

J.B. INSTITUTE OF ENGINEERING AND TECHNOLOGY
(UGC AUTONOMOUS)
Bhaskar Nagar, Moinabad Mandal, R.R. District, Hyderabad -500075

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
M.TECH (CSE)
R-18

CHOICE BASED CREDIT SYSTEM (CBCS)
COURSE STRUCTURE

SEMESTER-I							
Sl. No.	Code	Core/ Elective	Course Title	L	T	P	C
1.		GM71A	Advanced Data Structures	3	0	0	3
2.		GM71B	Cryptography & Network Security	3	0	0	3
3.		GM71C GM71D GM71E	1. Cloud Computing 2. Machine Learning 3. Internet of Things	3	0	0	3
4.		GM71F GM71G GM71H	1. Software Architectures 2. Information Retrieval Systems 3. Distributed Systems	3	0	0	3
5.		GM71I	Research Methodology and IPR	2	0	0	2
6.		GM71J	Advanced Data Structures Lab	0	0	4	2
7.		GM71K	Cryptography & Network Security Lab	0	0	4	2
8.		GM71L	Audit – I	2	0	0	0
TOTAL CREDITS				16			18

SEMESTER-II							
Sl. No.	Code	Core/ Elective	Course Title	L	T	P	C
1.		GM72A	Advanced Algorithms	3	0	0	3
2.		GM72B	Network Programming	3	0	0	3
3.		GM72C - GM72D	1. Digital Forensics 2. Data Analytics 3. Parallel Computing	3	0	0	3
4.		GM72E GM72F GM72G	1. Human Computer Interaction 2. Computer Vision 3. Distributed Databases	3	0	0	3
5.		GM72H	Mini Project with Seminar	0	0	4	2
6.		GM72I	Advanced Algorithms Lab	0	0	4	2
7.		GM72J	Network Programming Lab	0	0	4	2
8.		GM72K	Audit – II	2	0	0	0
TOTAL CREDITS				14		12	18

SEMESTER-III							
Sl. No.	Code	Core/ Elective	Course Title	L	T	P	C
1.		PSE5	1. Blockchain Technology 2. High Performance Computing 3. Ad hoc and Sensor Networks	3	0	0	3
2.		OEC	Open Elective	3	0	0	3
3.		PW	Phase-I Dissertation	0	0	20	10
TOTAL CREDITS				6	0	20	16

SEMESTER-IV							
Sl. No.	Code	Core/ Elective	Course Title	L	T	P	C
1.		PW	Phase-II Dissertation	0	0	32	16
TOTAL CREDITS				0	0	32	16
GRAND TOTAL CREDITS							

PSE: Program Specific Elective

OEC:Open Elective

AUDIT COURSES 1 & 2

1. English for Research Paper Writing
2. Disaster Management
3. Professional Ethics
4. Value Education
5. Constitution of India
6. Soft Skills
7. Stress Management by YOGA
8. Personality Development through Life Enlightenment Skills

OPEN ELECTIVES

- 1) Python Programming
- 2) E-Commerce
- 3) Computer Forensics

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**DEPARTMENT OF COMPUTER SCIENCE AND
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M.Tech.
I Year I-Sem

L T P C
3 0 0 3

ADVANCED DATA STRUCTURES

Prerequisites

1. A course on “ Data Structures”

Course objectives:

Students will :

1. Introduces the heap data structures such as leftist trees, binomial heaps, fibonacci and min-max heaps
2. Introduces a variety of data structures such as disjoint sets, hash tables, search structures and digital search structures

Course outcomes:

Students will be able to:

1. Select the data structures that efficiently model the information in a problem
2. Understand how the choice of data structures impact the performance of programs
3. Design programs using a variety of data structures, including hash tables, search structures and digital search structures

UNIT - I

Heap Structures- Introduction, Min-Max Heaps, Leftist trees, Binomial Heaps, Fibonacci heaps.

UNIT - II

Hashing and Collisions

Introduction, Hash Tables, Hash Functions, different Hash Functions:- Division Method, Multiplication Method, Mid-Square Method, Folding Method, Collisions

UNIT - III

Search Structures- OBST, AVL trees, Red-Black trees, Splay trees, Multiway Search Trees - B-trees., 2-3 trees

UNIT - IV

Digital Search Structures - Digital Search trees, Binary tries and Patricia, Multiway Tries, Suffix trees, Standard Tries, Compressed Tries

UNIT - V

Pattern matching : Introduction, Brute force, the Boyer –Moore algorithm, Knuth-Morris-Pratt algorithm, Naïve String , Harspool, Rabin Karp

Textbooks

1. Fundamentals of data structures in C++ Sahni, Horowitz, Mehatha, Universities Press.
2. Introduction to Algorithms, TH Cormen, PHI

References

1. Design methods and analysis of Algorithms, SK Basu, PHI.
2. Data Structures & Algorithm Analysis in C++, Mark Allen Weiss, Pearson Education.
3. Fundamentals of Computer Algorithms, 2nd Edition, Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, Universities Press.

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M.Tech **L T P C**

I Year I Semester **3 0 0 3**

CRYPTOGRAPHY & NETWORK SECURITY

Prerequisites

1. A Course on “Computer Networks

Course objectives:

Students will :

1. Impart knowledge on network security issues, services, goals and mechanisms.
2. Analyze the security of communication systems, networks and protocols.

Course outcomes:

Students will be able to:

1. Demonstrate the knowledge of cryptography and network security concepts and applications.
2. Ability to apply security principles in system design.
3. Ability to identify and investigate vulnerabilities and security threats and mechanisms to counter them.

UNIT - I

Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks.

UNIT - II

Conventional Encryption: Principles, Conventional encryption algorithms (DES, AES, RC4, Blowfish), cipher block modes of operation, location of encryption devices, key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC.

UNIT - III

Number Theory: Modular Arithmetic, Euclid's Algorithm, Fermat's and Euler's Theorem, Chinese Remainder Theorem, Public key cryptography principles, public key cryptography algorithms, digital signatures, digital Certificates, Certificate Authority and key management Kerberos, X.509 Directory Authentication Service.

UNIT - IV

Email privacy: Pretty Good Privacy (PGP) and S/MIME.

IP Security: Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.

UNIT - V

Web Security: Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET).

Intruders, Viruses and related threats, Firewall Design principles, Trusted Systems, Intrusion Detection Systems.

Text Books:

1. "Cryptography and Network Security" by William Stallings
3rd Edition, Pearson Education.
2. "Applied Cryptography" by Bruce Schneier 2nd Edition, Wiley
Publisher.

References:

1. Cryptography and Network Security by Behrouz A.Forouzan,
2nd edition, Tata McGraw-Hill Education.

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I Year I-Sem

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CLOUD COMPUTING
(Program Specific Elective-I)

Course Objectives:

Student will:

1. Learn about the cloud environment, services and Hadoop
2. Classify cloud platforms and virtualization concepts
3. Identify cloud computing applications and enterprise cloud computing paradigms
4. Demonstrate cloud application development using python
5. Explain security concepts in the cloud

Course Outcomes:

Student will able to:

1. Understand about the cloud environment, services and hadoop
2. Differentiate cloud platforms and virtualization concepts
3. Describe cloud computing applications and enterprise cloud computing paradigms
4. Implement cloud application development using python
5. Apply security concepts in the cloud

UNIT-I

Principles of Parallel and Distributed Computing, Introduction to cloud computing, Cloud computing Architecture, cloud concepts and technologies, cloud services and platforms, Cloud models, cloud as a service, cloud solutions, cloud offerings, introduction to Hadoop and Mapreduce.

UNIT –II

Cloud Platforms for Industry, Healthcare and education, Cloud Platforms in the Industry, cloud applications. Virtualization, cloud virtualization technology, deep dive: cloud virtualization, Migrating in to cloud computing, Virtual Machines Provisioning and Virtual Machine Migration Services, On the Management of Virtual Machines for cloud Infrastructure, Comet cloud, T-Systems,

UNIT-III

Cloud computing Applications: Industry, Health, Education, Scientific Applications, Business and Consumer Applications, Understanding Scientific Applications for Cloud Environments, Impact of Cloud computing on the role of corporate IT.

Enterprise cloud computing Paradigm, Federated cloud computing Architecture, SLA Management in Cloud Computing, Developing the cloud: cloud application Design.

UNIT-IV

Python Basics, Python for cloud, cloud application development in python, Cloud Application Development in Python.

Programming Google App Engine with Python: A first real cloud Application, Managing Data in the cloud, Google app engine Services for Login Authentication, Optimizing UI and Logic, Making the UI Pretty: Templates and CSS, Getting Interactive. Map Reduce Programming Model and Implementations.

UNIT-V

Cloud management, Organizational Readiness and change management in the cloud age , Cloud Security ,Data security in the cloud, Legal Issues in the Cloud , Achieving Production Readiness for the cloud Services

TEXT BOOKS:

1. Cloud Computing: Raj Kumar Buyya , James Broberg, andrzej Goscinski, 2013 Wiley
2. Mastering Cloud Computing: Raj Kumar buyya, Christian Vecchiola,selvi-2013.
3. Cloud Computing: Arshdeep Bahga, Vijay Madisetti, 2014,

University Press.

4. Cloud computing: Dr Kumar Saurab Wiley India 2011.

REFERENCES:

1. Code in the Cloud: Mark C.Chu-Carroll 2011, SPD.(Second part of IV UNIT)
2. Essentials of cloud computing : K Chandrasekharan CRC Press.
3. Cloud Computing: John W. Rittinghouse, James Ransome, CRC Press.
4. Virtualization Security: Dave shackleford 2013. SYBEX a wiley Brand.
5. Cloud computing and Software Services: Ahson , Ilyas.2011.
6. Cloud Computing Bible: Sosinsky 2012. Wiley India .
7. Cloud Computing: Dan C. Marinescu-2013, Morgan Kaufmann.
8. Distributed and Cloud Computing, Kai Hwang, Geoffery C.Fox, Jack J.Dongarra, Elsevier, 2012.
- 9 . Fundamentals of Python Kenneth A.Lambert | B.L.Juneja

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MACHINE LEARNING
(Program Specific Elective-I)

Prerequisites

1. Data Structures
2. Knowledge on statistical methods

Course objectives:

Students will :

1. Explains machine learning techniques such as decision tree learning, Bayesian learning etc.
2. Understand computational learning theory.
3. Study the pattern comparison techniques.

Course outcomes:

Students will be able to:

1. Understand the concepts of computational intelligence like machine learning
2. Ability to get the skill to apply machine learning techniques to address the real time problems in different areas
3. Understand the Neural Networks and its usage in machine learning application.

UNIT - I

Introduction - Well-posed learning problems, designing a learning system Perspectives and issues in machine learning

Concept learning and the general to specific ordering – Introduction, A concept learning task, concept learning as search, Find-S: Finding a Maximally Specific Hypothesis, Version Spaces and the Candidate Elimination algorithm, Remarks on Version Spaces and Candidate Elimination, Inductive Bias.

Decision Tree Learning – Introduction, Decision Tree Representation, Appropriate Problems for Decision Tree Learning, The Basic Decision Tree Learning Algorithm Hypothesis Space Search in Decision Tree Learning, Inductive Bias in Decision Tree Learning, Issues in Decision Tree Learning.

UNIT - II

Artificial Neural Networks Introduction, Neural Network Representation, Appropriate Problems for Neural Network Learning, Perceptions, Multilayer Networks and the Back propagation Algorithm.

Discussion on the Back Propagation Algorithm, An illustrative Example: Face Recognition

Evaluation Hypotheses – Motivation, Estimation Hypothesis Accuracy, Basics of Sampling Theory, A General Approach for Deriving Confidence Intervals, Difference in Error of Two Hypotheses, Comparing Learning Algorithms.

UNIT - III

Bayesian learning - Introduction, Bayes Theorem, Bayes Theorem and Concept Learning Maximum Likelihood and Least Squared Error Hypotheses, Maximum Likelihood Hypotheses for Predicting Probabilities, Minimum Description Length Principle , Bayes Optimal Classifier, Gibbs Algorithm, Naïve Bayes Classifier, An Example: Learning to Classify Text, Bayesian Belief Networks, EM Algorithm.

Computational Learning Theory – Introduction, Probably Learning an Approximately Correct Hypothesis, Sample Complexity for Finite Hypothesis Space, Sample Complexity for Infinite Hypothesis Spaces, The Mistake Bound Model of Learning.

Instance-Based Learning – Introduction, k-Nearest Neighbor Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Remarks on Lazy and Eager Learning.

UNIT - IV

Pattern Comparison Techniques, Temporal patterns, Dynamic Time Warping Methods, Clustering, Codebook Generation, Vector Quantization

Pattern Classification: Introduction to HMMS, Training and Testing of Discrete Hidden Markov Models and Continuous Hidden Markov Models, Viterbi Algorithm, Different Case Studies in Speech recognition and Image Processing

UNIT - V

Analytical Learning – Introduction, Learning with Perfect Domain Theories : PROLOG-EBG Remarks on Explanation-Based Learning, Explanation-Based Learning of Search Control Knowledge, Using Prior Knowledge to Alter the Search Objective, Using Prior Knowledge to Augment Search Operations.

Combining Inductive and Analytical Learning – Motivation, Inductive-Analytical Approaches to Learning, Using Prior Knowledge to Initialize the Hypothesis.

Text Books

1. Machine Learning – Tom M.Mitchell,-MGH
2. Fundamentals of Speech Recognition By Lawrence Rabiner and Biing – Hwang Juang.

Reference Books

1. Machine Learning : An Algorithmic Perspective, Stephen Marsland, Taylor & Francis

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INTERNET OF THINGS
(Program Specific Elective-I)

Prerequisites: NIL

Course objectives:

Students will :

1. Know the terminology, technology and its applications
2. Introduce the raspberry PI platform, that is widely used in IoT applications
3. Implementation of web based services on IoT devices

Course outcomes:

Students will be able to:

1. Understand the new computing technologies
2. Able to apply the latest computing technologies like cloud computing technology and Big Data
3. Ability to introduce the concept of M2M (machine to machine) with necessary protocols
4. Get the skill to program using python scripting language which is used in many IoT devices

UNIT - I

Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IoT – IoT Protocols, IoT communication models, IoT Communication APIs IoT enabled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates Domain

Specific IoTs – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle

UNIT - II

IoT and M2M – Software defined networks, network function virtualization, difference between SDN and NFV for IoT Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, SNMP NETOPEER

UNIT - III

Introduction to Python - Language features of Python, Data types, data structures, Control of flow, functions, modules, packaging, file handling, data/time operations, classes, Exception handling Python packages - JSON, XML, HTTPLib, URLLib, SMTPLib

UNIT - IV

IoT Physical Devices and Endpoints - Introduction to Raspberry PI- Interfaces (serial, SPI, I2C) Programming – Python program with Raspberry PI with focus of interfacing external gadgets, controlling output, reading input from pins.

UNIT - V

IoT Physical Servers and Cloud Offerings – Introduction to Cloud Storage models and communication APIs Webservice – Web server for IoT, Cloud for IoT, Python web application framework Designing a RESTful web API

Text Books

1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759

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SOFTWARE ARCHITECTURES
(Program Specific Elective-II)

Pre Requisite

1. A course On “Software Engineering”

Course objectives:

Students will :

1. Understand the concept of software architecture
2. Understand the design, documentation of software Architecture and Reconstruct.
3. Understand importance of Architecture Evaluation and Methods.
4. Understand reusability of Architecture

Course outcomes:

Students will be able to:

1. Design, document and Reconstruct Software Architecture
2. Gain knowledge on Software Architecture
3. Evaluate Architecture
4. Reuse the Architecture

UNIT - I

Envisioning Architecture

The Architecture Business Cycle, What is Software Architecture, Architectural patterns, reference models, reference architectures, architectural structures and views.

A-7E – A case study in utilizing architectural structures

UNIT - II

Creating an Architecture

Understanding Quality Attributes, Achieving qualities, Architectural styles and patterns

Air Traffic Control – a case study in designing for high availability

UNIT - III

Designing the Architecture, Documenting software architectures, Reconstructing Software Architecture

Flight Simulation – a case study in Architecture for Integrability

UNIT - IV

Analyzing Architectures

Architecture Evaluation, Architecture design decision making, ATAM, CBAM.

The Nightingale System - a case study in Applying the ATAM

The NASA ECS Project – a case study in Applying the CBAM

UNIT - V

Moving from one system to many

Software Product Lines, Building systems from off the shelf components, Software architecture in future.

Celsius Tech – a case study in product line development

Text Books:

1. Software Architecture in Practice, , Len Bass, Pau Clements & Rick Kazman, second edition Pearson Education,2003.

Reference Books:

1. Beyond Software architecture, Luke Hohmann, Addison wesley, 2003.
2. Software architecture, David M. Dikel, David Kane and James R. Wilson, Prentice Hall PTR, 2001
3. Software Design, David Budgen, second edition, Pearson education, 2003

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I Year I-Sem	3	0	0	3

INFORMATION RETRIEVAL SYSTEMS
(Program Specific Elective-II)

Prerequisites:

1. Data Structures

Course objectives:

Students will :

1. Learn the important concepts and algorithms in IRS
2. Understand the data/file structures that are necessary to design, and implement information retrieval (IR) systems.

Course outcomes:

Students will be able to:

1. Apply IR principles to locate relevant information large collections of data
2. Design different document clustering algorithms
3. Implement retrieval systems for web search tasks.
4. Design an Information Retrieval System for web search tasks.

UNIT - I

Introduction:

Motivation, Basic Concepts, Past-Present and Future, the Retrieval Process

Modelling :

Introduction, A Taxonomy of Information retrieval Models, Retrieval: Ad hoc and Filtering, A Formal Characteristics of IR Models, Classic

Information Retrieval, Alternative Set Theory Models, Alternative Probabilistic Models, Structured Text Retrieval Models, Model for Browsing

UNIT - II

Retrieval Evaluation

Introduction, retrieval Performance Evaluation, Reference Collections

Query languages

Introduction, Keyword-Based Querying, Pattern Matching, Structural Queries, Query Protocols

Query Operations

Introduction, User Relevance Feedback, Automatic Local Analysis, Automatic global Analysis

Text Operations

Introduction, Document Preprocessing, Document Clustering, Text Compression, Comparing text Compression Techniques

UNIT - III

Indexing and Searching

Introduction, Inverted Files, Other Indices for Text, Boolean queries, Sequential Searching, pattern Matching, Structural Queries, Compression

Searching the Web

Introduction, Challenges, Characterizing the Web, Search Engines, Browsing, Metasearches, Finding the Needle in the Haystack, Searching using Hyperlinks

UNIT - IV

User Interfaces and Visualization

Introduction, human-Computer Interaction, The Information Access Process, Starting Points, Query Specification, Context, User Relevance Judgments, Interface Support for the Search Process

UNIT - V

Multimedia IR: Models and Languages

Introduction, Data Modeling, Query Languages

Multimedia IR: Indexing and Searching

Introduction, Background-Spatial Access Methods, A Generic Multimedia Indexing Approach, One Dimensional Time Series, two dimensional Color Images, Automatic Feature Extraction.

Text Books

1. Modern Information Retrieval By Yates and Neto Pearson Education.

Reference

1. Kowalski, Gerald, Mark T Maybury: Information Retrieval Systems: Theory and Implementation, Kluwer Academic Press, 1997.
2. Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms, Prentice Hall, 1992.
3. Information Storage & Retrieval By Robert Korfhage – John Wiley & Sons.

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I Year I-Sem	3	0	0	3

DISTRIBUTED SYSTEMS
(Program Specific Elective-II)

Prerequisites

1. A course on “ Operating Systems”
2. A course on “Network Security and Cryptography”

Course objectives:

Students will :

1. Attain the knowledge on Distributed systems.
2. Know Peer to Peer Systems, Transactions and Concurrency control, Security and Distributed shared memory

Course outcomes:

Students will be able to:

1. Understand Transactions and Concurrency control.
2. Understand Security issues.
3. Understand Distributed shared memory.
4. Design distributed systems for basic level applications.

UNIT - I

Characterization of Distributed Systems-Introduction,Examples of Distributed systems,Resource sharing and web,challenges,System models-Introduction,Architectural and Fundamental models, Networking and Internetworking, Interprocess Communication, Distributed objects and Remote Invocation-Introduction,Communication between distributed objects,RPC,Events and notifications, Case study-Java RMI.

UNIT - - II

Operating System Support- Introduction, OS layer,Protection,Processes and Threads, Communication and Invocation, Operating system architecture,Distributed File Systems-Introduction,File Service architecture,case study- SUN network file systems.

Name Services-Introduction, Name Services and the Domain Name System,Case study of the Global Name Service,Case study of the X.500 Directory Service.

UNIT - III

Peer to Peer Systems–Introduction,Napster and its legacy,Peer to Peer middleware,Routing overlays,Overlay case studies-Pastry,Tapestry,Application case studies-Squirrel,OceanStore.

Time and Global States-Introduction,Clocks,events and Process states,Synchronizing physical clocks,logical time and logical clocks,global states,distributed debugging. Coordination and Agreement-Introduction, Distributed mutual exclusion, Elections, Multicast communication, consensus and related problems.

UNIT - IV

Transactions and Concurrency control-Introduction,Transactions, Nested Transactions, Locks, Optimistic concurrency control, Timestamp ordering, Comparison of methods for concurrency control.Distributed Transactions-Introduction,Flat and Nested Distributed Transactions, Atomic commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery,Replication-Introduction,System model and group communication, Fault tolerant services, Transactions with replicated data.

UNIT - V

Security-Introduction,Overview of Security techniques,Cryptographic algorithms,Digital signatures,Case studies-Kerberos,TLS,802.11 WiFi.

Distributed shared memory, Design and Implementation issues, Sequential consistency and Ivy case study, Release consistency and Munin case study,Other consistency models, CORBA case study-Introduction,CORBA RMI,CORBA Services.

Text Books

1. Distributed Systems Concepts and Design, G Coulouris, J Dollimore and T Kindberg, Fourth Edition, Pearson Education.
2. Distributed Systems,S.Ghosh,Chapman&Hall/CRC,Taylor&Francis Group,2010.

Reference Books

1. Distributed Computing, S. Mahajan and S. Shah, Oxford University Press.
2. Distributed Operating Systems Concepts and Design, Pradeep K. Sinha, PHI.
3. Advanced Concepts in Operating Systems, M Singhal, N G Shivarathri, TMH.
4. Reliable Distributed Systems, K.P. Birman, Springer.
5. Distributed Systems – Principles and Paradigms, A.S. Tanenbaum and M.V. Steen, Pearson Education.
6. Distributed Operating Systems and Algorithm Analysis, R. Chow, T. Johnson, Pearson.
7. Distributed Operating Systems, A.S. Tanenbaum, Pearson education.
8. Distributed Computing, Principles, Algorithms and Systems, Ajay D. Kshemakalyani and Mukesh Singhal, Cambridge, rp 2010.

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RESEARCH METHODOLOGIES & IPR

Course objectives:

Students will :

1. Introduce research paper writing and induce paper publication skills.
2. Give the introduction to Intellectual Property Rights

Course outcomes:

Students will be able to:

Gain the sound knowledge of the following important elements:

1. Distinguish research methods
2. Write and publish a technical research paper
3. Review papers effectively
4. IPR and Patent filing

UNIT - I

Introduction:

Objective of Research; Definition and Motivation; Types of Research; Research Approaches; Steps in Research Process; Criteria of Good Research; Ethics in Research.

Research Formulation and Literature Review:

Problem Definition and Formulation; Literature Review; Characteristics of Good Research Question; Literature Review Process.

UNIT - II

Data Collection:

Primary and Secondary Data; Primary and Secondary Data Sources; Data Collection Methods; Data Processing; Classification of Data.

Data Analysis:

Statistical Analysis; Multivariate Analysis; Correlation Analysis; Regression Analysis; Principle Component Analysis; Samplings;

UNIT - III

Research Design:

Need for Research Design; Features of a Good Design; Types of Research Designs; Induction and Deduction.

Hypothesis Formulation and Testing:

Hypothesis; Important Terms; Types of Research Hypothesis; Hypothesis Testing; Z-Test; t-Test; f-Test; Making a Decision; Types of Errors; ROC Graphics.

UNIT - IV

Test Procedures:

Parametric and Non Parametric Tests; ANOVA; Mann-Whitney Test; Kruskal-Wallis Test; Chi-Square Test; Multi-Variate Analysis

Presentation of the Research Work:

Business Report; Technical Report; Research Report; General Tips for Writing Report; Presentation of Data; Oral Presentation; Bibliography and References; Intellectual Property Rights; Open-Access Initiatives; Plagiarism.

UNIT - V

Law of Patents, Patent Searches, Ownership, Transfer

Patentability – Design Patents – Double Patenting – Patent Searching – Patent Application Process – Prosecuting the Application, Post-issuance Actions, Term and Maintenance of Patents. Ownership Rights – Sole and Joint Inventors – Inventions Made by Employees and Independent Contractors – Assignment of Patent Rights – Licensing of Patent Rights – Invention Developers and Promoters.

Patent Infringement, New Developments and International Patent Law

Direct Infringement – Inducement to Infringe – Contributory Infringement – First Sale Doctrine – Claims Interpretation – Defenses to

Infringement – Remedies for Infringement – Resolving an Infringement Dispute – Patent Infringement Litigation. New Developments in Patent Law

Text Books

1. Research Methodology. Methods & Technique : Kothari. C.R.
2. Intellectual Property – Copyrights, Trademarks, and Patents by Richard Stim, Cengage Learning

References

1. Practical Research : planning and Design(8th Edition) – Paul D. Leedy and Jeanne E. Ormrod.
2. A Hand Book of Education Research – NCTE
3. Methodology of Education Research – K.S. Sidhu.
4. Tests, Measurements and Research methods in Behavioural Sciences- A.K. Singh.
5. Statistical Methods- Y.P. Agarwal.
6. Methods of Statistical Analysis- P.S Grewal.
7. Fundamentals of Statistics – S.C. Gupta, V.K. Kapoor.
8. Intellectual Property Rights by Deborah E. Bouchoux, Cengage Learning.
9. Managing Intellectual Property – The Strategic Imperative, Second Edition by Vinod V.Sople, PHI Learning Private Limited.
10. Research methodology – S.S. Vinod Chandra, S. Anand Hareendran

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ADVANCED DATA STRUCTURES LAB

Prerequisites

1. A course on Computer Programming & Data Structures”

Course objectives:

Students will :

1. Introduces the basic concepts of Abstract Data Types.
2. Reviews basic data structures such as stacks and queues.
3. Introduces a variety of data structures such as hash tables, search trees, tries, heaps, graphs, and B-trees.
4. Introduces sorting and pattern matching algorithms

Course outcomes:

Students will be able to:

1. Select the data structures that effeciently model the information in a problem.
2. Assess efficiency trade-offs among different data structure implementations or combinations.
3. Implement and know the application of algorithms for sorting and pattern matching.
4. Design programs using a variety of data structures, including hash tables, binary and general tree structures, search trees, tries, heaps, graphs, and B-trees.

List of Programs

1. Write a program to perform the following operations:
 - a) Insert an element into a binary search tree.

- b) Delete an element from a binary search tree.
 - c) Search for a key element in a binary search tree.
2. Write a program for implementing the following sorting methods:
 - a) Merge sort
 - b) Heap sort
 - c) Quick sort
 3. Write a program to perform the following operations:
 - a) Insert an element into a B- tree.
 - b) Delete an element from a B- tree.
 - c) Search for a key element in a B- tree.
 4. Write a program to perform the following operations:
 - a) Insert an element into a Min-Max heap
 - b) Delete an element from a Min-Max heap
 - c) Search for a key element in a Min-Max heap
 5. Write a program to perform the following operations:
 - a) Insert an element into a Leftist tree
 - b) Delete an element from a Leftist tree
 - c) Search for a key element in a Leftist tree
 6. Write a program to perform the following operations:
 - a) Insert an element into a binomial heap
 - b) Delete an element from a binomial heap.
 - c) Search for a key element in a binomial heap
 7. Write a program to perform the following operations:
 - a) Insert an element into a AVL tree.
 - b) Delete an element from a AVL search tree.
 - c) Search for a key element in a AVL search tree.
 8. Write a program to perform the following operations:
 - a) Insert an element into a Red-Black tree.
 - b) Delete an element from a Red-Black tree.

c) Search for a key element in a Red-Black tree.

9. Write a program to implement all the functions of a dictionary using hashing.
10. Write a program for implementing Knuth-Morris-Pratt pattern matching algorithm.
11. Write a program for implementing Brute Force pattern matching algorithm.
12. Write a program for implementing Boyer pattern matching algorithm.

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CRYPTOGRAPHY & NETWORK SECURITY LAB

1. Write a client-server program where client sends a text message to server and server sends the text message to client by changing the case(uppercase and lowercase) of each character in the message.
2. Write a client-server program to implement following classical encryption techniques:
 - caesar cipher
 - transposition cipher
 - row substitution cipher
 - hill cipher
3. Install JCrypt tool (or any other equivalent) and demonstrate Asymmetric, Symmetric crypto algorithm, Hash and Digital/PKI signatures studied in theory Network Security and Management

Tools:

1. Perform an experiment to demonstrate how to sniff for router traffic by using the tool wireshark
2. Using nmap
 - a) Find open ports on a system
 - b) Find the machines which are active
 - c) Find the version of remote os on other systems
 - d) Find the version of s/w installed on other system

Ethical Hacking:

1. Setup a honey pot and monitor the honey pot on network
2. Write a script or code to demonstrate SQL injection attacks
3. Create a social networking website login page using phishing techniques
4. Write a code to demonstrate DoS attacks
5. Install rootkits and study variety of options

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ADVANCED ALGORITHMS

Prerequisites

1. A course on “Computer Programming & Data Structures”
2. A course on “Advanced Data Structures & Algorithms”

Course objectives:

Students will :

1. Introduces the recurrence relations for analyzing the algorithms
2. Introduces the graphs and their traversals.
3. Describes major algorithmic techniques (divide-and-conquer, greedy, dynamic programming, Brute Force , Transform and Conquer approaches) and mention problems for which each technique is appropriate;
4. Describes how to evaluate and compare different algorithms using worst-case, average-case and best-case analysis.
5. Introduces string matching algorithms
6. Introduces linear programming.

Course outcomes:

Students will be able to:

1. Analyze the performance of algorithms
2. Choose appropriate data structures and algorithm design methods for a specified application
3. Understand how the choice of data structures and the algorithm design methods impact the performance of programs

UNIT - I

Classification of algorithms, Algorithm Specifications,

Mathematical analysis of Recursive Algorithms: – Introduction to recurrence equations, formulation of recurrence equations, Techniques

for solving recurrence equations, Solving recurrence equations, Solving Recurrence Equations using polynomial reduction, Divide and conquer recurrences

UNIT - II

Graphs :- Graph representations, Graph traversals

Brute Force Approaches:- Computational Geometry Problems-Closest pair problem, Convex Hull Problem, Exhaustive Searching- Magic Squares problem, Container Loading problem, Knapsack Problem, Assignment Problem

UNIT - III

Divide and Conquer approach:- Multiplication of long integers, Strassen's matrix multiplication, Fourier Transform

Greedy algorithms:- Coin change problem, Scheduling problems, knapsack problem, optimal storage on tapes, optimal tree problems, optimal graph problems

UNIT - IV

Transform and Conquer approach :- Matrix operations- Gaussian Elimination method, LU decomposition, Crout's method of decomposition

Dynamic Programming:- Computing binomial coefficients, Multistage graph problem, Transitive Closure and Warshall algorithm, Floyd warshall all pairs shortest path problem, TSP, Flow shop scheduling algorithm

UNIT - V

String algorithms:- Basic string algorithms, Longest Common Subsequences, Naive String Matching algorithm, Rabin Karp, KMP, Harspool algorithm

Linear Programming, Graphical method for solving LPP, Simplex method, Minimization problems, Principle of Duality, Max Flow problem

Text Books

1. Design and Analysis of Algorithms, S.Sridhar, OXFORD University Press

References

1. Introduction to Algorithms, second edition, T.H.Cormen, C.E.Leiserson, R.L.Rivest and C.Stein, PHI Pvt. Ltd./ Pearson Education.
2. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharam, Universities Press.
3. Design and Analysis of algorithms, Aho, Ullman and Hopcroft, Pearson education

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NETWORK PROGRAMMING

Course Objectives:

Student will:

1. Understand the major components in the LINUX system Structure and describe the architecture of the UNIX operating system.
2. Describe use of UNIX utilities and Shell scripting language such as bash.
3. Identifying advanced C systems programming and debugging techniques in a Unix/Linux environment.
4. Apply how to organize and manipulate files and directories in Linux Operating system.
5. Analyze how to use UNIX utilities to create simple tools for the information processing for inter process communication consisting of pipes, FIFOs, Semaphores and message Queues

Course Outcomes:

Student will able to:

1. Work confidently in LINUX environment.
2. Write shell script to automate different tasks as LINUX administration
3. Use different LINUX utilities to organize and manipulate files and directories in LINUX operating system.
4. Schedule the process for inter process communication techniques using various system calls.
5. Manage remote system by connecting to them using socket programming system calls for TCP, and UDP connections.

UNIT – I

Linux Utilities- File handling utilities, Security by file permissions, Process utilities, Disk utilities, Networking utilities, Filters, Text processing utilities and Backup utilities.

Bourne again shell(bash) - Introduction, pipes and redirection, here documents, running a shell script, the shell as a programming language, shell meta characters, file name substitution, shell variables, command substitution, shell commands, the environment, quoting, test command, control structures, arithmetic in shell, shell script examples.

Review of C programming concepts-arrays, strings (library functions), pointers, function pointers, structures, unions, libraries in C.

UNIT - II

Files- File Concept, File types File System Structure, Inodes, File Attributes, file I/O in C using system calls, kernel support for files, file status information-stat family, file and record locking-lockf and fcntl functions, file permissions- chmod, fchmod, file ownership-chown, lchown , fchown, links-soft links and hard links – symlink, link, unlink.

File and Directory management – Directory contents, Scanning Directories- Directory file APIs.

Process- Process concept, Kernel support for process, process attributes, process control – process creation, replacing a process image, waiting for a process, process termination, zombie process orphan process.

UNIT - III

Signals- Introduction to signals, Signal generation and handling, Kernel support for signals, Signal function, unreliable signals, reliable signals, kill, raise , alarm, pause, abort, sleep functions.

Interprocess Communication - Introduction to IPC mechanisms, Pipes-creation, IPC between related processes using unnamed pipes, FIFOs-creation, IPC between unrelated processes using FIFOs(Named pipes), differences between unnamed and named pipes, popen and pclose library functions, Introduction to message queues, semaphores and shared memory.

Message Queues- Kernel support for messages, UNIX system V APIs for messages, client/server example.

Semaphores-Kernel support for semaphores, UNIX system V APIs for semaphores.

UNIT – IV

Shared Memory- Kernel support for shared memory, UNIX system V APIs for shared memory, client/server example.

Network IPC - Introduction to Unix Sockets, IPC over a network, Client-Server model , Address formats(Unix domain and Internet domain), Socket system calls for Connection

Oriented - Communication, Socket system calls for Connectionless-Communication, Example-Client/Server Programs- Single Server-Client connection, Multiple simultaneous clients, Socket options – setsockopt, getsockopt, fcntl.

UNIT-V

Network Programming in Java-Network basics, TCP sockets, UDP sockets (datagram sockets), Server programs that can handle one connection at a time and multiple connections (using multithreaded server), Remote Method Invocation (Java RMI)-Basic RMI Process, Implementation details-Client-Server Application.

TEXT BOOKS:

1. Unix System Programming using C++, T.Chan, PHI.(Units II,III,IV)
2. Unix Concepts and Applications, 4th Edition, Sumitabha Das, TMH.(Unit I)
3. An Introduction to Network Programming with Java, Jan Graba, Springer, rp 2010.(Unit V)
4. Unix Network Programming ,W.R. Stevens, PHI.(Units II,III,IV)
5. Java Network Programming,3rd edition, E.R. Harold, SPD, O'Reilly.(Unit V)

REFERENCE BOOKS:

1. Linux System Programming, Robert Love, O'Reilly, SPD.
2. Advanced Programming in the UNIX environment, 2nd Edition, W.R.Stevens, Pearson Education.
3. UNIX for programmers and users, 3rd Edition, Graham Glass, King Ables, Pearson Education.

4. Beginning Linux Programming, 4th Edition, N.Matthew, R.Stones, Wrox, Wiley India Edition.
5. Unix Network Programming The Sockets Networking API, Vol.- I, W.R.Stevens, Bill Fenner, A.M.Rudoff, Pearson Education.
6. Unix Internals, U.Vahalia, Pearson Education.
7. Unix shell Programming, S.G.Kochan and P.Wood, 3rd edition, Pearson Education.
8. C Programming Language, Kernighan and Ritchie, PHI

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DIGITAL FORENSICS
(Program Specific Elective-III)

Course objectives:

Students will :

1. Know the history and evaluation of digital forensics
2. Describe various types of cyber crime
3. Understand benefits of forensics
4. Implement forensics readiness plan

Course outcomes:

Students will be able to:

Upon completion graduates with a BS degree in Computer Forensics & Digital Investigations should be able to:

1. Interpret and appropriately apply the laws and procedures associated with identifying, acquiring, examining and presenting digital evidence.
2. Create a method for gathering, assessing and applying new and existing legislation and industry trends specific to the practice of digital forensics

UNIT - I

Computer Forensics Fundamentals: What is Computer Forensics?, Use of Computer Forensics in Law Enforcement, Computer Forensics Assistance to Human Resources/Employment Proceedings, Computer Forensics Services, Benefits of Professional Forensics Methodology, Steps taken by Computer Forensics Specialists Types of Computer Forensics Technology: Types of Military Computer Forensic Technology, Types of Law Enforcement — Computer Forensic

Technology — Types of Business Computer Forensic Technology
Computer Forensics Evidence and Capture: Data Recovery Defined —
Data Back-up and Recovery — The Role of Back-up in Data Recovery
— The Data-Recovery Solution.

UNIT - II

Evidence Collection and Data Seizure: Why Collect Evidence?
Collection Options — Obstacles — Types of Evidence — The Rules of
Evidence — Volatile Evidence — General Procedure — Collection and
Archiving — Methods of Collection — Artifacts — Collection Steps —
Controlling Contamination: The Chain of Custody Duplication and
Preservation of Digital Evidence: Preserving the Digital Crime Scene —
Computer Evidence Processing Steps — Legal Aspects of Collecting and
Preserving Computer Forensic Evidence Computer Image Verification
and Authentication: Special Needs of Evidential Authentication —
Practical Consideration — Practical Implementation.

UNIT - III

Computer Forensics analysis and validation: Determining what data to
collect and analyze, validating forensic data, addressing data-hiding
techniques, performing remote acquisitions

Network Forensics: Network forensics overview, performing live
acquisitions, developing standard procedures for network forensics,
using network tools, examining the honeynet project.

Processing Crime and Incident Scenes: Identifying digital evidence,
collecting evidence in private-sector incident scenes, processing law
enforcement crime scenes, preparing for a search, securing a computer
incident or crime scene, seizing digital evidence at the scene, storing
digital evidence, obtaining a digital hash, reviewing a case

UNIT - IV

Current Computer Forensic tools: evaluating computer forensic tool
needs, computer forensics software tools, computer forensics hardware
tools, validating and testing forensics software E-Mail Investigations:
Exploring the role of e-mail in investigation, exploring the roles of the

client and server in e-mail, investigating e-mail crimes and violations, understanding e-mail servers, using specialized e-mail forensic tools.

Cell phone and mobile device forensics: Understanding mobile device forensics, understanding acquisition procedures for cell phones and mobile devices.

UNIT - V

Working with Windows and DOS Systems: understanding file systems, exploring Microsoft File Structures, Examining NTFS disks, Understanding whole disk encryption, windows registry, Microsoft startup tasks, MS-DOS startup tasks, virtual machines.

Text Books

1. Computer Forensics, Computer Crime Investigation by John R. Vacca, Firewall Media, New Delhi.
2. Computer Forensics and Investigations by Nelson, Phillips Einfinger, Stuart, CENGAGE Learning

Reference Books

1. Real Digital Forensics by Keith J. Jones, Richard Bejtich, Curtis W. Rose, Addison- Wesley Pearson Education
2. Forensic Compiling, A Tractitioneris Guide by Tony Sammes and Brian Jenkinson, Springer International edition.
3. Computer Evidence Collection & Presentation by Christopher L.T. Brown, Firewall Media.
4. Homeland Security, Techniques & Technologies by Jesus Mena, Firewall Media.
5. Software Forensics Collecting Evidence from the Scene of a Digital Crime by Robert M. Slade, TMH 2005
6. Windows Forensics by Chad Steel, Wiley India Edition.

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DATA ANALYTICS **(Program Specific Elective-III)**

Course objectives:

Students will :

1. Explore the fundamental concepts of data analytics.
2. Learn the principles and methods of statistical analysis
3. Discover interesting patterns, analyze supervised and unsupervised models and estimate the accuracy of the algorithms.
4. Understand the various search methods and visualization techniques.

Course outcomes:

Students will be able to:

After completion of this course students will be able to

1. Understand the impact of data analytics for business decisions and strategy
2. Carry out data analysis/statistical analysis
3. Carry out standard data visualization and formal inference procedures
4. Design Data Architecture
5. Understand various Data Sources

UNIT - I

Data Management: Design Data Architecture and manage the data for analysis, understand various sources of Data like Sensors/Signals/GPS etc. Data Management, Data Quality(noise, outliers, missing values, duplicate data) and Data Processing & Processing.

UNIT - II

Data Analytics: Introduction to Analytics, Introduction to Tools and Environment, Application of Modeling in Business, Databases & Types of Data and variables, Data Modeling Techniques, Missing Imputations etc. Need for Business Modeling.

UNIT - III

Regression – Concepts, Blue property assumptions, Least Square Estimation, Variable Rationalization, and Model Building etc.

Logistic Regression: Model Theory, Model fit Statistics, Model Construction, Analytics applications to various Business Domains etc.

UNIT - IV

Object Segmentation: Regression Vs Segmentation – Supervised and Unsupervised Learning, Tree Building – Regression, Classification, Overfitting, Pruning and Complexity, Multiple Decision Trees etc.

Time Series Methods: Arima, Measures of Forecast Accuracy, STL approach, Extract features from generated model as Height, Average Energy etc and Analyze for prediction

UNIT - V

Data Visualization: Pixel-Oriented Visualization Techniques, Geometric Projection Visualization Techniques, Icon-Based Visualization Techniques, Hierarchical Visualization Techniques, Visualizing Complex Data and Relations.

Text books:

1. Student's Handbook for Associate Analytics – II, III.
2. Data Mining Concepts and Techniques, Han, Kamber, 3rd Edition, Morgan Kaufmann Publishers.

Reference books:

1. Introduction to Data Mining, Tan, Steinbach and Kumar, Addison Wesley, 2006.
2. Data Mining Analysis and Concepts, M. Zaki and W. Meira
3. Mining of Massive Datasets, Jure Leskovec Stanford Univ.
Anand RajaramanMilliway Labs Jeffrey D Ullman Stanford Univ.

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PARALLEL COMPUTING
(Program Specific Elective – III)

Prerequisites

1. Computer Organization & Architecture
2. Operating Systems
3. Programming for problem solving

Course objectives:

Students will :

1. Introduce the foundations of parallel Computing
2. Learn various parallel computing architectures and programming models
3. Gain knowledge of writing efficient parallel programs

Course outcomes:

Students will be able to:

1. Understand the concepts of parallel architectures
2. Select the data structures that efficiently model the information in a problem.
3. Develop an efficient parallel algorithm to solve it.
4. Implement an efficient and correct code to solve it, analyse its performance

UNIT - I

Parallel Computing: Introduction, Motivation and scope - Parallel Programming Platforms – Basic Communication Operations

UNIT - II

Principles of Parallel Algorithm Design - Analytical Modelling of Parallel Programs

UNIT - III

Programming using Message Passing Paradigm(MPI) – Programming Shared Address Space Platforms(PThreads)

UNIT - IV

Dense Matrix Algorithms (Matrix-Vector Multiplication , Matrix-Matrix Multiplication) – Sorting Algorithms (Issues, Bubble Sort, Quick Sort, Bucket Sort, Enumeration Sort, Radix Sort)

UNIT - V

Graph Algorithms (Minimum Spanning Tree: Prim's Algorithm - Single-Source Shortest Paths: Dijkstra's Algorithm) Search Algorithms (DFS, BFS)

Text Book:

1. Introduction to Parallel Computing, Second Edition, Ananth Grama, George Karypis, Vipin Kumar, Anshul Gupta, Addison-Wesley, 2003, ISBN: 0201648652

References:

1. Parallel Computing – Theory and Practice, Second Edition, Michael J. Quinn, Tata McGraw-Hill Edition.
2. Parallel Computers – Architectures and Programming, V. Rajaraman, C. Siva Ram Murthy, PHI.

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HUMAN COMPUTER INTERACTION
(Program Specific Elective-IV)

Course objectives:

Students will :

- 1.Understand the design principles of developing a Human Computer Interface (HCI).
- 2.Learn tools and devices required for designing a good interface

Course outcomes:

Students will be able to:

- 1.Acquire knowledge on principles and components of HCI.
- 2.Analyze product usability evaluations and testing methods
- 3.Design an effective user interface for software application using the building tools and techniques

UNIT - I

Introduction: Importance of user Interface – definition, importance of good design. Benefits of good design. A brief history of Screen design

The graphical user interface: Popularity of graphics, direct manipulation, graphical system, Characteristics, Web user –interface popularity, characteristics- Principles of user interface.

UNIT - II

Design process: Human interaction with computers, important of human characteristics in design, human considerations in design, Human interaction speeds, understanding business junctions.

UNIT - III

Screen Designing : Interface design goals, Screen meaning and purpose, organizing screen elements, ordering of screen data and content, screen navigation and flow, Visually pleasing composition, amount of information, focus and emphasis, presenting information simply and meaningfully, information retrieval on web, statistical graphics, Technological consideration in interface design.

UNIT - IV

Windows: Window characteristics, components of a window, presentation styles, types, management, organizing window functions, operations

Selection of device based and screen based controls.

UNIT - V

Write clear text and messages, create meaningful Graphics, Icons, Images, Choose proper colors

Interaction Devices:

Keyboard and function keys, pointing devices, speech recognition digitization and generation, image and video displays, drivers.

Text Books:

1. Wilbent. O. Galitz, “The Essential Guide To User Interface Design”, Second Edition, Wiley India Edition
2. Ben Sheiderman, “Designing The User Interface”, Third Edition, Addison-Wesley

Reference:

1. Alan Cooper, “The Essential Of User Interface Design”, Wiley – Dream Tech Ltd., 2002.

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COMPUTER VISION
(Program Elective - IV)

Course objectives:

Students will :

1. Review image processing techniques for computer vision
2. Understand shape and region analysis
3. Understand Hough Transform and its applications to detect lines, circles, ellipses
4. Understand three-dimensional image analysis techniques
5. Understand motion analysis
6. Study some applications of computer vision algorithms

Course outcomes:

Students will be able to:

Upon Completion of the course, the students will be able to

1. Implement fundamental image processing techniques required for computer vision
2. Perform shape analysis
3. Implement boundary tracking techniques
4. Apply chain codes and other region descriptors
5. Apply Hough Transform for line, circle, and ellipse detections
6. Apply 3D vision techniques
7. Implement motion related techniques
8. Develop applications using computer vision techniques

UNIT - I

IMAGE PROCESSING FOUNDATIONS

Review of image processing techniques – classical filtering operations – thresholding techniques – edge detection techniques – corner and interest point detection – mathematical morphology – texture

UNIT - II

SHAPES AND REGIONS

Binary shape analysis – connectedness – object labeling and counting – size filtering – distance

functions – skeletons and thinning – deformable shape analysis – boundary tracking procedures –

active contours – shape models and shape recognition – centroidal profiles – handling occlusion – boundary length measures – boundary descriptors – chain codes – Fourier descriptors – region descriptors – moments

UNIT - III

HOUGH TRANSFORM

Line detection – Hough Transform (HT) for line detection – foot-of-normal method – line localization – line fitting – RANSAC for straight line detection – HT based circular object detection – accurate center location – speed problem – ellipse detection – Case study: Human Iris location – hole detection – generalized Hough Transform – spatial matched filtering – GHT for ellipse detection – object location – GHT for feature collation

UNIT - IV

3D VISION AND MOTION

Methods for 3D vision – projection schemes – shape from shading – photometric stereo – shape from texture – shape from focus – active range finding – surface representations – point-based representation – volumetric representations – 3D object recognition – 3D reconstruction – introduction to motion – triangulation – bundle adjustment – translational alignment – parametric motion – splinebased motion – optical flow – layered motion

UNIT - V

APPLICATIONS

Application: Photo album – Face detection – Face recognition – Eigen faces – Active appearance and 3D shape models of faces Application: Surveillance – foreground-background separation – particle filters – Chamfer matching, tracking, and occlusion – combining views from multiple cameras – human gait analysis Application: In-vehicle vision system: locating roadway – road markings – identifying road signs – locating pedestrians

TEXTBOOK:

1. E. R. Davies, “Computer & Machine Vision”, Fourth Edition, Academic Press, 2012.

REFERENCES:

1. R. Szeliski, “Computer Vision: Algorithms and Applications”, Springer 2011.
2. Simon J. D. Prince, “Computer Vision: Models, Learning, and Inference”, Cambridge University Press, 2012.
3. Mark Nixon and Alberto S. Aquado, “Feature Extraction & Image Processing for Computer Vision”, Third Edition, Academic Press, 2012.
4. D. L. Baggio et al., “Mastering OpenCV with Practical Computer Vision Projects”, Packt Publishing, 2012.
5. Jan Erik Solem, “Programming Computer Vision with Python: Tools and algorithms for analyzing images”, O'Reilly Media, 2012.

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DISTRIBUTED DATABASES
(Program Specific Elective-IV)

Prerequisites

1. A course on “Database Management Systems”

Course objectives:

Students will :

To acquire knowledge on parallel and distributed databases and its applications.

1. Study the usage and applications of Object Oriented databases.
2. Learn the modeling and design of databases
3. Acquire knowledge on parallel and distributed databases and its applications.
4. Equip students with principles and knowledge of parallel and object oriented databases.
5. Know topics include distributed DBMS architecture and design; query processing and optimization; distributed transaction management and reliability; parallel and object database management systems.

Course outcomes:

Students will be able to:

1. Understand theoretical and practical aspects of distributed database systems.
2. Study and identify various issues related to the development of distributed database system.
3. Understand the design aspects of object oriented database system and related development.
4. Ability to write global queries for distributed databases.

UNIT - I

Features of Distributed versus Centralized Databases, Principles of Distributed Databases, Levels Of Distribution Transparency, Reference Architecture for Distributed Databases, Types of Data Fragmentation, Integrity Constraints in Distributed Databases, Distributed Database Design

UNIT - II

Translation of Global Queries to Fragment Queries, Equivalence transformations for Queries, Transforming Global Queries into Fragment Queries, Distributed Grouping and Aggregate Function Evaluation, Parametric Queries.

Optimization of Access Strategies, A Framework for Query Optimization, Join Queries, General Queries

UNIT - III

The Management of Distributed Transactions, A Framework for Transaction Management, Supporting Atomicity of Distributed Transactions, Concurrency Control for Distributed Transactions, Architectural Aspects of Distributed Transactions

Concurrency Control, Foundation of Distributed Concurrency Control, Distributed Deadlocks, Concurrency Control based on Timestamps, Optimistic Methods for Distributed Concurrency Control.

UNIT - IV

Reliability, Basic Concepts, Nonblocking Commitment Protocols, Reliability and concurrency Control, Determining a Consistent View of the Network, Detection and Resolution of Inconsistency, Checkpoints and Cold Restart, Distributed Database Administration, Catalog Management in Distributed Databases, Authorization and Protection

UNIT - V

Architectural Issues, Alternative Client/Server Architectures, Cache Consistency, Object Management, Object Identifier Management, Pointer Swizzling, Object Migration, Distributed Object Storage, Object Query Processing, Object Query Processor Architectures, Query Processing Issues, Query Execution, Transaction Management, Transaction Management in Object DBMSs, Transactions as Objects

Database Integration, Scheme Translation, Scheme Integration, Query Processing Query Processing Layers in Distributed Multi-DBMSs, Query Optimization Issues Transaction Management Transaction and Computation Model, Multidatabase Concurrency Control, Multidatabase Recovery, Object Orientation and Interoperability, Object Management Architecture CORBA and Database interoperability, Distributed Component Object Model, COM/OLE and Database Interoperability, PUSH-Based Technologies

Text books:

1. Distributed Databases Principles & Systems, Stefano Ceri, Giuseppe Pelagatti, TMH.
2. Principles of Distributed Database Systems, M. Tamer Ozsu, Patrick Valduriez , Pearson Education, 2nd Edition.

Reference books:

1. Distributed Database Systems, Chanda Ray, Pearson.
2. Distributed Database Management Systems, S.K. Rahimi and Frank.S. Haug, Wiley.

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ADVANCED ALGORITHMS LAB

Course objectives:

Students will :

The student can able to attain knowledge in advance algorithms.

Course outcomes:

Students will be able to:

The student can able to analyze the performance of algorithms

1. Implement assignment problem using Brute Force method
2. Perform multiplication of long integers using divide and conquer method.
3. Implement solution for knapsack problem using Greedy method.
4. Implement Gaussian elimination method.
5. Implement LU decomposition
6. Implement Warshall algorithm
7. Implement Rabin Karp algorithm.
8. Implement KMP algorithm.
9. Implement Harspool algorithm
10. Implement max-flow problem.

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NETWORK PROGRAMMING LAB

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Course Objectives:

Student will:

1. Familiarize with the Linux environment.
2. Describe the fundamentals of shell scripting/programming.
3. Apply the various linux system calls for writing c programs to implement inter-process communication.
4. Analyze use of UNIX utilities like pipes, FIFOs.
5. Analyze TCP and UDP programs.

Course Outcomes:

Student will able to:

1. Develop application programs using commands and system calls in unix.
2. Develop effective use of unix utilities, and scripting languages
3. Implement inter-process communication between processes.
4. Construct and manage simple tcp/ip network services on a linux system.
5. Implement UDP for client-server application.

Note: Use Bash for Shell scripts.

EXPERIMENT 1. Write a shell script that accepts a file name, starting and ending line numbers as arguments and displays all the lines between the given line numbers.

EXPERIMENT 2. Write a shell script that deletes all lines containing a specified word in one or more files supplied as arguments to it.

EXPERIMENT 3. Write a shell script that displays a list of all the files in the current directory to which the user has read, write and execute permissions.

EXPERIMENT 4. Write a shell script that receives any number of file names as arguments checks if every argument supplied is a file or a directory and reports accordingly. Whenever the argument is a file, the number of lines on it is also reported.

EXPERIMENT 5. Write a shell script that accepts a list of file names as its arguments, counts and reports the occurrence of each word that is present in the first argument file on other argument files.

EXPERIMENT 6. Write a shell script to list all of the directory files in a directory.

EXPERIMENT 7. Write a shell script to find factorial of a given integer.

EXPERIMENT 8. Write an awk script to count the number of lines in a file that do not contain vowels.

EXPERIMENT 9. Write an awk script to find the number of characters, words and lines in a file.

EXPERIMENT 10. Write a c program that makes a copy of a file using standard I/O and system calls.

EXPERIMENT 11. Implement in C the following Unix commands using System calls

A . cat

B. ls

C. mv

EXPERIMENT 12. Write a program that takes one or more file/directory names as command line input and reports the following information on the file.

A. File type.

B. Number of links.

C. Time of last access. D. Read, Write and Execute permissions.

EXPERIMENT 13. Write a C program to emulate the Unix ls -l command.

EXPERIMENT 14. Write a C program to list for every file in a directory, its inode number and file name.

EXPERIMENT 15. Write a C program that demonstrates redirection of standard output to a file.Ex: ls > f1.

EXPERIMENT 16. Write a C program to create a child process and allow the parent to display “parent” and the child to display “child” on the screen.

EXPERIMENT 17. Write a C program to create a Zombie process.

EXPERIMENT 18. Write a C program that illustrates how an orphan is created.

EXPERIMENT 19. Write a C program that illustrates how to execute two commands concurrently with a command pipe. Ex:- `ls -l | sort`

EXPERIMENT 20. Write C programs that illustrate communication between two unrelated processes using named pipe.

EXPERIMENT 21. Write a C program to create a message queue with read and write permissions to write 3 messages to it with different priority numbers.

EXPERIMENT 22. Write a C program that receives the messages (from the above message queue as specified in (21)) and displays them.

EXPERIMENT 23. Write a C program to allow cooperating processes to lock a resource for exclusive use, using a) Semaphores b) flock or lockf system calls.

EXPERIMENT 24. Write a C program that illustrates suspending and resuming processes using signals.

EXPERIMENT 25. Write a C program that implements a producer-consumer system with two processes. (using Semaphores).

EXPERIMENT 26. Write client and server programs (using c) for interaction between server and client processes using Unix Domain sockets.

EXPERIMENT 27. Write client and server programs (using c) for interaction between server and client processes using Internet Domain sockets.

EXPERIMENT 28. Write a C program that illustrates two processes communicating using shared memory.

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**DEPARTMENT OF COMPUTER SCIENCE AND
ENGINEERING**

M.Tech	L	T	P	C
I Year III-Sem	3	0	0	3

BLOCKCHAIN TECHNOLOGY
(Program Specific Elective-V)

Course objectives:

Students will :

1. Learn the fundamentals of BlockChain Technology
2. Understand the History of Money and working with Bitcoin
3. Understand usage of cryptography in Block Chain Technology
4. Create smart account and decentralized Systems

Course outcomes:

Students will be able to:

1. Understated the block chain Technology and limitations
2. Analyse the history of money and working with Bitcoin and Bitcoin wallets
3. Use cryptography in bitcoin transactions
4. Understand the Design philosophy of Block Chain Technology and Virtual Machine
5. Develop Decentralized applications and Building ethereumDapp

UNIT-I:

Introduction: History, what is blockchain, the structure of block chains, types of block chain, block chain applications, block chain lifecycle. Limitations and challenges of blockchain.

UNIT – II:

Crypto currencies: Cryptography, the science behind crypto currencies, Symmetric key cryptography, cryptography hash functions, MAC and HMAC, asymmetric key cryptography Diffie-Hellman key exchange, symmetric vs asymmetric key cryptography, game theory Nash

equilibrium, prisoners dilemma, byzantine Generals' problem, zero-sum games.

UNIT-III:

Bitcoin: History of Money, working with Bitcoins, the Bitcoin Blockchain, Bitcoin network, bitcoin scripts, Full nodes vs SPVs, Bitcoin wallets.

UNIT – IV:

Ethereum: Ethereum as Next-Gen Blockchain, Design Philosophy of Ethereum, Ethereum Blockchain, Ethereum Accounts, Trie Usage, RLP Encoding, Ethereum Transaction Message structure, Ethereum smart contracts, Ethereum Virtual Machine, Ethereum Eco System .

UNIT – V:

Block chain application development, Interacting with bitcoin blockchain, interacting programmatically with ethereum for sending transactions, creating smart account, executing smart contract functions, decentralised application structure. Building an ethereum Dapp

Text Books:

1. Beginning Blockchain: A Beginner's Guide to Building Blockchain Solutions by Bikramaditya Singhal, Gautam Dhameja , Priyansu Sekhar Panda.
2. Blockchain Technology Explained: The Ultimate Beginner's Guide About Blockchain Wallet, Mining, Bitcoin, Ethereum, Litecoin, Zcash, Monero, Ripple, Dash

Reference Books:

1. Blockchain Technology: Introduction to Blockchain Technology and its impact on Business Ecosystem
2. Blockchain: Bitcoin, Ethereum & Blockchain: Beginners Guide to Understanding the Technology Behind Bitcoin & Cryptocurrency
3. Blockchain: Discover the Technology behind Smart Contracts, Wallets, Mining and Cryptocurrency.

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**DEPARTMENT OF COMPUTER SCIENCE AND
ENGINEERING**

M.Tech.	L	T	P	C
II Year I-Sem	3	0	0	3

HIGH PERFORMANCE COMPUTING
(Program Specific Elective-V)

Prerequisites

1. Computer Organization & Architecture
2. Operating System Programming

Course objectives:

Students will :

1. Improve the system performance
2. Learn various distributed and parallel computing architecture
3. Learn different computing technologies

Course outcomes:

Students will be able to:

1. Understanding the concepts in grid computing
2. Set up cluster and run parallel applications
3. Understand the cluster projects and cluster OS
4. Understand the concepts of pervasive computing & quantum computing.

UNIT - I

Grid Computing: Data & Computational Grids, Grid Architectures And Its Relations To Various Distributed Technologies. Autonomic Computing, Examples Of The Grid Computing Efforts (Ibm).

UNIT - II

Cluster Setup & Its Advantages, Performance Models & Simulations; Networking Protocols & I/O, Messaging Systems. Process Scheduling, Load Sharing And Balancing; Distributed Shared Memory, Parallel I/O.

UNIT - III

Example Cluster System – Beowlf; Cluster Operating Systems: Compas And Nanos

Pervasive Computing Concepts & Scenarios; Hardware & Software; Human – Machine Interface.

UNIT - IV

Device Connectivity; Java For Pervasive Devices; Application Examples.

UNIT - V

Classical Vs Quantum Logic Gates; One, Two & Three Qubit Quantum Gates; Fredkin & Toffoli Gates; Quantum Circuits; Quantum Algorithms.

Text Book:

1. “Selected Topics In Advanced Computing” Edited By Dr. P. Padmanabham And Dr. M.B. Srinivas, 2005 Pearson Education.

References:

1. J. Joseph & C. Fellenstien: ‘Grid Computing ‘, Pearson Education
2. J. Burkhardt et.al: ‘pervasive computing’ Pearson Education
3. Marivesar:’ Approaching quantum computing’, pearson Education.
4. Raj kumar Buyya:’High performance cluster computing’, pearson Education.
5. Neilsen & Chung L:’Quantum computing and Quantum Information’, Cambridge University Press.
6. A networking approach to Grid Computing , Minoli , Wiley

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M.Tech.	L	T	P	C
II Year I-Sem	3	0	0	3

ADHOC AND SENSOR NETWORKS
(Program Specific Elective-V)

Prerequisites

1. Computer Networks
2. Distributed Systems
3. Mobile Computing

Course objectives:

Students will :

1. Understand the concepts of sensor networks
2. Understand the MAC and transport protocols for adhoc networks
3. Understand the security of sensor networks
4. Understand the applications of adhoc and sensor networks

Course outcomes:

Students will be able to:

1. Understand the state of the art research in emerging subject of ad hoc and wireless sensor networks (ASN)
2. Solve the issues in real-time application development based on ASN
3. Conduct further research in the ASN domain

UNIT - I

Introduction to Ad Hoc Networks - Characteristics of MANETs, Applications of MANETs and Challenges of MANETs.

Routing in MANETs - Criteria for classification, Taxonomy of MANET routing algorithms, *Topology-based* routing algorithms-Proactive: DSDV, WRP; Reactive: DSR, AODV, TORA; Hybrid: ZRP; *Position-based* routing algorithms-Location Services-DREAM, Quorum-based, GLS; Forwarding Strategies: Greedy Packet, Restricted Directional

Flooding-DREAM, LAR; Other routing algorithms-QoS Routing, CEDAR.

UNIT - II

Data Transmission - Broadcast Storm Problem, Rebroadcasting Schemes-Simple-flooding, Probability-based Methods, Area-based Methods, Neighbour Knowledge-based: SBA, Multipoint Relaying, AHBP. Multicasting: Tree-based: AMRIS, MAODV; Mesh-based: ODMRP, CAMP; Hybrid: AMRoute, MCEDAR and Geocasting: Data-transmission Oriented-LBM; Route Creation Oriented-GeoTORA, MGR.

UNIT - III

TCP over Ad Hoc TCP protocol overview, TCP and MANETs, Solutions for TCP over Ad hoc Basics of Wireless, Sensors and Applications Applications, Classification of sensor networks, Architecture of sensor network, Physical layer, MAC layer, Link layer.

UNIT - IV

Data Retrieval in Sensor Networks

Routing layer, Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs, Sensor Networks and mobile robots.

UNIT - V

Security - Security in Ad Hoc networks, Key management, Secure routing, Cooperation in MANETs, Intrusion Detection systems.

Text Books:

1. Ad Hoc and Sensor Networks – Theory and Applications, *Carlos Corderio Dharma P. Aggarwal*, World Scientific Publications, March 2006, ISBN – 981-256-681-3
2. Wireless Sensor Networks: An Information Processing Approach, Feng Zhao, Leonidas Guibas, Elsevier Science, ISBN – 978-1-55860-914-3 (Morgan Kauffman)

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DEPARTMENT OF COMPUTER SCIENCE AND
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PYTHON PROGRAMMING
(Open Elective)

L	T-P	C
3	0-0	3

Course objectives:

Student will:

1. Learn how to design and program Python applications.
2. Learn how to use lists, tuples, and dictionaries in Python programs.
3. Learn how to identify Python object types, Components ,decision statements, pass arguments in Python.
4. Learn how to build and package Python modules for reusability, design object oriented programs with Python classes,use class inheritance in Python for reusability.
5. Learn how to use exception handling in Python applications for error handling

Course outcomes:

Students will able to:

1. Describe to design and program Python applications.
2. Analyze and conversion of to use lists, tuples, and dictionaries in Python programs.
3. Explain the concept to identify Python object types, Components ,decision statements, pass arguments in Python.
4. Apply decision for building and package Python modules for reusability, design object-oriented programs with Python classes,use class inheritance in Python for reusability.

UNIT - I:

Programming paradigms; Structured programming vs object oriented programming, OOPs fundamentals- class, object, abstraction, encapsulation, polymorphism, and inheritance; Introduction to Python Getting started to Python- an interpreted high level language, interactive

mode and script mode. Variables, Expressions and Statements Values and types, Variables and keywords, statements, evaluating expressions, operators and operands, order of operations, composition. Functions function calls, type conversion, type coercion, pre-defined functions, composition, user define functions, flow of execution, passing parameters, function parameters and scope. Conditionals and recursion modulus operator, Boolean expression, logical operators, conditional execution, alternative execution, chained and nested conditionals, return statement; Recursion, infinite recursion.

UNIT - II:

Python data structures Strings Creating, initializing and accessing the elements; String operators, comparing strings using relational operators; String functions and methods. **Lists:** Concept of mutable lists, creating, initializing and accessing the elements, traversing, appending, updating and deleting elements; List operations; List functions and Methods, list parameters, nested lists, Matrices.

Dictionaries

Concept of key-value pair, creating, initializing and accessing the elements in a dictionary, dictionary operations traversing, appending, updating and deleting elements, Dictionary functions and methods.

Tuples

Mutability and tuples, Immutable concept, creating, initializing and accessing the elements in a tuple, Tuple functions.

UNIT - III:

Object oriented programming using Python: creating python classes, classes and objects: user defined compound types, attributes, instances as arguments, instances as return values, objects are mutable, copying; classes and functions: pure function, modifiers; Exceptions: raising exceptions, handling exceptions, exception hierarchy.

UNIT - IV:

Classes and methods: object oriented features, optional arguments, initialization method, operator overloading and polymorphism. Inheritance: Basic Inheritance: extending built-ins, overriding and super; Multiple inheritance: the diamond problem, different sets of arguments.

UNIT - V:

Files handling and Exceptions: Text files, writing variables, Directories, Pickling;

Database Programming in Python: Connection module, connect MySQL

Data base, perform DDL, DML and DQL operations.

Text Books:

1. **Python 3 Object Oriented Programming**, Dusty Phillips, Packet Publishing, 2010.
2. **Programming in Python 3** - A complete Introduction to the Python Language- Second Edition, Mark Summerfields, Addison-Wesley 2010.

Reference Books:

1. **Programming Python- 4th Edition**, Mark Lutz, O'Reilly, 2011.
2. **Object-Oriented Programming in Python**, Michael H, Goldwasser, David Letscher, Pearson Prentice Hall, 2008.

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DEPARTMENT OF COMPUTER SCIENCE AND
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E-COMMERCE
(Open Elective)

L	T-P	C
3	0-0	3

Course objectives:

At the end of the course, students will :

1. Gain knowledge about the main objective and at the same time need is transaction on your web store. Of, course if you are selling products online what you require are customers. If you are getting good reach ability then your business will definitely grow. Therefore one of the objectives is high reachability.
2. Solve conversions i.e., if people are coming on your web store and purchasing something then it will calculate as conversions and from the number of people who are buying stuff from your web store we can calculate the conversion rate.
3. Provide customer satisfaction i.e., customer is the main part of any e-commerce business so it's very important to make your customer happy and satisfied by providing quality and desirable products, on time delivery, 24*7 customer support, and timely sale & best deal offers you can make your customer happy. It is one of the main objectives of e-commerce.
4. Receive social popularity i.e., unless and until you are not famous and popular among people you cannot establish your brand. Social presence with omni channel and digital marketing is essential for any e-commerce business.

Course outcomes:

Students will be able to:

1. Demonstrate an understanding of the foundations and importance of e-commerce.

2. Demonstrate an understanding of retailing in e-commerce by:
 - a. Analyzing branding and pricing strategies,
 - b. Using and determining the effectiveness of market research.
 - c. Assessing the effects of disintermediation.
3. Analyze the impact of e-commerce on business models and strategy.
4. Describe internet trading relationships including business-to-business, intraorganizational.
5. Describe the infrastructure for E-Commerce.

UNIT-I:

Introduction, Electronic Commerce Framework, The Anatomy of E-Commerce applications, E-Commerce Consumer applications, E-Commerce organization applications.

UNIT-II:

Consumer Oriented Applications, mercantile process models, mercantile models from the consumer's perspective, Mercantile from the merchant's perspective.

Types of Electronic Payment Systems, Digital Token-Based Electronic Payment Systems, Smart Cards & Electronic Payment Systems, Credit Card- Based Electronic Payment Systems, Risk & Electronic Payment Systems, Designing Electronic Payment Systems.

UNIT-III:

Electronic Data Interchange, EDI Applications in Business, EDI implementation, MIME, and value added networks.

Intra organizational E-Commerce, Macro forces and Internal Commerce, Work flow automation and Coordination, Customization and Internal Commerce, Supply Chain Management(SCM).

UNIT-IV:

Making a business case for a Document Library, Digital document types, Corporate Data warehouses, Advertising and Marketing, the new age of Information Based Marketing, advertising on Internet, charting the Online marketing process, Market Research.

UNIT-V:

Consumer Search and Resource Discovery, information search and Retrieval, Electronic commerce catalogs or directories, Information Filtering.

Multimedia and Digital video, Key Multimedia concepts, Digital Video & Electronic Commerce, Desktop Video Processing, Desktop Video Conferencing.

Text Books

1. "Frontiers of electronic commerce" – Kalakota, Whinston, Pearson
2. "E-Commerce", S.Jaiswal – Galgotia

References

1. Ravi Kalakota, Andrew Winston, "Frontiers of Electronic Commerce", Addison- Wesley.
2. Goel, Ritendra "E-commerce", New Age International
3. Laudon, "E-Commerce: Business, Technology, Society", Pearson Educatio

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DEPARTMENT OF COMPUTER SCIENCE AND
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COMPUTER FORENSICS
(Open Elective)

L	T	P	C
3	0	0	3

UNIT-I:

Computer Forensics Fundamentals: What is Computer Forensics?. Use of Computer Forensics in Law Enforcement, Computer Forensics in Law Enforcement, Computer Forensics Assistance to Human Resources/Employment Proceedings, Computer Forensics Services, Benefits of professional Forensics Methodology, Steps taken by computer Forensics Specialists.

Types of Computer Forensics Technology: Types of Military Computer Forensics Technology, Types of Law Enforcement - Computer Forensic Technology - Types of Business Computer Forensics Technology.

Computer Forensics Evidence and Capture: Data Recovery Defined-Data Back-up and Recovery- The Role of Back-up in Data Recovery-The Data Recovery Solution.

UNIT-II :

Evidence Collection and Data Seizure: Why Collection Evidence? Collection Options – Obstacles – Types of Evidence – The Rules of Evidence- Volatile Evidence- General Procedure – Collection and Archiving – Methods of Collection – Artifacts – Collection Steps – Controlling Contamination: The chain of Custody.

Duplication and preservation of Digital Evidence: Preserving the Digital Crime Scene – Computer Evidence Processing Steps – Legal Aspects of Collecting Preserving Computer Forensics Evidence. Computer Image Verification and Authentication: Special Needs of Evidential Authentication – Practical Consideration – Practical Implementation.

UNIT-III :

Computer Forensics analysis and validation: Determining what data to collect and analyze, validating forensic data, addressing data – hiding

techniques, performing remote acquisitions.

Network Forensics: Network Forensics overview, performing live acquisitions, developing standard procedures for network forensics, using network tools, examining the honeynet project.

UNIT-IV :

Processing crime and incident scenes: Identifying digital evidence, collecting evidence in private-sector incident scenes, processing law enforcement crime scenes, preparing for a search, securing a computer incident or crime scene, seizing digital evidence at the scene, storing digital evidence, obtaining a digital hash, reviewing a case.

Current computer forensic tools: evaluating computer forensic tool needs, computer forensics software tools, computer forensics hardware tools, validating and testing forensics software.

UNIT-V :

E-Mail investigations: Exploring the role of E-mail in investigation, exploring the role of the client and server in E-mail, investigating e-mail crimes and violations, understanding e-mail servers, using specialized e-mail forensic tools.

Cell phone and mobile device forensics: Understanding mobile device forensics, understanding acquisition procedures for cell phones and mobile devices.

Working with windows and DOS Systems: Understanding file systems, exploring Microsoft

File Structures, Examining NTFS Disks, Understanding whole disk encryption, windows registry, Microsoft startup tasks, MS-DOS Startup tasks, virtual machines.

TEXTBOOKS

1. Computer forensics, computer crime investigation by John R.Vacca, Firewall Media, New Delhi.
2. Computer forensics and investigations by Nelson, Phillips Einfinger Steuart, CENGAGE Learning.

REFERENCE BOOKS

1. Real Digital Forensics by Keith J.Jones, Recharad Bejtlich, Curtis W.Rose, Addison-Wesley Pearson Education.
2. Forensic compiling, A Tractitioneris Guide By Tony Sammes and Brain Jenkinson, Springer International Edition.
3. Computer Evidence Collection & Presentation by Christopher L.T.Brown, Firewall Media.

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M.Tech CSE

L T P C
2 0 0 0

ENGLISH FOR RESEARCH PAPER WRITING
(Audit Course)

Unit-I

Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness

Unit-II

Clarifying Who Did What, Highlighting Your Findings, Hedging and 4 Criticising, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction

Unit-III

Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check.

Unit-IV

key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature,

Unit-V

skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions useful phrases, how to ensure paper is as good as it could possibly be the 4 first time submission

Suggested Studies:

1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman's book .

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M.Tech CSE

L T P C
2 0 0 0

DISASTER MANAGEMENT
(Audit Course)

Unit-I

Introduction

Disaster: Definition, Factors And Significance; Difference Between Hazard And Disaster; Natural And Manmade Disasters: Difference, Nature, Types And Magnitude.

Unit-II

Repercussions Of Disasters And Hazards: Economic Damage, Loss Of Human And Animal Life, Destruction Of Ecosystem.

Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.

Unit-III

Disaster Prone Areas In India

Study Of Seismic Zones; Areas Prone To Floods And Droughts, Landslides And Avalanches; Areas Prone To Cyclonic And Coastal Hazards With Special Reference To Tsunami; Post-Disaster Diseases And Epidemics

Unit-IV

Disaster Preparedness And Management

Preparedness: Monitoring Of Phenomena Triggering A Disaster Or Hazard; Evaluation Of Risk: Application Of Remote Sensing, Data From Meteorological And Other Agencies, Media Reports: Governmental And Community Preparedness.

Unit-V

Risk Assessment

Disaster Risk: Concept And Elements, Disaster Risk Reduction, Global And National Disaster Risk Situation. Techniques Of Risk Assessment, Global Co- Operation In Risk Assessment And Warning, People's Participation In Risk Assessment. Strategies for Survival.

Disaster Mitigation

Meaning, Concept And Strategies Of Disaster Mitigation, Emerging Trends In Mitigation. Structural Mitigation And Non-Structural Mitigation, Programs Of Disaster Mitigation In India.

SUGGESTED READINGS:

1. R. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies "New Royal book Company.

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M.Tech CSE

L T P C
2 0 0 0

PROFESSIONAL ETHICS
(Audit Course)

Course Objectives:

The student will :

1. Create social awareness & inculcate ethical values among the students.
2. Understand theoretical aspects of the subject
3. Identify the values that are so important for ethical behavior in society including workplace.

Course Outcomes:

The student will be able to:

1. discourse ethics and morals are imbibed in a student since childhood, still there is a need to inculcate certain ethical values among them
2. differentiate between the terms professionals as professionalism
3. acquire knowledge not only the theoretical aspect of the subject but also to internalize the values that are so important for ethical behavior in society including work places.

UNIT - I:Basic Concepts

Introduction, Ethics-Ethical Dilemma-Morals, , emotional, intelligence, Indian and western thoughts on ethics, value education, domains of learning, human values, attitudes, Basic Ethical Principles. Meaning of profession, professionalism, professional's roles and professional risks, professional accountability, successful professional, engineering professionals, engineering ethics, roles of engineers.

UNIT - II: Global issues and safety

Introduction, current scenario, business ethics, environmental ethics, computer ethics, ethical hacking and its dilemma,, ethics in research, intellectual property rights, patents, trademarks, managers and engineers responsibility , Engineerng ethics.

UNIT - III: Ethical codes and audits

Introduction need and types of professional ethical codes, sample standard codes, ethical codes for corporate entities and non-profit organization, charitable institutions, limitations of the codes, need for ethical audit, ethical profile of organizations.

REFERENCES:

1. Professional ethics and human value by D.R.Kiran, Tata McGraw Hills education.
2. Ethics in engineering by Mike W. Martin and Roland Schinzinger, Tata McGraw Hills education.
3. Fundamental of Ethics by Edmund G Seebauer and Robert L.Barry, Oxford university press.
4. Professional ethics and human values by R.S.Nagarajan, New age international.
5. Professional ethics by R. Subramanian, Oxford press.

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M.Tech CSE

L T P C
2 0 0 0

VALUE EDUCATION
(Audit Course)

Unit-I

Values and self-development –Social values and individual attitudes. Work ethics, Indian vision of humanism. Moral and non- moral valuation. Standards and principles Value judgements

Unit-II

Importance of cultivation of values. Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness. Honesty, Humanity. Power of faith, National Unity. Patriotism.Love for nature ,Discipline

Unit-III

Personality and Behavior Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline. Punctuality, Love and Kindness. Avoid fault Thinking.Free from anger, Dignity of labour.Universal brotherhood and religious tolerance. True friendship

Unit-IV

Happiness Vs suffering, love for truth. Aware of self-destructive habits. Association and Cooperation. Doing best for saving nature
Character and Competence –Holy books vs Blind faith.Self-management and Good health. Science of reincarnation.

Unit-V

Equality, Nonviolence ,Humility, Role of Women. All religions and same message. Mind your Mind, Self-control. Honesty, Studying effectively

Reference Book:

1. Chakroborty, S.K. “Values and Ethics for organizations Theory and practice”, Oxford University Press, New Delhi

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M.Tech CSE

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CONSTITUTION OF INDIA
(Audit Course)

Unit-I

History of Making of the Indian Constitution:

History

Drafting Committee, (Composition & Working)

Unit-II

Philosophy of the Indian Constitution:

Preamble Salient Features

Unit-III

Contours of Constitutional Rights & Duties:

Fundamental Rights Right to Equality Right to Freedom

Right against Exploitation Right to Freedom of Religion Cultural and Educational Rights

Right to Constitutional Remedies Directive Principles of State Policy

Fundamental Duties.

Unit-IV

Organs of Governance:

Parliament Composition

Qualifications and Disqualifications Powers and Functions

Executive President Governor

Council of Ministers

Judiciary, Appointment and Transfer of Judges, Qualifications Powers and Functions

Unit-V

Local Administration:

District's Administration head: Role and Importance,

Municipalities: Introduction, Mayor and role of Elected Representative
CEO of Municipal Corporation.

Pachayati raj: Introduction, PRI: Zila Pachayat. Elected officials and
their roles, CEO Zila Pachayat: Position and role. Block level:

Organizational Hierarchy (Different departments),

Village level: Role of Elected and Appointed officials,

Election Commission: Election Commission: Role and Functioning.

Chief Election Commissioner and Election Commissioners. State

Election Commission: Role and Functioning. Institute and Bodies for the
welfare of SC/ST/OBC and women

Suggested reading

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014

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**DEPARTMENT OF COMPUTER SCIENCE AND
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M.Tech CSE

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2 0 0 0

SOFT SKILLS
(Audit Course)

Unit-I:

KNOW YOURSELF/ SELF DISCOVERY and SOFT SKILLS

Introduction—Importance of Knowing Yourself

Process of knowing yourself—SWOT analysis

Benefits of SWOT analysis---Using SWOT analysis

SWOT analysis grid—questions to complete the grid

Introduction –What are soft skills?—importance of soft skills

Selling your skills—Attributes regarded as soft skills—Soft Skills

Social Soft Skills—Thinking Soft Skills—Negotiating –Exhibiting your Soft Skills

Identifying your soft skills—Improving your soft skills –Train Yourself

Top 60 soft skills—Practicing soft skills—Measuring Attitudes

Unit-II:

Time and Stress Management

Introduction—The 80-20 rule—take a good look at the people around you—Examine your work

Sense of time management –around you—examine your work—sense of time management

Time is money—features of time—three secrets of time management

Time management matrix—analysis of time matrix—effective scheduling

Grouping of activities—five steps to successful time management

Difficulties in time management—evils of not planning—interesting facts about time

Deal say of spending a day—time wasters—time savers—realizing the

value of time

Time circle planner.

Introduction –Meaning—Effects , Kinds , and Sources of Stress

Case study—spotting stress—stress management tips

Unit-III:

Developing Positive Attitude

Introduction—meaning –features of attitudes—attitude and human behavior : Passive, Aggressive and Behavior

Formation of attitudes—change of attitudes—what can you do to change attitude?

Ways of changing attitude in a person—attitude in a workplace

Features of a good team player

The power of positive attitude—developing positive attitude

Obstacles in developing positive attitude—staying negative—examples of negative attitude

Overcoming negative attitude—negative attitude and its results.

Unit-IV:

Body Language

Introduction –body talk—Voluntary and involuntary body language

Forms of body language—parts of body language—origin of body language

Uses of body language—Body language in building interpersonal relations

Body language in building interpersonal relations—reasons to study body language

Improving your body language –types of body language—gender differences

Body language—shaking hands

Interpreting body language

Unit-V:

Practice in Presentation Skills

Types of Presentations

Do's and Don'ts of Presentation Skills

Body language in presentation skills

Examples—Aspects, etc

TEXT BOOKS:

1. Soft Skills: Know Yourself and Know the World—Dr. K. Alex-S. Chand Publishing-2010

REFERENCE BOOKS:

1. Managing Soft skills: K.R. Lakshminarayanan & Murugavel, Scitech Publications-2010

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STRESS MANAGEMENT BY YOGA
(Audit Course)

Unit:I

Definitions of Eight parts of yog. (Ashtanga)

Unit:II

Yam and Niyam. Do`s and Don`t`s in life.

- i) Ahinsa, satya, astheya, bramhacharya and aparigraha
- ii) Shaucha, santosh, tapa, swadhyay, ishwarpranidhan

Unit:III

Asan and Pranayam

- i) Various yog poses and their benefits for mind & body
- ii)Regularization of breathing techniques and its effects-Types of pranayam

Reference book:

1. ‘Yogic Asanas for Group Tarining-Part-I’ : Janardan Swami
Yogabhyasi Mandal, Nagpur
2. “Rajayoga or conquering the Internal Nature” by Swami
Vivekananda, Advaita Ashrama (Publication Department),
Kolkata

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PERSONALITY DEVELOPMENT THROUGH LIFE
ENLIGHTENMENT SKILLS
(Audit Course)

UNIT-I:

Neetisatakam-Holistic development of personality Verses- 19,20,21,22
(wisdom)
Verses- 29,31,32 (pride & heroism) Verses- 26,28,63,65 (virtue)
Verses- 52,53,59 (dont's)
Verses- 71,73,75,78 (do's)

UNIT-II:

Approach to day to day work and duties. Shrimad Bhagwad Geeta :
Chapter 2-Verses 41, 47,48, Chapter 3-Verses 13, 21, 27, 35, Chapter 6
Verses 5,13,17, 23, 35, Chapter 18-Verses 45, 46, 48.

UNIT-III:

Statements of basic knowledge Shrimad Bhagwad Geeta: Chapter2-
Verses 56, 62, 68 Chapter 12 -Verses 13, 14, 15, 16,17, 18

UNIT-IV:

Personality of Role model. Shrimad Bhagwad Geeta: Chapter2-Verses
17, Chapter 3-Verses 36,37,42, Chapter 4-Verses 18, 38,39 Chapter18 –
Verses 37,38,63

Reference Book:

1. “Srimad Bhagavad Gita” by Swami Swarupananda Advaita Ashram (Publication Department), Kolkata
2. Bhartrihari's Three Satakam (Niti-sringar-vairagya) by P.Gopinath, Rashtriya Sanskrit Sansthanam, New Delhi.