EN010501 B Engineering Mathematics IV

(CS, IT)

Teaching scheme **Credits: 4**

2 hours lecture and 2 hour tutorial per week

Objectives: *To use basic numerical techniques for solving problems and to know the importance of learning theories in mathmatics and in queueing system.*

MODULE 1 Finite differences (12 hours)

Finite difference operators $\Delta, \nabla, E, \mu \quad \delta$ - interpolation using Newtons forward and backward formula – Newton's divided difference formula - Numerical differentiation using Newtons forward and backward formula – Numerical integration – Trapezoidal rule – Simpsons $1/3^{rd}$ and $3/8^{th}$ rule

MODULE 2 **Z** transforms (12 hours)

Definition of Z transforms – transform of polynomial function and trignometric functions – shifting property , convolution property - inverse transformation – solution of 1^{st} and 2^{nd} order difference equations with constant coifficients using Z transforms.

MODULE 3 Discrete numeric functions (12 hours)

Discrete numeric functions – Manipulations of numeric functions- generating functions – Recurrence relations – Linear recurrence relations with constant coefficients – Homogeneous solutions – Particular solutions – Total solution – solution by the method of generating functions.

MODULE 4 Complex integration (12 hours)

Functions of complex variable – analytic function - Line integral – Cauchy's integral theorem – Cauchy's integral formula – Taylor's series- Laurent's series – Zeros and singularities – types of singularities – Residues – Residue theorem – evaluation of real integrals in unit circle – contour integral in semi circle when poles lie on imaginary axis.

MODULE 5 Queueing Theory (12 hours)

General concepts – Arrival pattern – service pattern – Queue disciplines – The Markovian model M/M/1/∞ , M/M/1/N – steady state solutions – Little's formula.

References

1. C.L.Liu and D.P. Mohapatra – Elements of Discrete Mathematics - Mc Graw Hill
2. S.Lipschutz, M.L.Lipson – Discrete mathematics –Schaum's outlines – Mc Graw Hill
3. B.V. Ramana - Higher Engg. Mathematics – McGraw Hill
4. Babu Ram – Engg. Mathematics -Pearson.
5. K Venkataraman- Numerical methods in science and Engg -National publishing co

6. V. Sundarapandian - probability ,Statistics and Queueing theory - PHI
7. S.Bathul – text book of Engg.Mathematics – Special functions and complex variables –PHI
8. H. Weif HSU – probability, random variables & Random processes – Schaum's out lines - Mc Graw Hill
9. T.Veerarajan - probability ,Statistics & Random processes - Mc Graw Hill
10. H.C.Taneja – Advanced Engg. Mathematics Vol II – I.K.International

EN010 502(ME): Principles of Management

(Common with EN010 402(ME))

Teaching scheme **Credits:** 4

3 hours lecture and 1 hour tutorial per week

Objectives

- *To develop an understanding of different functional areas of management.*
- *To understand the functions and duties an individual should perform in an organisation.*

Module I (12 hours)

Management Concepts: Vision, Mission, Goals and Objectives of management-MBO-Scientific management- Functions of management- Planning- Organizing- Staffing-Directing- Motivating- Communicating- Coordinating- Controlling- Authority and Responsibility- Delegation- Span of control- Organizational structure- Line, Line and staff and Functional relationship.

Module II (12 hours)

Personnel Management: Definition and concept- Objectives of personnel management-Manpower planning- Recruitment and Selection of manpower- Training and development of manpower- Labour welfare- Labour turnover- Quality circle- Industrial fatigue- Industrial disputes-Method of settling disputes- Trade unions.

Module III (12 hours)

Production management: Objectives and scope of production management- Functions of production department- production management frame work- product life cycle-Types of production- Production procedure- Project planning with CPM and PERT- Basic concepts in network.

Module IV (12 hours)

Financial Management: Objectives and Functions of Financial Management- Types of Capital- Factors affecting working capital- Methods of financing.
Cost Management: Elements of cost- Components of cost- Selling Price of a product.

Module V (12 hours)

Sales and Marketing Management: Sales management- Concept- Functions of sales department- Duties of sales engineer- Selling concept and Marketing concept- Marketing-Definition and principles of marketing- Marketing management and its functions- Sales forecasting- Pricing- Advertising- Sales promotion- Channels of distribution- Market research.

Text Books

1. Koontz and Weihrich, *Essentials of Management*, Tata McGraw Hill.
2. Mahajan M., *Industrial Engineering and Production Management*, Dhanpat Rai and Co.
3. Kemthose and Deepak, *Industrial Engineering an Management*, Prentice Hall of India.

Reference Books

1. Martand Telsang, *Industrial Engineering and Production Management.*
2. Khanna O.P., *Industrial Engineering and Management*, Dhanpat Rai and Co.
3. Philip Kotler, *Marketing Management*, Prentice Hall of India.
4. Sharma S. C. & Banga T. R., *Industrial Organisation and Engineering Economics*, Khanna Publishers.
5. Prasanna Chandra, *Financial Management*, Tata McGraw Hill.

CS010 503: Database Management Systems
(Common with IT010 506)

Teaching scheme **Credits:** 4
2 hours lecture and 2 hours tutorial per week

Objectives

- *To impart an introduction to the theory and practice of database systems.*
- *To develop basic knowledge on data modelling and design of efficient relations.*
- *To provide exposure to oracle database programming.*

Module I (10 hours)

Basic Concepts - Purpose of Database Systems- 3 Schema Architecture and Data Independence- Components of DBMS –Data Models, Schemas and Instances-Data Modeling using the Entity Relationship Model-Entity types, Relationship Types, Weak Entity Types .

Module II (14 hours)

Relational Model Concepts –Constraints – Entity Integrity and Referential Integrity, Relational Algebra -Select, Project, Operations from Set Theory, Join, OuterJoin and Division - Tuple Relational Calculus.

SQL- Data Definition with SQL - Insert, Delete and Update Statements in SQL, Defining Domains, Schemas and Constraints, Constraint Violations - Basic Queries in SQL - Select Statement, Use of Aggregate functions and Group Retrieval, Nested Queries, Correlated Queries – Views.

Module III (12 hours)

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 - Assertions – Triggers.

Indexing and Hashing Concepts -: Ordered Indices, Hash Indices, Dense and Sparse Indices, Multi Level Indices, Cluster Index, Dynamic Hashing.

Module IV (11 hours)

Database Design– Design Guidelines– Relational Database Design – Functional Dependency- Determination of Candidate Keys, Super Key, Foreign Key, Normalization using Functional Dependencies, Normal Forms based on Primary keys- General Definitions of First, Second and Third Normal Forms. Boyce Codd Normal Form– Multi-valued Dependencies and Forth Normal Form – Join Dependencies and Fifth Normal Form – Pitfalls in Relational Database Design.

Module V (13 hours)

Introduction to Transaction Processing- Transactions- ACID Properties of Transactions- Schedules- Serializability of Schedules- Precedence Graph- Concurrency Control – Locks and Timestamps-Database Recovery

Query processing and Optimization- Translating SQL Queries into a Relational Algebra Computing Select, Project and Join

Object Relational Databases-Distributed Databases-Different Types-Fragmentation and Replication Techniques-Functions of DDBMS.

Reference Books

1. Elmsari and Navathe, *Fundamentals of Database System,* Pearson Education Asia, 5th Edition, New Delhi, 2008.
2. Henry F Korth, Abraham Silbershatz , *Database System Concepts*, Mc Graw Hill 6td Edition, Singapore, 2011.
3. Elmsari and Navathe, *Fundamentals of Database System,* Pearson Education Asia, 3rd Edition, New Delhi,2005, for oracle
4. Alexis Leon and Mathews Leon, *Database Management Systems,* Leon vikas Publishers, New Delhi.
5. Narayanan S, Umanath and Richard W.Scamell, *Data Modelling and Database Design,Ce*ngage Learning, New Delhi, 2009.
6. S.K Singh,*Database Systems Concepts,Design and Applications,* Pearson Education Asia, New Delhi, 2006.
7. Pranab Kumar Das Gupta, *Datbase management System Oracle SQL And PL/SQL,* Easter Economy Edition, New Delhi, 2009
8. C.J.Date , *An Introduction to Database Systems,* Pearson Education Asia, 7th Edition, New Delhi.
9. Rajesh Narang, *Database Management Systems,* Asoke K ghosh , PHI Learning, New Delhi, 2009.
10. Ramakrishnan and Gehrke, *Database Management Systems*, Mc Graw Hill, 3rd Edition , 2003.
11. Peter Rob and Carlos Coronel, *Database Systems*, Thomson Course Technology, 7th Edition, 2007.
12. Satinder Bal Guptha and Adithya Mittal, *Introduction to Database Management System*, University Science Publishers, New Delhi, 2010.
13. Patrick O'Neil and Elizabeth O'Neil, *Database Principles, Programming and Performance*, Morgan Kaufmann, 2nd Edition, New Delhi,2010 .
14. Ramon A Mata-Toledo and Pauline K Cushman, Schaum's OUTlines *Database Management Systems,* Tata Mc Graw Hill , New Delhi, 2007.
15. Michel Kifer, Philip M. Lewis, Prabin K .Panigrahi and Arthur Bernstein, *Database Systems An Application Oriented Approach*, Pearson Education Asia, 2nd Edition, New Delhi, 2008.

Mahatma Gandhi University

CS010 504 DIGITAL SIGNAL PROCESSING

Teaching scheme **Credits:** 4

3 hours lecture and 1 hour tutorial per week

Objectives:-

To introduce the principles and core areas of Signal Processing, in a programmatic approach and explore the basic ideas on the applications of DSP in various fields of Science and Technology.

Pre-requisites:

CS 010 404 Signals and Communication Systems

Module 1: (15 Hrs)

Basic Concepts of DSP Systems:- Review of Continuous Time Signals and Discrete Time Signals, Elementary Discrete Signals, Operations on Discrete Signals- Operations on Independent and Dependent Variable(s)- Convolution Sum, Discrete Systems, Properties of Discrete Systems, Response of LTI Systems ,Z-Transforms- Definition, Properties and Illustrative Examples, System Function, Discrete Time Fourier Transform(DTFT)- Definition, Properties and Illustrative Examples, Frequency Response

Module 2: (15 Hrs)

Discrete Fourier Transform(DFT): -Definition, Properties and Illustrative Examples, Relation between DFT, DTFT and Z Transforms, Complexity of DFT calculation, Divide & Conquer – Fast Fourier Transform (FFT)- Radix 2 Decimation in Time (DIT) and Decimation in Frequency (DIF)Algorithms, Composite Point DFT Computation, Circular convolution- Computation of Circular Convolution using DFT, Discrete Cosine Transform, ,Finite Word Length effects in DFT Computation

Module 3(12Hrs)

Digital Filter Design:- Need of Digital Filters, Types of Digital Filters- Theoretical and Realizable Frequency responses of Low Pass, High Pass, Band Pass and Band Stop Filters. Filter Design Specifications

Finite Impulse Response Filter:- FIR Filters with Linear Phase, Need of Linear Phase, Frequency response of Linear Phase FIR Filters, FIR Filter Design Methods- Fourier Series Method – Gibb's Phenomenon, Window Method- Design of FIR Filters using Rectangular, Triangular,Hamming, Hanning, Blackmann and Kaiser Windows, Frequency Sampling Method. Realization of FIR Filter- Direct, Linear Phase and Cascade Realisations.Finite Word Length effects in FIR Filter Design

Module 4: (10 Hrs)

Infinite Impulse Response Filters:- Steps in IIR Filter Design, Conversion of Analog Filter to Digital Filter- Impulse Invariant and Bilinear Transformations, Analog Filter Design Approximations- Butterworth and Chebyshev Approximations., Realization of IIR Filter- Direct, Cascade and Parallel Realizations. Finite Word Length effects in IIR Filter Design.

Module 5(8 Hrs)

Introduction to DSP Chips: - Basic Architecture of a DSP chip, Case Study: TMS 320, TigerSHARC Processors (Overview of Architecture and Features)

Applications of DSP:- Audio Signal Processing and Compression, Image Processing- JPEG Compression,Video Compression, Speech Processing and Recognition, Weather Forecasting, RADAR, (Brief idea only)

*Note: While discussing the Topics on Frequency response, DFT, Design of FIR and IIR Filters, illustrative example programs **must** be developed in **MATLAB/SCILAB** .*

Reference Books

1. Digital Signal Processing Andreas Antoniou Tata McGrawHill
2. John G. Proakis, Dimitris G. Manolakis, Digital Signal Processing: Principles, Algorithms and Applications, Prentice Hall of India Pvt. Ltd., 1997
3. Digital Signal Processing , A Computer Based Approach- S.K. Mithra TataMcGraw Hill
4. Oppenheim A. V., Schafer R. W., Discrete-Time Signal Processing, PrenticeHall/Pearson.

CS010 505: Operating Systems

(Common with IT010 504)

Teaching scheme **Credits:** 4

3 hours lecture and 1 hour tutorial per week

Objectives

- *To understand the fundamental concepts and techniques of Operating Systems.*
- *To study the basic structure of Linux system.*

Module I (8 hours)

Introduction: Operating System – Batch, Multiprogrammed, Time-sharing and Real time systems – Operating system structure – Operating system operations

System Structures: Operating system service – System calls – System Programs – System structure – Simple structure, Layered approach – Kernel, Shell.

Module II (12 hours)

Process Management: Process concept – Process state, PCB – Process scheduling – Operations on processes – Interprocess communication – Multithreading –Benefits, Models

Process Scheduling: Basic concepts – Preemptive scheduling, Dispatcher – Scheduling criteria – Scheduling algorithms – Multiple-processor scheduling.

Module III (16 hours)

Process Synchronization: The Critical-Section problem – Peterson's solution – Synchronization Hardware – Semaphores – Classic problems of synchronization – Monitors

Deadlocks: System model – Deadlock characterization – Methods for handling deadlocks – Prevention, Avoidance and Detection – Recovery from deadlock.

Module IV (14 hours)

Memory Management: Resident Monitor – Dynamic loading – Swapping – Contiguous memory allocation – Paging – Basic, Multi-level Paging – Segmentation

Virtual Memory – Demand Paging – Page Replacement algorithms – Allocation of Frames – Thrashing – Cause of thrashing.

Module V (10 hours)

File System: File concept – Access methods – Directory structure – Directory implementation – Linear list, Hash table – Disk scheduling

Case study: Linux system.

Reference Books

1. Abraham Silberschatz, Peter B.Galvin and Greg Gagne, "*Operating System Concepts*", John Wiley & Sons Inc, 8th Edition 2010.
2. D M Dhamdhere, "*Operating Systems A Concept-based Approach"*, Tata McGraw Hill, New Delhi, 2nd Edition, 2010.
3. Achyut S Godbole, *"Operating Systems"*, Tata McGraw Hill , New Delhi, 2nd Edition, 2009.
4. Elmasri, Carrick, Levine, "*Operating Systems A Spiral Approach"*, Tata McGraw Hill, New Delhi, First Edition 2010.
5. Gary Nutt, "Operating Systems", Second Edition, Addison Wesley, 2003.
6. Andew S. Tanenbaum, "*Modern Operating*", Pearson Education, Second Edition, 2001.
7. Promod Chandra P.Bhatt, "*An introduction to Operating Systems Concepts and Practice"*, PHI, New Delhi, Third Edition, 2010
8. B Prasanalakshmi, "*Computer Operating System*", CBS Publishers, New Delhi, First Edition, 2010
9. D P Sharma, "Foundation of *Operating Systems"*, EXCEL BOOKS, New Delhi, First Edition 2008
10. Brian L Stuart, "*Operating Systems Principles, Design and Applications"*, Cengage Learning, New Delhi, First Edition 2009.
11. Charles Crowley, "*Operating Systems A Design Oriented Approach"*, Tata McGraw Hill, New Delhi, First Edition 2009.
12. Pabitra Pal Choudhaury, " *Operating Systems Principles and, Design"*, PHI, New Delhi, First Edition, 2009

CS010 506: Advanced Microprocessors & Peripherals

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Objectives

- *To understand the concepts related to advanced microprocessors.*
- *To study the basic technology of various peripherals.*
- *To have an overview of different types of communication buses and ports.*

Module I (15 hours)
8086 Architecture, Block diagram – Addressing modes – Instructions set of 8086 – data transfer – arithmetic – branch – loop – flag manipulation – shift & rotate – string instructions – writing simple program in 8086.

Module II (9 hours)
Additional features of 80286 – protected mode memory addressing – Additional features of 80386 – Paging mechanism (Flat memory model) – Additional features of Pentium Processors – Brief study of latest processors of Intel & AMD – Dual core processor(Brief idea only) .
Note: Architecture not required for the processors discussed in this module.

Module III: Peripherals (11 hours)
Study of motherboards – Different types of ports, slots and connectors – Processor Bus, AGP, PCI – Add-on cards – USB – Hard Disk Interfaces – IDE, ATA, Power supply – SMPS – function & operations.

Module IV: Storage Devices (15 hours)
Magnetic data storage: Principles – Hard disks – Cylinders – Clusters – Tracks and Sectors – Disk formatting – Partitioning – Hard disk drive operation – Data Transfer rates – Data addressing – CHS addressing – Logical Block Addressing.
Optical storage: CD Technology, CD ROM, CD-R, CD-RW, Interface – Magneto optical drives – DVD – RAID – Blu-ray disc.

Module V (10 hours)
Memory: Parity – ECC – Memory Addressing – 640 KB barrier – Extended and Expanded memory – HMA – Video memory – Flash Memory – Pen drive – Advanced memory technologies.

Reference Books

1. A K Ray, K M Bhurchandi, "*Advanced Microprocessors and Peripherals*", Tata McGraw Hill, New Delhi, 2nd Edition, 2010.
2. Craig Zacker & John Rourke, "*PC Hardware: The Complete Reference*", Tata McGraw Hill, New Delhi, First Edition, 2001.
3. Barry B.Brey, "*The Intel Microprocessors*", PHI, New Delhi, Sixth Edition, 2004.
4. Nilesh B. Bahadure, "Microprocessors", PHI, New Delhi, First Edition, 2010.
5. K.K Tripathi, Rajesh K Gangwar, "*Microprocessor and Its Application*", Acme Learning,2010
6. Douglas V Hall, "*Microprocessors and Interfacing*", Tata McGraw Hill, New Delhi, 2nd Edition, 2006
7. Scott Mueller, "*Upgrading and Repairing PC's*", Pearson Education, 17th Edition, 2006
8. Stephen J.Bigelow, "*Troubleshooting, Maintaining and Repairing PC's*", Tata McGraw Hill, New Delhi, 5th Edition, 2001

CS010 507 Database Lab

Teaching scheme **Credits:** 2
3 hours practical per week

Objectives

- *To acquaint the students with the implementation and fundamental algorithms of database systems.*
- *To provide experience on design, querying, and processing of data in a relational database.*

I. Experiments to implement the following

1. Relational algebra operations select, project and join.
2. Determination of Attribute Closure, Candidate Key, Functional Dependency.
3. Checking Serializability of a Schedule.
4. Dynamic Hashing.

II. Experiments in any relational database for 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, Cursor, Procedure, Function, Trigger, Sequence.
4. Report Generation
5. ODBC/JDBC Interface.

Any experiment according to the syllabus of CS010 503 can be substituted.

Resources:
1 SQL,PL/SQL"Ivan Bayross", BPB Publication 3rd Ed.

CS010 508: Hardware and Microprocessors Lab

Teaching scheme **Credits:** 2
3 hours practical per week

Objectives

- *To acquaint the students with the implementation and fundamental algorithms of database systems.*
- *To provide experience on design, querying, and processing of data in a relational database.*
- *To familiarise the students with 8085,8086,masm programming and various PC hardware components*
- *To provide experience on design, querying, and processing of data in a relational database.*

Phase I

1. Familiarization of 8085 training Kit.

2. Simple programs using 8085 Kit.

Phase II

3.Study of MASM Programming.

4.Simple programs in 8086 using MASM.

Phase III.

5.Familiarisation with PC Components.

6.Experiments based on various hardware components.

7.Experiments for communication with peripheral devices using C and MASM

NB: Students should do the experiments in all the phases. External examiner can conduct University Examinations on any of these phases.