khanna Publishers.
4. Operations research - Richard Bronson, Schaum's Outline Series
5. Operations research - Panneer Selvam, PHI
6. Numerical Methods in Science & Engg - M.K. Venkataraman, National Publishing Co.

# OPERATING SYSTEMS

R502

3+1+0

## Module 1 Introduction

OS Concepts – Evolution of OS, OS Structures- Kernel, Shell, General Structure of MSDOS, Windows 2000, Linux.

## Module 2 Process Management

Process & Threads – Process States - Process Control Block – Process Scheduling – Operations on Processes, Threads, CPU Scheduler – Preemptive and Non-Preemptive; Dispatcher, Scheduling Criteria, Scheduling Algorithms – Process Management in UNIX.

## Module 3 Process Synchronization & Interprocess Communication

Concurrent Processes, Co-operating Processes, Precedence Graph, Hierarchy of Processes, Critical Section Problem – Two process solution, Synchronization Hardware, Semaphores – Deadlock- detection, handling, prevention, avoidance, recovery, Starvation, Critical Regions, Monitors, Interprocess communication.

## Module 4 Memory Management

Objectives and functions, Simple Resident Monitor Program (No design), Overlays – Swapping; Schemes – Paging – Simple, Multi-level Paging; Internal and External Fragmentation; Virtual Memory Concept, Demand Paging - Page Interrupt Fault, Page Replacement Algorithms; Segmentation – Simple, Multi-level, Segmentation with Paging, Memory Management in UNIX.

## Module 5 Information Management

Files and Directories – Directory Structure –Directory Implementation – Linear List - Hash Table.  
Device Management: Dedicated, Shared and Virtual Devices - Serial Access Devices, Direct Access Devices, Direct Access Storage Devices - Channels and Control Units – Disk Scheduling methods.

## Text Book

1. Operating Systems Concepts – Silberschatz, Galvin, Wiley Publications

## References

1. Operating Systems – William Stallings, Pearson Education Asia
2. Operating Systems: Design & implementation - Andrew S. Tenenbaum, PHI
3. Modern Operating Systems - Andrew S. Tenenbaum, Pearson Education Asia / PHI
4. Operating Systems - Nutt, Pearson Education Asia
5. Operating Systems - Deitel & Deitel, Pearson Education Asia

# DATA BASE MANAGEMENT SYSTEMS

RT503

3+1+0

## Module 1

Basic Concepts - Purpose of database systems-Components of DBMS – DBMS Architecture and Data Independence- Data modeling - Entity Relationship Model, Relational – Network- Hierarchical and object oriented models-Data Modeling using the Entity Relationship Model.

## Module 2

Structure of relational databases – relational databases – relational algebra- tuple relational calculus. Data definition with SQL, insert, delete and update statements in SQL – views – data manipulation with SQL

## Module 3

Introduction to Transaction Processing- Transaction and System Concepts- Desirable properties of Transactions- Schedules and Recoverability- Serializability of Schedules-Query processing and Optimization- Concurrency Control- -assertions – triggers.

Oracle case study: The basic structure of the oracle system – database structure and its manipulation in oracle- storage organization in oracle - Programming in PL/SQL- Cursor in PL/SQL

## Module 4

Database Design– Design guidelines– Relational database design – Integrity Constraints – Domain Constraints- Referential integrity – Functional Dependency- Normalization using Functional Dependencies, Normal forms based on primary keys- general definitions of Second and Third Normal Forms. Boyce Codd Normal Form– Multivalued Dependencies and Forth Normal Form – Join Dependencies and Fifth Normal Form – Pitfalls in Relational Database Design.

## Module 5

Distributed databases: Distributed Database Concepts- Data Fragmentation, Replication and Allocation Techniques- Different Types- Query Processing – semijoin -Concurrency Control and Recovery.

## Text Book

1. Fundamentals of Database System Elmasri and Navathe (3<sup>rd</sup> Edition), Pearson Education Asia

## References

1. Database System Concepts - Henry F Korth, Abraham Silbershatz, Mc Graw Hill 2<sup>nd</sup> edition.

2. An Introduction to Database Systems- C.J.Date (7<sup>th</sup> Edition) Pearson Education Asia
3. Database Principles, Programming and Performance – Patrick O’Neil, Elizabeth O’Neil
4. An Introduction to Database Systems - Bibin C. Desai

## **FILE STRUCTURES AND ALGORITHMS**

**R504**

**2+1+0**

### **Module1**

File Organization: - Operations on Files – Heap Files - Sequential Files – Indexed sequential files – Direct files – Secondary key retrieval.

### **Module 2**

Index Structures for Files: - Single level Ordered Index-Multilevel Indexes- Indexes on multiple Keys. Searching - Sequential search, Binary search, Interpolation search.

### **Module 3**

Hashing: - Static Hashing-Hash Tables-Different Hash Functions-Mid Square-Division-Folding-Digit Analysis, Dynamic Hashing. Collision-Collision Resolution Techniques-Extendible Hashing.

### **Module 4**

Search trees: -AVL Trees, height balanced trees, weight balanced trees, Threaded Binary Trees, Multiway search Trees- B Trees-B+ Trees.

### **Module 5**

Storage management: - Dynamic storage management- storage allocation & liberation – First fit, best fit – Buddy system- Garbage Collection & Compaction.

### **References**

1. Fundamentals of Data Structures in C++: Horowitz, Sahni & Mehta, Galgotia publications
2. Fundamentals of Database Systems: Elmasri & Navathe, Pearson Education Asia
3. File Structures an Object-Oriented Approach with C++: Folk, Zoellick, Riccardi, Pearson Education Asia.
4. Data Structures using C & C++: Langsam, Augenstein & Tanenbaum, Pearson Education Asia
5. Data Structures, Algorithms and Applications in C++: Sahni Galgotia publications
6. Data structures & Program design in C: Robert Kruse Pearson Education Asia

# LANGUAGE PROCESSORS

RT 505

3+1+0

## Module 1 Assembler

Overview of the assembly process - Design of two pass assembler- Single pass assembler- Macros – Macro definition and usage- schematics for Macro expansion – Design of a Macro pre-processor - Macro Assembler.

## Module 2 Introduction to Compilers

Compilers and Translators – Structure of a compiler – lexical analysis – syntax analysis – context free grammars – basic parsing techniques- top down and bottom up parsing (brief idea only)- Recursive Decent parser – Shift reduce parser.

## Module 3 Storage allocation

Data descriptors- Static and Dynamic storage allocation – Storage allocation and access in block structured programming languages – Array allocation and access- Compilation of expressions – Handling operator priorities – Intermediate code forms for expressions –code generator.

## Module 4 Compilation of Control Structures

Control transfer- Conditional and Iterative constructs- Procedure calls – Code optimization – Optimization transformations – Local optimization and global optimization – Compiler writing tools – Incremental Compilers

## Module 5 Loaders and Linkers

Loading – Program relocatability – linking – various loading schemes – linkage editing – Design of linkage editor – dynamic loading – overlays – dynamic linking.

## Text Book

1. System Programming and Operating Systems - Dhamdhare Mc Graw Hill
2. Principles of Compiler Design - Aho A.V., Ullman Narosa Publications.

## References

1. Systems programming - Donovan, Mc. Graw Hill.
2. System Software - An Introduction to Systems Programming- Leland L. Beck, Addison Wesley.
3. Compilers Principles Techniques And Tools Aho, Sethi, Ullman, Pearson Education Asia

## **DATA COMMUNICATION**

**RT 506**

**2+1+0**

### **Module 1**

Communication concepts – Analog modulation – Various schemes – AM, PM, FM – Sampling theorem - Analog pulse modulation – PAM, PWM, PPM – Generation of various modulated waves (Block diagram only) – Digital Pulse modulation (PCM).

### **Module 2**

Multiplexing - Frequency Division Multiplexing (FDM) – Time Division Multiplexing (TDM), Synchronous Time Division Multiplexing – Statistical time Division multiplexing – Key Techniques - ASK, FSK, PSK, DPSK - Channel capacity - Shannon`s Theorem.

### **Module 3**

Digital data transmission – Serial, Parallel, Synchronous, Asynchronous and Isochronous transmission. Transmission mode- Simplex - Half duplex – Full duplex, Noise- different types of noise – Basic Principles of Switching (circuit, packet, message switching)

### **Module 4**

Error detection and Correcting codes: Hamming code – Block codes and convolution codes – ARQ techniques – Transmission codes – Baudot – EBCDIC and ASCII codes – Barcodes.

### **Module 5**

Terminal handling – Point to point, Multidrop lines. Components of computer communication – Concentrators - Front end Processor – Transmission media – Guided media – Twisted pair cable, coaxial cable, fibre optic cable. GSM service and GSM system architecture.

### **References**

1. Electronic communication system - Kennedy, Mc Graw Hill.
2. Principles of Communication System- Taub & Schilling Mc Graw Hill.
3. Introduction to Data Communications & Networking - Behrouz & Forozan Mc Graw Hill.
4. Data Communication, Computer Networks & Open Systems - Fred Halsall Pearson Education Asia
5. Principles & Application of GSM. - Vijay K. Garg Pearson Education Asia
6. Modern Digital & Analog Communication Systems – B.P Lathi Prism Books Pvt. Ltd.
7. Computer Networks - A.S. Tanenbaum, PHI
8. Data and Computer Communication - William Stallings, Pearson Education Asia
9. Communication Engineering - A. Kumar, Umesh Publications

## **MICROPROCESSOR LAB**

**R507**

**0+0+4**

1. Familiarization of training kits.
2. Simple programs for Arithmetic and Data Transfer.
3. Study of MASM Programming.
4. Programming Peripheral Controllers.
5. Interfacing the Trainer Kit.
6. Any experiment according to the syllabus R302 can be substituted

## **DATABASE LAB**

**R508**

**0+0+4**

Experiments for performing the following:

1. Creation, insertion, updation, deletion of tables, indexes, views
2. Simple queries, nested queries, use of arithmetic and string functions.
3. Simple PL/SQL programs, use of exceptions, savepoints, cursor, procedure, function, trigger, sequence generator.
4. Importing and Exporting data.
5. Database Administration
6. ODBC/JDBC Interface.
7. Implementation of File Structures

Any experiment according to the syllabus of RT503 can be substituted.

