Veer Narmad South Gujarat University

Ph.D. / M.Phil. Course Work

Computer Science

Paper	Subject	Mark
I	Research Methodology	100
Electives	ANY TWO from Following	200
I	Advanced Web Technology	
II	Operating System	
III	Database Management System	
IV	Object Oriented Programming Methodology	
V	Digital Image Processing	
Dissertation		400

Paper – I Research Methodology

UNIT – I

Meaning and objectives of research, motivation in research, types of research, research methods VS research methodology, how research is done, criteria of good research, defining a research problem, selection of a research problem, research design and its need,

UNIT – II

Report writing, significance of report writing, steps in report writing, layout of research; figures, tables, graphs, references, foot notes etc. presentation of research, art of writing a good research paper, selection of a journal for paper publication,

UNIT – III (MATLAB-I)

Introduction to MATLAB, MATLAB data types, Arrays and array operations, Expressions in MATLAB, Declaration of variables and numbers, Logical and relational operators, Functions (inbuilt and used defined), Data analysis, String manipulation, Programming in MATLAB, Plotting in MATLAB -Two and three dimensional plotting, Various options for plotting, Property editor, Problem solving techniques, Graphical and tabular representation of results

UNIT IV (MATLAB – II)

Matrix manipulation, Addition and multiplication of matrices, Matrix inversion, Eigenvalues and eigenvectors of matrices, Solving problems containing matrices, function writing, Tools

boxes like; Optimization toolbox, Genetic Algorithms toolbox, Fuzzy logic toolbox, Digital Signal Processing toolbox, Image Processing toolbox, Neural Networks toolbox

UNIT – V

Latest developments in Computer Science

References

[1] Kothari, C. R., Research Methodology -methods and techniques, 2nd Edition,Wishwa Prakashjan, Newdelhi. 1999.
[2] 2. Berny, H. Durston, M. Poole, "Thesis and Assignment writing", Wiley Eastern Ltd, ND,
[3] 3. Misra, R P, Research Methodology - A Hand Book , Concept publishing Company, New Delhi, 1988.
[4] Y. Kirani Singh, B.B. Chaudhuri, Matlab Programming,PHI EEE, 2007
[5] Amos Gilat, MATLAB An introduction with applications, Wiley India Edition,
[6] John H. Mathews, Kurtis D. Fink, Numerical Methods using MATLAB, Fourth Edition, PHI EEE
[7] Alasdair Mc Andrew, Introduction to Digital Image Processing with MATLAB, Cengage Learning

Elective I : Advanced Web Technology

Unit - 1

Introduction to Advanced Web Technology, The World Wide Web, WWW Architecture, Web Search Engines,Web crawling,Web indexing,Web Searching

Unit - 2

Web Technologies like Java, Microsoft .Net technology and Open source PHP, Comparison of Performance, Security, System Resource Requirement etc. in various Web technologies

Unit – 3

Advance Concepts in Web Technologies, **Java:** Swing, Threading, Basic XML processing in XML, Web Services etc. **Asp .Net :** Silverlight, WCF ,WPF ,LINQ ,AJAX, Web Services ,MVC pattern , jquery etc. , **PHP :** Ajax ,Jquery ,GD library ,Web Services ,Template based programming etc. , Basic concept of Service Oriented Architecture (SOA)

Unit - 4

Recent Trends in Markup Languages

Reference Books :

1. Java Programming Advance Topics – Joe Wigglesworth and Paula Lumby - Thomson Learning
2. Java Server and Servlets : Building Portable Web Applications – Peter Rossbach & Hendrick Schreiber – Addition Wesley
3. Special Edition Using ASP.NET – Richard Leinecker – Pearson Education.
4. PHP and MySQL Bible – Tim Converse and Joyce Park with Clark Morgam By Wiley INDIA
5. PHP MySQL Website Programming - Chris Lea, Mike Buzzard, Jessey White-Cinis & Dilip Thomas - Wrox Press Inc

Elective II : Operating Systems

UNIT – I

Process management, memory management, File system, I/O management, security

UNIT - II

Multiprocessor, multiprocessor operating system types, multiprocessor, synchronization, scheduling

UNIT – III

Multicomputers, Architecture of distributed systems, Distributed resource management

UNIT – IV

Comparative study of operating systems, Memory management, File system, security

Reference Books:

1. Modern Operating Systems by Andrew S. Tanenbaum, Pearson Edu./PHI, 3rd edition
2. Advanced Concepts In Operating Systems, Mukesh Singhal**,** Niranjan Shivaratri, Tata McGraw Hill
3. Distributed Operating Systems by Tanenbaum, Pearson.
4. Operating Systems: A Concept-based Approach by Dhamdhere, TMH
5. Unix Concepts and Application - Das – McGrawHill

Elective III : Database Concepts and Knowledge Management

UNIT - I

Introduction of Various Types of File Organizations, Serial Files, Sequential Files

Index Sequential Files, Direct Files, File Organization, Organization of Records in Files, Data Dictionary Storage

UNIT - II

Introduction to Indexing & Hashing, Ordered Indices, Dense & Sparse Indices,Multi Level Indices, Index Update, Secondary Indices, Indices on Multiple Keys, B^+ Tree Index Files, Structure of a B^+ Tree, Queries on B^+ Trees, Updates on B^+ Trees (Insertion & Deletion), B-Tree Index Files, Static Hashing, Hash Functions, Handling of Bucket Overflows, Hash Indices,Dynamic Hashing, Data Structure, Queries & Updates, Bitmap Indices, Index Definition in SQL

UNIT - III

Query Optimization overview, Transformation of Relational Expressions, Equivalence Rules, Join Ordering, Estimating Statistics of Expression Results, Catalog Information,

Selection Size Estimation, Join Size Estimation, Size Estimation for Other Operations, Choice of Evaluation Plans, Cost Based Join Order Selection, Cost Based Optimization with Equivalence Rules

UNIT - IV

Recent Trends in Database, Introduction to Data Warehousing & Mining, Introduction to Spatial & Temporal Data, Technical Comparison of at least Two Current DBMS & RDBMS Packages(Broadly on parameters like locking, concurrency, parallel execution, performance, indexing, partitioning, clustering etc.)

Reference Books:

1. Database System Concepts, H. F. Korth, S. Sudarshan, A. Silberschatz, McGraw Hill
2. Database Systems, Models, Languages, Design & Application Programming, R. Elmasri, S. B. Navathe, Pearson
3. Database Systems, A Practical Approach to Design, Implementation & Management, T. Connolly, C. Begg, Pearson
4. An Introduction to Database Systems, Bipin Desai, Galgotia Publication
5. Database Systems, Design, Implementation & Management, Peter Rob, Carlos Coronel, Cengage Learning
6. Database Processing Fundamentals, Design & Implementation, David M. Kroenke, PHI

Elective IV : Object Oriented Programming Methodology

UNIT - I

Overview of Object Oriented Properties, Introduction to Object Oriented Analysis & Design, Introduction to Object Oriented Database Management Systems

UNIT - II

Comparison of Object Oriented Languages (C ++, Java, VB.Net) with regards to Encapsulation, Abstraction, Inheritance, Static Polymorphism, Dynamic, Polymorphism, Genericity, Persistence

UNIT – III

Object Modeling Techniques, Links and Associations, Classification of Object,

Aggregation & Generalization, OMT Models, Introduction & Overview of UML,

Comparison of recent Object Modeling Techniques

UNIT - IV

Object Oriented Database Management System (OODBMS), Impedance Mismatch, Object Persistence Framework, Advantages of OODBMS over other RDBMS and ORDBMS, Comparison of currently available OODBMS

Reference Books :

1. The C++ Programming Language, Stroustrup, Addison Wesley
2. The Complete Reference C++, Schildt, Tata McGraw Hill
3. OOP in Tourbo C++, Robert Lafore, Galgotia Publication
4. C++ Primer, Lippman, Addition Wesley
5. Object Oriented Modelling & Design, Rumbaugh, PHI
6. Object Oriented Analysis & Design with Application, Grady Booch, LPE
7. Object Oriented Programming with Visual Basic .Net , J P Hamilton, O'Reilly
8. Object Oriented Programming in Visual Basic .Net, Alastair McMonnies, Addison Wesley Longman
9. Java- The Complete Reference, Patrick Naughton, Tata McGraw Hill

Elective V - Digital Image Processing

Unit I - Digital Image Fundamentals

Introduction, Digital Image representation, Fundamentals of Image processing, Elements of Digital Image Processing system, Applications. Sampling and Quantization,. Elements of visual perception, a simple image model, Sampling and quantization, Some basic relationships Basic Relationship among pixels-neighbor, connectivity, regions, boundaries, distance measures

Unit II - Image Transformation and Image Enhancement

Introduction to the Fourier Transform, The Discrete Fourier Transform, some properties of the Two - Dimensional Fourier Transform, The fast Fourier Transform.
Image Enhancement - Image Enhancement in spatial model, mask based processing , histogram processing, enhancement in frequency domain

Unit III - Image Restoration, Image Compression and Colour Processing

Degradation Model, Degradation functions, Noise Models, Signal – to noise ratio, Restoration Models, Discrete formation, Inverse filtering, Least mean square (wiener) filter, Constrained least squares Restoration, Interactive Restoration.
Image Compression **-** Image compression fundamentals, Image compression models, Image compression standards.
Color fundamentals, Color models, The RGB, CMY, CMYK, HSI model, Pseudo color Image processing, Color Transformations, Smoothing and sharpening, Color segmentation.

Unit IV - Edge Detection, and Image Segmentation

Introduction to Edge Detection, Edge Detection Techniques, First and Second order of detection, Finite difference edge detectors
Segmentation; Detection of discontinuities, Edge linking and boundary detection, Thresholding, Region base segmentation,

Reference Books

1. Digital Image Processing – Gonzalez and Woods, 3rd Edition, Pearson Education Publication
2. Digital Image Processing Using MATLAB- Gonzalez, Woods, Eddins, 2nd Edition, McGraw Hill
3. Digital Image Processing – B.Chanda, D.Dutta and Majumdar, Analysis ,PHI Publication
4. Digital Image Processing and Pattern Recognition – Malay K. Pakhira, PHI
5 Introduction to Image Processing - Alasdair McAndrew, Cengage Learning
6. Digital Image Processing and Computer Vision – Sonka, Klavac, Boyle, Cengage Learning