## Syllabus of (M. Phil Computer Science) DDE, BRABU, Muzaffarpur

**SEMESTER – I (M. Phil)**

| Sr. | SUBJECT CODE | NAME OF THE SUBJECT | Teaching Scheme | | Examination Scheme | |
|---|---|---|---|---|---|---|
| | | | Theory | Practical | Theory | Practical |
| 1 | MPCS-01 | Research Methodologies for Quality, relevant and consistent research | 2 | | 100 | |
| 2 | MPCS-02 | Data Warehousing and Data Mining | 2 | 2 | 70 | 30 |
| 3 | MPCS-03 | Web Technologies and Services | 2 | 2 | 70 | 30 |
| | | TOTAL | 6 | 4 | 240 | 60 |

**SEMESTER – II (M. Phil)**

| Sr. | SUBJECT CODE | NAME OF THE SUBJECT | Teaching Scheme | | Examination Scheme | |
|---|---|---|---|---|---|---|
| | | | Theory | Practical | Theory | Practical |
| 1 | MPCS-04 | Elective-I | 1 | 2 | 50 | 50 |
| 2 | MPCS-05 | Elective-II | 1 | 2 | 50 | 50 |
| 3 | MPCS-06 | Project Work | - | 2 | - | 200 |
| | | TOTAL | 2 | 6 | 100 | 300 |

**Elective I**

(A) Software Technologies
(B) Knowledge Management Techniques
(C) Digital Image Processing and Multimedia Systems

**Elective II**

(A) Advanced Networking and Security Systems
(B) Data Structures and Algorithms
(C) Advanced Computer Techniques

**SEMESTER-I**

**Paper 1 (MPCS- 01) Research Methodology**

**Course Content:**

**UNIT - I**

Research – Definition – Importance and Meaning of research – Characteristics of research – Types of Research – Steps in research – Identification, Selection and formulation of research problem – Research questions – Research design – Formulation of Hypothesis – Review of Literature.

**UNIT – II**

Sampling techniques sampling theory – types of sampling – Steps in sampling – Sampling and Non-sampling error – Sample size – Advantages and limitations of sampling. Collection of Data : Primary Data – Meaning – Data Collection methods – Secondary data – Meaning – Relevances, limitations and cautions.

**UNIT – III**

Statistics in Research – Measure of Central tendency – Dispersion – Skewness and Kurtosis in research. Hypothesis – Fundamentals of Hypothesis testing – Standard Error – Point and Interval estimates – Important Non-Parametric tests : Sign, Run, Kruskal – Wallis tests and Mann-Whitney test.

**UNIT – IV**

Para metric tests : Testing of significance – mean, Proportion, Variance and Correlation – testing for Significance of difference between means, proportions, variances and correlation co-efficient. Chi-square tests – ANOVA – One-way and Two-way.

**UNIT – V**

Research Report : Types of reports – contents – styles of reporting – Steps in drafting reports – Editing the final draft – Evaluating the final draft.

**Reference Books**

1. Statistical Methods - S.P. Gupta

2. Research Methodology Methods and Techniques - C.R. Kothari
3. Statistics (Theory and Practice) - B.N. Gupta
4. Research Methodology Methods and Statistical Techniques - Santosh Gupta

**Paper 2 ( MPCS- 02 ) Data Warehousing and Data Mining**
**Course Content:**

**UNIT - I**

**Fundamentals of data mining:** Data mining Functionalities, Classification of Data Mining Systems, Major issues in Data Mining, Data Warehouse and OLAP Technology for Data mining Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse implementation, Development of Data Cube Technology.

**UNIT - II**

**Data Preprocessing, Data Mining Primitives, Languages, and System Architectures:** Needs Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation. Data Mining Primitives, Data Mining Query Languages, Designing Graphical User Interfaces Based on Data Mining Query Language Architectures of Data Mining Systems.

**UNIT - III**

**Concepts Description and Mining Association Rules:** Characterization and Comparison, Data Generation and Summarization, Bases characterization, Analytical Characterization: Mining Class Comparisons, Association Rule Mining, Rules from Relational Databases and Data Warehouses.

**UNIT – IV**

**Classification, Prediction and Cluster Analysis Introduction:** Issues Regarding Classification and Prediction, Classification by Decision Tree , Classification by Back propagation, Classification Based on Concepts from Association Rule Mining , Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Density , Based Methods, Grid Based Methods, Model – Based Clustering Methods, outlier analysis, Multidimensional Analysis and Descriptive

**UNIT – V**

**Mining Complex Types of Data:** Mining of Complex, Data Objects, Mining Spatial Databases, Mining Multimedia Databases, Mining Time – Series and Sequence Data, Mining Text Databases, Mining the World Wide Web.

**REFERENCE:**

1. Data Mining - Concepts and Techniques - Jiaweihan & Micheline Kamber Morgan Kaufamann publishers.
2. Data Ming Techniques – Arjun K Pujari, Universities Press.
3. Data warehousing in the Real world Sam Anahory & Dennis Murray. Pearson Edn Asia.

**Paper 3 (MPCS- 03 ) Web Technologies and Services**

**Course Content:**

**UNIT – I**

**HTML ,DHTML and Scripting Language:** Common tags – HTML Tables and formatting internal, linking – Complex HTML forms, Java Scripts – Control structures, DHTML – CSS – event model – filters & transitions.

**UNIT – II**

**Applets and AWT Programming:** Review of Applets, Class, Event Handling, AWT Programming, Introduction to Swing: Japplet, Handling Swing Controls, Tables, Differences between AWT Controls & Swing Controls, Developing a Home page using Applets & Swing, Multi-Threading and RMI.

**UNIT – III**

**Java Beans and Servlets:** Introduction and Advantages of Java Beans, BDK, Introspection, Using Bound properties, Bean Info Interface, Constrained properties, persistence, Customizers, Java Beans API, Life Cycle of a Servlet, JSDK, The Servlet API, The javax.servlet Package, Reading Servlet parameters, Reading Initialization Parameters, The javax.servlet HTTP package, Handling, Http Request & responses, Using Cookies – Sessions Tracking, Security Issues.

**UNIT – IV**

**JSP:** Introduction to JSP: The Problem with Servlets, The Anatomy of a JSP Page, JSP Processing, JSP Application Design with MVC. Tomcat Server & Testing Tomcat, JSP Application Deployment.

**UNIT – IV**

**JDBC:** Database Access, Database Programming using JDBC, Studying javax.sql.* package, Accessing a Database from a JSP Page.

**REFERENCE:**


- Internet and World Wide Web – How to program by Dietel, and Nieto Pearson Education Asia. (Chapters: 3,4,8,9,10,11,12-18).
- The Complete Reference Java 2 third Edition by Patrick Naughton and Herbert Schildt. (Chapters: 19,20,,21,22,25,27).
- Java Server Pages by Hans Bergstan. (Chapters: 1-9).


**SEMESTER-II**

**ELECTIVE I**

**(A) SOFTWARE TECHNOLOGIES**

**Course Content:**

**UNIT – I**

**Software Management Concept:** Software process, Software project Metrics, Software project Planning, Risk Management.

**UNIT – II**

**Software Quality Assurance:** Quality Concepts, Quality Movement, Software Review, Software Quality Assurance, Formal Technical Reviews.

**UNIT – III**

**Software Testing:** Software Testing Fundaments, Test Case Design, Basic path Testing, Control Structure Testing, A Strategic approach to software.

**UNIT – IV**

**Enterprise Application Integration:** Concepts and challenges of integrating different application, Different heterogeneous platform, EAI architecture , EAI approaches data level, Application / process level , method level.

**UNIT – V**

**Messaging concepts and services:** Messaging concepts and various types of messaging services, Middleware and adapter services, Transaction middle aware, EAI process methodology

**REFERENCES:**


- Software Engineering – Roger S.Pressman , fifth edition, Mc Graw hill.


**(B.) Knowledge Management Techniques**

**Course Content:**

**UNIT – I**

**Overview of KM:** Scope and significance, techniques, difficulties (Road Map), implementation, KM and sharing, types of KM, Principles, dynamics.

**UNIT – II**

**Drivers of KM:** Pillars of KM, Seven Layers, critical success factors.

**UNIT – III**

**Essence of information technology:** Knowledge Economy, context, Association of KM with e-comm, customer relationship management, total quality management, benchmarking and reassurance of KM.

**UNIT – IV**

**KM implementation strategies:** Digital dash board, Web storage system, wireless solutions, intelligent interfaces.

**UNIT – V**

**Case Studies**

A study and development of minimum one KM initiatives of different organizations for problem solving, conflict resolution and facing turbulence through KM.

**REFERENCE:**


- Knowledge Management [Tools for business development] by Dr. B. Rathan Reddy; himalaya publishing house.
- Knowledge Management Strategies, by Jerry Honeycutt; Prentice-Hall of India.
- Sowa J. F., Knowledge Representation: Logical, Philosophical, and Computational Foundations, Brooks Cole Publishing Co., 1999.

• Gonzalez A. J., and Dankel D. D., the Engineering of Knowledge-Based Systems, Prentice Hall, 1993.

**(C.) Digital Image Processing and Multimedia Systems**

**Course Content:**

**UNIT – I**

**Digital Image fundaments and Image Transforms:** Introduction, An image model, sampling & quantization, Basic relationships between Pixels, imaging geometry, Properties of 2 – D Fourier transform, FFT algorithm and other separable image transforms, Walsh transforms,Hadamard, Cosine, Haar, Slant transforms, KL transforms and their properties.

**UNIT – II**

**Image Enhancement and Image filtering:** enhancement by point processing, histogram processing, spatial filtering and enhancement in frequency domain, color image processing, Image filtering and restoration : Algebraic approach to restoration, inverse, filtering, least mean squares and interactive restoration, geometric transformations.

**UNIT – III**

**Image compression and segmentation:** Image compression modes, error free compression, lossy compression, image, compression standards. Detection of discontinuities,edge linking and boundary detection thresholding, region – oriented segmentation, use of motion in segmentation, Representation and description: Various schemes for representation, boundary descriptors and regional descriptors, Image reconstruction from Projections, Radon Transforms; Convolution/Filter, back – Project Algorithms.

**UNIT – IV**

**Multimedia System:** Project design: setting up, requirements, navigation, storage, delivery, Authoring tools: history, comparison of different approaches, functionality and Principles, Case study: Adobe Flash - Applications (eg. kiosks, distance learning, webbased).

**UNIT – V**

**Auditory input and output:** Auditory input and output: standards and techniques - Quality of service and usability in sound.

**REFERENCE:**


• A.K.JAIN, " Fundamental of Digital Image Processing" PHI
• C.GONZALEX & R.E WOODS " Digital Image Processing " Addison Wesley
• Macromedia Flash MX 2004: The Complete Reference, Second Edition (Complete Reference)(for FLASH)
• Multimedia magic by S Gokul
• S. McGloughlin. Multimedia: Concepts and Practice. Prentice-Hall, 2001.
• N. Chapman & J. Chapman. Digital Multimedia. Wiley, Second Edition, 2004; and Digital Media Tools, 2nd or 3rd Editions, Wiley.


**ELECTIVE II**

**(A) Advanced Networks**

**Course Content:**

**UNIT – I**

**Network Tools and Techniques:** Protocol layering, system design, multiple access, switching, scheduling, naming, addressing, routing, error control; flow control, Traffic management – data link layer protocols, Internet: concept, history, network layer, transport protocol UDP, TCP, Ipv4, Ipv6

**UNIT – II**

**Local Area Networks, Socket and Interprocess communication:** Topologies, access techniques, LAN, 802.11G wireless LANs, Application layer: DNS, Email, WWW, multimedia, TCP sockets, UDP sockets name and address conversion, IPv4 / Ipv6 interoperability - Socket programming, Posix IPC, system V IPC, Pipes, FIFO, Posix message queen, System V semaphore, RPC in Sun systems. Unix programming using IPe.

**UNIT – III**

**Classical Encryption, Block Cipher and the Data Encryption Standard:** Classical Encryption Techniques : Symmetric Cipher Model, Substitution Techniques, ransportation Techniques, Rotor Machines, Steganography, Simplified DES, Block Cipher Principles, The Data Encryption Standard, Block Cipher Design Principles and Modes of Operation, Advanced Encryption Standard : Evaluation Criteria , The AES Cipher

**UNIT – IV**

**Contemporary Symmetric Ciphers and Confidentiality using Symmetric Encryption:** Triple DES, Blowfish, RC5, Characteristics of Advanced Symmetric Blick Ciphers RC4 Stream Cipher, Placement of Encryption function, Traffic Confidentiality, Key Distribution, Random Number generation.

**UNIT – V**

**Introduction to Number Theory and Key Management:** Prime Numbers, Fermat's and Euler's Theorems, Testing for Primality, The Chainese Remainder Theorem, Discrete Logarithms. Key Management, Diffe-Hellman Key Exchange, Ellipric Curve Arithmetic, Elliptic Curve Cryptography, Authentication applications – Electronic Mail Security, IP Security– Web Security – System Secuirty : Intruders – Malicious Software – Firewalls.

**REFERENCE:**


- Computer Networks, A.S. Tanenbaum, PHI, 4th ed, ISBN 81-7808-785-5
- Cryptography and Network Security Third Edition William Stallings
- Cryptography and Daa Security Demming, D, Addission Wesley, 1982.
- Computer Networking A top down approach featuring the Internet, J.F.Kurose, K.W Rose, Pearson, ISBN 81-7808-247-0.
- An Engineering Approach to Computer Networks, S.Keshav, Addison Wesley, ISBN 981-235-986-9.
- Local Area Networks, G.E. Keiser, McGrew Hill, ISBN 0-07-033561-3.
- UNIX network programming, Vol I ( Networking APIs: Sockets and XTI ), W.Richord Stevens, PHI, ISBN 81-203-2061-1.
- UNIX network Programming, Vol II, ( Interprocess Communication ) Richards Slenens, PHI, ISBN 81-203-2062-X.


**(B) DATA STRUCTURES AND ALGORITHMS**

**Course Content:**

**UNIT – I**

**Trees:** Operations on binary trees - tree search and insertion - tree deletion - Analysis of tree search and insertion - balanced tree insertion - balanced tree deletion - optimal search trees.

**UNIT – II**

**Multi way trees and hashing:** B - trees - binary B - trees - choice of a transformation function - collision handling – analysis of key transformation.

**UNIT – III**

**Greedy Methods:** The general method - Knapsack problem - job sequencing with deadlines - minimum cost spanning tree - Optimal storage on tapes - optimal merge patterns.

**UNIT – IV**

**Dynamic Programming:** The general method - All - pairs shortest paths - single source shortest paths - optimal binary search trees - The traveling salesman problem - Flow shop scheduling

**UNIT – V**

**Back tracking :** The general method - the 8 - queen problem - sum of subsets - graph coloring – Hamiltonian cycles.

**REFERENCE:**


- Niklaus Wirth, “Algorithms+Data structures=Programs”,Prentice Hall of India Limited, New Delhi 2002.(units I and II)

- Ellis Horowitz and Sartaj Sahani, “Fundamentals of Computer Algorithms”, Galgotia publications, New Delhi, 1985. (units III,IV and V)


**(C) Advanced Computer Techniques**

**Course Content:**

**UNIT – I**

**Theory of Programming Languages**: Programming Language : Introduction, Characteristics, Uses, Programming Language Processor, Hierarchies of Computers, Data, Elementary data types, Structured data types, expression, statements, procedures, functions, data control and storage management, data abstraction, exception handling, data encapsulation, theoretical models. The above features in C, C++, JAVA.

**UNIT – II**

**Software Engineering:** Introduction to Software Engineering, Software Project Planning, Requirement analysis specification, Software Design, Implementation issues, Software Testing, Verification and Validation, Software maintenance and Reliability**.**

**UNIT – III**

**Compiler Design:** Introduction, Lexical analysis, syntax analysis, types, storage organization, storage allocation, parameter passing, symbol table, language facilities for dynamic storage, allocation, dynamic storage allocation techniques, Intermediate code generation, code generation, code optimization.

**Unit – IV - Artificial Intelligence and Expert Systems**

Introduction : Problem Definition, Search Strategies, Characteristics, Game Playing, Knowledge representation, Expert System, Roles of Expert System, Knowledge acquisition, Meta knowledge, Heuristics knowledge, Interface, Backward and forward chaining, Fuzzy reasoning, Learning, Adaptive Learning, Types of Expert System : MYSIN, PIP, INTERNIST, DART, XOON, Expert Systems Shells.

**Unit – V - Neural Networks**

Introduction, Humans and computers, Structure of the Brain, Learning in Machine, differences, Pattern Recognition, The Basic Neutron, Perception, Limitation, Multilayer Perception, Organising Networks, Hopfield Networks, Associative Memory.

**REFERENCE:**


- Data Structures and Algorithms by Alfred V. Aho, John E. Hoperoft and D. Ulman, Wesley Publishing Company, 1987.
- Computer Algorithms by Ellis Horowitz and Sartaj Sahni, Galgotia Publications Pvt. Ltd., 1993.
- Software Engineering, Concepts by Richard Fairley, Mc. Graw Hill, 1985.
- Compiler Principles, techniques and tool by Alfred. V. Aho, Ravi Sethi and Jeffrey D. Ullman, Addison Wesley Publishing Company, 1986.
- Artificial Intelligence by Elaine Rich – Mc. Graw Hill
- Neural Computing : An Introduction by R. Beale and T. Jackson, Adam Hilger, 1990.


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