

## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M. Tech. COMPUTER NETWORKS AND INFORMATION SECURITY/  
COMPUTER NETWORKS/CYBER SECURITY

EFFECTIVE FROM ACADEMIC YEAR 2019 - 20 ADMITTED BATCH

## COURSE STRUCTURE AND SYLLABUS

## I YEAR I – SEMESTER

Course Code	Course Title	L	T	P	Credits
Professional Core - I	Distributed Systems	3	0	0	3
Professional Core - II	Advanced Data Structures	3	0	0	3
Professional Elective - I	1. Information Security 2. Network Coding Theory 3. Cryptanalysis	3	0	0	3
Professional Elective - II	1. Network Security 2. Advanced Wireless Networks 3. Trustworthy Computing	3	0	0	3
Lab - I	Advanced Data Structures Lab	0	0	4	2
Lab - II	Information Security Lab	0	0	4	2
	Research Methodology & IPR	2	0	0	2
Audit - I	Audit Course - I	2	0	0	0
	<b>Total</b>	<b>16</b>	<b>0</b>	<b>8</b>	<b>18</b>

## I YEAR II – SEMESTER

Course Code	Course Title	L	T	P	Credits
Professional Core - III	Advanced Algorithms	3	0	0	3
Professional Core - IV	Web & Database Security	3	0	0	3
Professional Elective - III	1. Intrusion Detection & Prevention Systems 2. Internet of Things 3. Cloud Security	3	0	0	3
Professional Elective - IV	1. Digital Image Processing 2. Blockchain Technology 3. Biometrics	3	0	0	3
Lab - III	Web & Database Security Lab	0	0	4	2
Lab - IV	Internet of Things Lab	0	0	4	2
	Mini Project with Seminar	0	0	4	2
Audit - II	Audit Course - II	2	0	0	0
	<b>Total</b>	<b>14</b>	<b>0</b>	<b>12</b>	<b>18</b>

**II YEAR I – SEMESTER**

Course Code	Course Title	L	T	P	Credits
Professional Elective - V	1. Digital Forensics 2. Surveillance & Video Analytics 3. Data Analytics for Fraud Detection	3	0	0	3
Open Elective	Open Elective	3	0	0	3
Dissertation	Dissertation Work Review - II	0	0	12	6
	<b>Total</b>	<b>6</b>	<b>0</b>	<b>12</b>	<b>12</b>

**II YEAR II - SEMESTER**

Course Code	Course Title	L	T	P	Credits
Dissertation	Dissertation Work Review - III	0	0	12	6
Dissertation	Dissertation Viva-Voce	0	0	28	14
	<b>Total</b>	<b>0</b>	<b>0</b>	<b>40</b>	<b>20</b>

**\*For Dissertation Work Review - I, Please refer 7.8 in R19 Academic Regulations.**

**Audit Course I & II:**

1. English for Research Paper Writing
2. Disaster Management
3. Sanskrit for Technical Knowledge
4. Value Education
5. Constitution of India
6. Pedagogy Studies
7. Stress Management by yoga
8. Personality Development Through Life Enlightenment Skills

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**  
**M. Tech. (CNIS/CN/Cyber Security) – I Year – I Semester**  
**Common to CNIS, CN and Cyber Security**

**DISTRIBUTED SYSTEMS (PC– I)**

**Prerequisites:**

- A course on “Operating Systems”.

**Course Objectives:**

- This course provides an insight into Distributed systems.
- Topics include- Peer to Peer Systems, Transactions and Concurrency control, Security and Distributed shared memory

**Course Outcomes:**

- Ability to understand Transactions and Concurrency control.
- Ability to understand Security issues.
- Understanding Distributed shared memory.

**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.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**  
**M. Tech. (CNIS/CN/Cyber Security) – I Year – I Semester**  
**Common to CNIS, CN and Cyber Security**

**ADVANCED DATA STRUCTURES (PC– II)**

**Pre-Requisites:** UG level course in Data Structures

**Course Objectives:**

- The student should be able to choose appropriate data structures, understand the ADT/libraries, and use it to design algorithms for a specific problem.
- Students should be able to understand the necessary mathematical abstraction to solve problems.
- To familiarize students with advanced paradigms and data structure used to solve algorithmic problems.
- Student should be able to come up with analysis of efficiency and proofs of correctness.

**Course Outcomes:** After completion of course, students would be able to:

- Understand the implementation of symbol table using hashing techniques.
- Understand the implementation of symbol table using hashing techniques.
- Develop algorithms for text processing applications.
- Identify suitable data structures and develop algorithms for computational geometry problems.

**UNIT - I**

**Dictionaries:**

Definition, Dictionary, Abstract Data Type, Implementation of Dictionaries.

**Hashing:**

Review of Hashing, Hash Function, Collision Resolution Techniques in Hashing, Separate Chaining, Open Addressing, Linear Probing, Quadratic Probing, Double Hashing, Rehashing, Extendible Hashing.

**UNIT - II**

**Skip Lists:**

Need for Randomizing Data Structures and Algorithms, Search and Update Operations on Skip Lists, Probabilistic Analysis of Skip Lists, Deterministic Skip Lists.

**UNIT - III**

**Trees:**

Binary Search Trees, AVL Trees, Red Black Trees, 2-3 Trees, B-Trees, Splay Trees

**UNIT - IV**

**Text Processing:**

String Operations, Brute-Force Pattern Matching, The Boyer- Moore Algorithm, The Knuth-Morris-Pratt Algorithm, Standard Tries, Compressed Tries, Suffix Tries, The Huffman Coding Algorithm, The Longest Common Subsequence Problem (LCS), Applying Dynamic Programming to the LCS Problem

**UNIT - V**

**Computational Geometry:**

One Dimensional Range Searching, Two-Dimensional Range Searching, constructing a Priority Search Tree, Searching a Priority Search Tree, Priority Range Trees, Quadrees, k-D Trees.

Recent Trends in Hashing, Trees, and various computational geometry methods for efficiently solving the new evolving problem

**References:**

1. Mark Allen Weiss, Data Structures and Algorithm Analysis in C++, 2nd Edition, Pearson, 2004.
2. M T Goodrich, Roberto Tamassia, Algorithm Design, John Wiley, 2002.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**  
**M. Tech. (CNIS/CN/Cyber Security) – I Year – I Semester**  
**Common to CNIS, CN and Cyber Security**

**INFORMATION SECURITY (Professional Elective - I)**

**Prerequisites**

1. A Course on “Computer Networks and a course on Mathematics

**Course Objectives**

1. To understand the fundamentals of Cryptography
2. To understand various key distribution and management schemes
3. To understand how to deploy encryption techniques to secure data in transit across data networks
4. To apply algorithms used for secure transactions in real world applications

**Course Outcomes**

1. Demonstrate the knowledge of cryptography, 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.

Classical Encryption Techniques, DES, Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles and Modes of operation, Blowfish, Placement of Encryption Function, Traffic Confidentiality, key Distribution, Random Number Generation.

**UNIT - II**

Public key Cryptography Principles, RSA algorithm, Key Management, Diffie-Hellman Key Exchange, Elliptic Curve Cryptography.

Message authentication and Hash Functions, Authentication Requirements and Functions, Message Authentication, Hash Functions and MACs Hash and MAC Algorithms SHA-512, HMAC.

**UNIT - III**

Digital Signatures, Authentication Protocols, Digital signature Standard, Authentication Applications, Kerberos, X.509 Directory Authentication Service.

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

**UNIT - IV**

IP Security:

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

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

**UNIT - V**

Intruders, Viruses and Worms Intruders, Viruses and related threats Firewalls: Firewall Design Principles, Trusted Systems, Intrusion Detection Systems.

**Text Book:**

1. Cryptography and Network Security (principles and approaches) by William Stallings Pearson Education, 4th Edition.

**Reference Books:**

1. Network Security Essentials (Applications and Standards) by William Stallings Pearson Education.
2. Principles of Information Security, Whitman, Thomson.



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**  
**M. Tech. (CNIS/CN/Cyber Security) – I Year – I Semester**  
**Common to CNIS, CN and Cyber Security**

**NETWORK CODING THEORY (Professional Elective - I)**

**Course Objectives:**

1. Learn the fundamentals of network coding theory.
2. Understand the performance parameters required for network coding.
3. Gain the knowledge of the network coding design methods.
4. Learn different approaches for the network coding.
5. Understand error correction and detection methods of adversarial errors.

**Course Outcomes:**

1. Demonstrate knowledge and understanding of the fundamentals of Network Coding Theory.
2. Summarize all the performance parameters and resources for network coding.
3. Construct the network code for different networks.
4. Deal with different approaches of Network Coding in lossy and lossless networks.
5. Deal with multiple sources network coding and detect adversarial errors.

**UNIT - I**

**Introduction:** A historical Perspective, Network Coding; Network Coding Benefits: Throughput, Robustness, Complexity, Security; Network Model.

**Main Theorem of Network Multicast:** The Min-Cut Max-flow Theorem, The Main network coding Theorem,

**Theoretical Framework for Network Coding:** A Network Multicast Model, algebraic Framework, Combinatorial Framework, Information-Theoretic Framework, Types of Routing and coding.

**UNIT - II**

**Throughput Benefits of Network Coding:** Throughput Measures, Linear Programming Approach, Configurations with Large Network Coding Benefits, Configurations with Small Network Coding Benefits, Undirected Graphs.

**Networks with Delay and Cycles:** Dealing with Delay, Optimizing for Delay, Dealing with Cycles.

**Resources for Network Coding:** Bounds on Code Alphabet Size, Bounds on the Number of Coding Points, Coding with Limited Resources.

**UNIT - III**

**Network Code Design Methods For Multicasting:** Common initial procedure, centralized algorithms, decentralized algorithms, scalability to network changes.

**Single-Source Linear Network Coding:**

**Acyclic Networks:** Acyclic Networks, Linear network code, Desirable properties of a linear network code, Existence and construction, Algorithm refinement for multicast.

**Cyclic Networks:** Delay-Free Cyclic Code, Non-equivalence between local and global descriptions, Convolutional network code, decoding of convolutional network code.

**UNIT - IV**

**Inter-Session Network Coding:** Scalar and vector linear network coding, Fractional coding problem formulation, Insufficiency of linear network coding, Information theoretic approaches: Multiple unicast networks; Constructive approaches: Pairwise XOR coding in wireline networks, XOR coding in wireless networks.

**Network Coding in Lossy Networks:** Random linear network coding, Coding theorems: Unicast connections, Multicast connections, Error exponents for Poisson traffic with i.i.d. losses.

**Subgraph Selection:** Flow-based approaches: Intra-session coding, Computation-constrained coding, Inter-session coding; Queue-Length-Based approaches: Intra-session network coding for multicast sessions, Inter-session coding.

#### UNIT - V

##### Multiple Sources Network Coding:

**Superposition coding and max-flow bound; Network Codes for Acyclic Networks:** Achievable information rate region, Inner bound  $R_{in}$ , Outer bound  $R_{out}$ ,  $R_{LP}$  – An explicit outer bound.

**Security against adversarial Errors:** Error correction: Error Correcting bounds for centralized network coding, Distributed random network coding and polynomial-complexity error correction; Detection of adversarial errors: Model and problem formulation, Detection probability.

##### Text Books:

1. Raymond W. Yeung, Shuo-Yen Robert Li, Ning Cai, Zhen Zhang, "Network Coding Theory", now publishers Inc, 2006, ISBN: 1-933019-24-7.
2. Christina Fragouli, Emina Soljanin, "Network Coding Fundamentals", now publishers Inc, 2007, ISBN: 978-1-60198-032-8.

##### Reference Books:

1. Tracey Ho, Desmond Lun, "Network Coding: An Introduction", Cambridge University Press, 2008, ISBN: 978-0-521-87310-9.
2. Muriel Medard, Alex Sprintson, "Network Coding: Fundamentals and Applications", 1<sup>st</sup> Edition, 2012, Academic Press, Elsevier, ISBN: 978-0-12-380918-6.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**  
**M. Tech. (CNIS/CN/Cyber Security) – I Year – I Semester**  
**Common to CNIS, CN and Cyber Security**

**CRYPTANALYSIS (Professional Elective - I)**

**Prerequisites:** A Course on “Computer Networks, Mathematics”.

**Course Objectives:**

- To understand the importance of cryptanalysis in our increasingly computer-driven world.
- To understand the fundamentals of Cryptography
- To understand the Lattice- based cryptanalysis and elliptic curves and pairings
- To understand birthday- based algorithms for functions and attacks on stream ciphers
- To apply the techniques for secure transactions in real world applications

**Course Outcomes:**

- Ability to apply cryptanalysis in system design to protect it from various attacks.
- Ability to identify and investigate vulnerabilities and security threats and the mechanisms to counter them.
- Ability to analyze security of cryptographic algorithm against brute force attacks, birthday attacks.

**UNIT - I**

**A bird's – eye view of modern Cryptography:** Preliminaries, Defining Security in Cryptography  
**Monoalphabetic Ciphers:** Using Direct Standard Alphabets, The Caesar Cipher, Modular arithmetic, Direct Standard alphabets, Solution of direct standard alphabets by completing the plain component, Solving direct standard alphabets by frequency considerations, Alphabets based on decimations of the normal sequence, Solution of decimated standard alphabets, Monoalphabets based on linear transformation. **Polyalphabetic Substitution:** Polyalphabetic ciphers, Recognition of polyalphabetic ciphers, Determination of number of alphabets, Solution of individual alphabets if standard, Polyalphabetic ciphers with a mixed plain sequence, Matching alphabets, Reduction of a polyalphabetic cipher to a monoalphabetic ciphers with mixed cipher sequences

**UNIT - II**

**Transposition:** Columnar transposition, Solution of transpositions with Completely filled rectangles, Incompletely filled rectangles, Solution of incompletely filled rectangles – Probable word method, Incompletely filled rectangles general case, Repetitions between messages; identical length messages. **Sieve algorithms:** Introductory example: Eratosthenes's sieve, Sieving for smooth composites

**UNIT - III**

**Brute force Cryptanalysis:** Introductory example: Dictionary attacks, Brute force and the DES Algorithm, Brute force as a security mechanism, Brute force steps in advanced cryptanalysis, Brute force and parallel computers. **The birthday paradox: Sorting or not?:** Introductory example: Birthday attacks on modes of operation, Analysis of birthday paradox bounds, Finding collisions, Application to discrete logarithms in generic groups.

**UNIT - IV**

**Birthday- based algorithms for functions:** Algorithmic aspects, Analysis of random functions, Number-theoretic applications, A direct cryptographic application in the context of blockwise security, Collisions in hash functions. **Attacks on stream ciphers:** LFSR- based key stream generators,

Correlation attacks, Noisy LFSR model, Algebraic attacks, Extension to some non-linear shift registers, The cube attack.

#### **UNIT - V**

**Lattice-based cryptanalysis:** Direct attacks using lattice reduction, Coppersmith's small roots attacks. **Elliptic curves and pairings:** Introduction to elliptic curves, The Weil pairing, the elliptic curve factoring method.

#### **Text Books:**

1. Elementary Cryptanalysis A Mathematical Approach by Abraham Sinkov, The mathematical Association of America (Inc).
2. Algorithmic Cryptanalysis" by Antoine Joux, CRC Press'

#### **References:**

1. Algebraic Cryptanalysis, Bard Gregory, Springer, 2009
2. Cryptanalysis of Number Theoretic Ciphers, Sameul S. Wagstaff, Chapman & Hall/CRC.
3. Cryptanalysis: A Study of Cipher and Their Solution, Helen F. Gaines, 1989

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**  
**M. Tech. (CNIS/CN/Cyber Security) – I Year – I Semester**  
**Common to CNIS, CN and Cyber Security**

**NETWORK SECURITY (Professional Elective - II)**

**Pre-Requisites:** Computer Networks, Web Programming

**Course Objectives:**

- To learn the basics of security and various types of security issues.
- To study different cryptography techniques available and various security attacks.
- Explore network security and how they are implemented in real world.
- To get an insight of various issues of Web security and biometric authentication.

**Course Outcomes:** After completion of course, students would be able to:

- To understand basics of security and issues related to it.
- Understanding of biometric techniques available and how they are used in today's world.
- Security issues in web and how to tackle them.
- Learn mechanisms for transport and network security.

**UNIT – I**

**Data security:** Review of cryptography. Examples RSA, DES, ECC.

**UNIT – II**

Authentication, non-repudiation and message integrity. Digital signatures and certificates. Protocols using cryptography (example Kerberos). Attacks on protocols

**UNIT - III**

**Network security:** Firewalls, Proxy-Servers, Network intrusion detection.

**Transport security:** Mechanisms of TLS, SSL, IPSec.

**UNIT - IV**

Web security – SQL injection, XSS, etc. Software security and buffer overflow.

Malware types and case studies. Access Control, firewalls and host/network intrusion detection.

**UNIT - V**

**Other topics:** Biometric authentication, Secure E-Commerce (ex. SET), Smart

Cards, Security in Wireless Communication. Recent trends in IOT security, IDS and Biometric.

**References:**

1. W. R. Cheswick and S. M. Bellovin. Firewalls and Internet Security. Addison Wesley, 1994.
2. W. Stallings. Cryptography and Network Security. Prentice Hall, 1999.
3. B. Schneier. Applied Cryptography. Wiley, 1999.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**  
**M. Tech. (CNIS/CN/Cyber Security) – I Year – I Semester**  
**Common to CNIS, CN and Cyber Security**

**ADVANCED WIRELESS NETWORKS (Professional Elective - II)**

**Pre-Requisites:** Computer Networks

**Course Objectives:**

- The students should get familiar with the wireless/mobile market and the future needs and challenges.
- To get familiar with key concepts of wireless networks, standards, technologies and their basic Operations.
- To learn how to design and analyse various medium access.
- To learn how to evaluate MAC and network protocols using network simulation software tools.
- The students should get familiar with the wireless/mobile market and the future needs and challenges.

**Course Outcomes:** After completion of course, students would be able to:

- Demonstrate advanced knowledge of networking and wireless networking and understand various types of wireless networks, standards, operations and use cases.
- Be able to design WLAN, WPAN, WWAN, Cellular based upon underlying propagation and performance analysis.
- Demonstrate knowledge of protocols used in wireless networks and learn simulating wireless networks.
- Design wireless networks exploring trade-offs between wire line and wireless links.
- Develop mobile applications to solve some of the real-world problems.

**UNIT - I**

**Introduction:**

Wireless Networking Trends, Key Wireless Physical Layer Concepts, Multiple Access Technologies - CDMA, FDMA, TDMA, Spread Spectrum technologies, Frequency reuse, Radio Propagation and Modelling, Challenges in Mobile Computing: Resource poorness, Bandwidth, energy etc.

**Wireless Local Area Networks:**

IEEE 802.11 Wireless LANs Physical & MAC layer, 802.11 MAC Modes (DCF& PCF) IEEE 802.11 standards, Architecture & protocols, Infrastructure vs. Adhoc Modes, Hidden Node & Exposed Terminal Problem, Problems, Fading Effects in Indoor and outdoor WLANs, WLAN Deployment issues

**UNIT – II**

**Wireless Cellular Networks:**

1G and 2G, 2.5G, 3G, and 4G, Mobile IPv4, Mobile IPv6, TCP over Wireless Networks, Cellular architecture, Frequency reuse, Channel assignment strategies, Handoff strategies, Interference and system capacity, Improving coverage and capacity in cellular systems, Spread spectrum Technologies.

**UNIT - III**

WiMAX (Physical layer, Media access control, Mobility and Networking), IEEE802.22 Wireless Regional Area Networks, IEEE 802.21 Media Independent Handover Overview

**Wireless Sensor Networks:**

Introduction, Application, Physical, MAC layer and Network Layer, Power Management, Tiny OS Overview.

**UNIT - IV**

**Wireless PANs:**

Bluetooth AND Zigbee, Introduction to Wireless Sensors,.

**UNIT - V**

**Security:**

Security in wireless Networks Vulnerabilities, Security techniques, Wi-Fi Security, DoS in wireless communication.

**Advanced Topics**

IEEE 802.11x and IEEE 802.11i standards, Introduction to Vehicular Adhoc Networks

**References:**

1. Schiller J., Mobile Communications, Addison Wesley 2000
2. Stallings W., Wireless Communications and Networks, Pearson Education 2005
3. Stojmenic Ivan, Handbook of Wireless Networks and Mobile Computing, John Wiley and Sons Inc 2002
4. Yi Bing Lin and Imrich Chlamtac, Wireless and Mobile Network Architectures, John Wiley and Sons Inc 2000
5. Pandya Raj, Mobile and Personal Communications Systems and Services, PHI 200

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**  
**M. Tech. (CNIS/CN/Cyber Security) – I Year – I Semester**  
**Common to CNIS, CN and Cyber Security**

**TRUSTWORTHY COMPUTING (Professional Elective - II)**

**Prerequisites:** An introductory course in Computer Networks

**Course Objectives:** The main objectives of the proposed course are:

- To make students realize the practical risks and concerns in network security
- To introduce a coherent framework for understanding network security
- To introduce the field's essential security concepts and techniques used to secure a network
- To expose the students to new state-of-the-art research topics in network security

**Course Outcomes:**

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

**UNIT - I**

**Introduction:** Computer Security Concepts, The OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms, A Model for Network Security, Standards

**Symmetric Encryption and Message Confidentiality:** Symmetric Encryption Principles, Symmetric Block Encryption Algorithms, Random and Pseudorandom Numbers, Stream Ciphers and RC4, Cipher Block Modes of Operation

**UNIT - II**

**Public-Key Cryptography and Message Authentication:**

Approaches to Message Authentication, Secure Hash Functions, Message Authentication Codes, Public-Key Cryptography Principles, Public-Key Cryptography Algorithms, Digital Signatures.

**UNIT - III**

**Key Distribution and User Authentication:**

Symmetric Key Distribution Using Symmetric Encryption, Kerberos, Key Distribution Using Asymmetric Encryption, X.509 Certificates, Public-Key Infrastructure.

**UNIT - IV**

**Electronic Mail Security:** Pretty Good Privacy, S/MIME, Domain Keys Identified Mail.

**IP Security:**

IP Security Overview, IP Security Policy, Encapsulating Security Payload, Combining Security Associations, Internet Key Exchange, Cryptographic Suites

**UNIT - V**

**Intruders:**

Intruders, Intrusion Detection, Password Management

**Malicious Software:**

Types of Malicious Software, Viruses, Virus Countermeasures, Worms, Distributed Denial of Service Attacks

**Firewalls:**

The Need for Firewalls, Firewall Characteristics, Types of Firewalls, Firewall Basing, Firewall Location and Configurations



**Text Book:**

Network Security Essentials: Applications and Standards (4<sup>th</sup> edition) (Paperback), William Stallings, Prentice Hall, 2010, ISBN: 978-0136108054.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**  
**M. Tech. (CNIS/CN/Cyber Security) – I Year – I Semester**  
**Common to CNIS, CN and Cyber Security**

**ADVANCED DATA STRUCTURES LAB (Lab - I)**

**Prerequisites:** A course on Computer Programming & Data Structures

**Course Objectives:**

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:**

1. Ability to select the data structures that efficiently model the information in a problem.
2. Ability to 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.

**TEXT BOOKS:**

1. Fundamentals of Data structures in C, E.Horowitz, S.Sahni and Susan Anderson Freed, 2<sup>nd</sup> Edition, Universities Press
2. Data Structures Using C – A.S.Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/Pearson education.
3. Introduction to Data Structures in C, Ashok Kamthane, 1<sup>st</sup> Edition, Pearson.

**REFERENCES:**

1. The C Programming Language, B.W. Kernighan, Dennis M.Ritchie, PHI/Pearson Education
2. C Programming with problem solving, J.A. Jones & K. Harrow, Dreamtech Press
3. Data structures: A Pseudocode Approach with C, R.F.Gilberg And B.A.Forouzan, 2<sup>nd</sup> Edition, Cengage Learning.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**  
**M. Tech. (CNIS/CN/Cyber Security) – I Year – I Semester**  
**Common to CNIS, CN and Cyber Security**

**INFORMATION SECURITY LAB (Lab – II)**

**Course Objectives:**

- To implement the cryptographic algorithms.
- To implement the security algorithms.
- To implement cryptographic, digital signatures algorithms.

**List of Experiments:**

1. Implementation of symmetric cipher algorithm (AES and RC4)
2. Random number generation using a subset of digits and alphabets.
3. Implementation of RSA based signature system
4. Implementation of Subset sum
5. Authenticating the given signature using MD5 hash algorithm.
6. Implementation of Diffie-Hellman algorithm
7. Implementation EIGAMAL cryptosystem.
8. Implementation of Goldwasser-Micali probabilistic public key system
9. Implementation of Rabin Cryptosystem. (Optional).
10. Implementation of Kerberos cryptosystem
11. Firewall implementation and testing.
12. Implementation of a trusted secure web transaction.
13. Cryptographic Libraries-Sun JCE/Open SSL/Bouncy Castle JCE.
14. Digital Certificates and Hybrid (ASSY/SY) encryption, PKI.
15. Message Authentication Codes.
16. Elliptic Curve cryptosystems (Optional)
17. PKCS Standards (PKCS1, 5, 11, 12), Cipher modes.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**  
**M. Tech. (CNIS/CN/Cyber Security) – I Year – I Semester**  
**Common to CNIS, CN and Cyber Security**

**RESEARCH METHODOLOGY & IPR**

**Prerequisite:** None

**Course Objectives:**

- To understand the research problem
- To know the literature studies, plagiarism and ethics
- To get the knowledge about technical writing
- To analyze the nature of intellectual property rights and new developments
- To know the patent rights

**Course Outcomes:** At the end of this course, students will be able to

- Understand research problem formulation.
- Analyze research related information
- Follow research ethics
- Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
- Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.
- Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

**UNIT-I:**

Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

**UNIT-II:**

Effective literature studies approaches, analysis, Plagiarism, Research ethics

**UNIT-III:**

Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee

**UNIT-IV:**

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

**UNIT-V:**

Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications. New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

**TEXT BOOKS:**

1. Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students"
2. Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"

**REFERENCES:**

1. Ranjit Kumar, 2nd Edition, "Research Methodology: A Step by Step Guide for beginners"
2. Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd ,2007.
3. Mayall, "Industrial Design", McGraw Hill, 1992.
4. Niebel, "Product Design", McGraw Hill, 1974.
5. Asimov, "Introduction to Design", Prentice Hall, 1962.
6. Robert P. Merges, Peter S. Menell, Mark A. Lemley, "Intellectual Property in New Technological Age", 2016.
7. T. Ramappa, "Intellectual Property Rights Under WTO", S. Chand, 2008

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**  
**M. Tech. (CNIS/CN/Cyber Security) – I Year – II Semester**  
**Common to CNIS, CN and Cyber Security**

**ADVANCED ALGORITHMS (PC– III)**

**Pre-Requisites:** UG level course in Algorithm Design and Analysis

**Course Objectives:**

- Introduce students to the advanced methods of designing and analyzing algorithms.
- The student should be able to choose appropriate algorithms and use it for a specific problem.
- To familiarize students with basic paradigms and data structures used to solve advanced algorithmic problems.
- Students should be able to understand different classes of problems concerning their computation difficulties.
- To introduce the students to recent developments in the area of algorithmic design.

**Course Outcomes:** After completion of course, students would be able to:

- Analyze the complexity/performance of different algorithms.
- Determine the appropriate data structure for solving a particular set of problems.
- Categorize the different problems in various classes according to their complexity.
- Students should have an insight of recent activities in the field of the advanced data structure.

**UNIT – I**

**Sorting:**

Review of various sorting algorithms, topological sorting

**Graph:**

Definitions and Elementary Algorithms: Shortest path by BFS, shortest path in edge-weighted case (Dijkstra's), depth-first search and computation of strongly connected components, emphasis on correctness proof of the algorithm and time/space analysis, example of amortized analysis.

**UNIT – II**

**Matroids:**

Introduction to greedy paradigm, algorithm to compute a maximum weight maximal independent set. Application to MST.

**Graph Matching:**

Algorithm to compute maximum matching. Characterization of maximum matching by augmenting paths, Edmond's Blossom algorithm to compute augmenting path.

**UNIT - III**

**Flow-Networks:**

Maxflow-mincut theorem, Ford-Fulkerson Method to compute maximum flow, Edmond-Karp maximum-flow algorithm.

**Matrix Computations:**

Strassen's algorithm and introduction to divide and conquer paradigm, inverse of a triangular matrix, relation between the time complexities of basic matrix operations, LUP-decomposition.

**UNIT - IV**

**Shortest Path in Graphs:**

Floyd-Warshall algorithm and introduction to dynamic programming paradigm. More examples of dynamic programming.

**Modulo Representation of integers/polynomials:**

Chinese Remainder Theorem, Conversion between base-representation and modulo-representation. Extension to polynomials. Application: Interpolation problem.

**Discrete Fourier Transform (DFT):**

In complex field, DFT in modulo ring. Fast Fourier Transform algorithm. Schonhage-Strassen Integer Multiplication algorithm.

**UNIT - V**

**Linear Programming:**

Geometry of the feasibility region and Simplex algorithm

**NP-completeness:**

Examples, proof of NP-hardness and NP-completeness.

**One or more of the following topics based on time and interest:**

Approximation algorithms, Randomized Algorithms, Interior Point Method, Advanced Number Theoretic Algorithm

Recent Trends in problem solving paradigms using recent searching and sorting techniques by applying recently proposed data structures.

**References:**

1. "Introduction to Algorithms" by Cormen, Leiserson, Rivest, Stein.
2. "The Design and Analysis of Computer Algorithms" by Aho, Hopcroft, Ullman.
3. "Algorithm Design" by Kleinberg and Tardos.



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**  
**M. Tech. (CNIS/CN/Cyber Security) – I Year – II Semester**  
**Common to CNIS, CN and Cyber Security**

**WEB AND DATABASE SECURITY (PC – IV)**

**Pre-Requisites:** Database Management

**Course Objectives:**

1. Give an Overview of information security
2. Give an overview of Access control of relational databases

**Course Outcomes:** Students should be able to

1. Understand the Web architecture and applications
2. Understand client side and service side programming
3. Understand how common mistakes can be bypassed and exploit the application
4. Identify common application vulnerabilities

**UNIT - I**

**The Web Security**

The Web Security Problem, Risk Analysis and Best Practices

Cryptography and the Web: Cryptography and Web Security, Working Cryptographic Systems and Protocols, Legal Restrictions on Cryptography, Digital Identification

**UNIT - II**

**The Web Privacy**

The Web's War on Your Privacy, Privacy-Protecting Techniques, Backups and Antitheft, Web Server Security, Physical Security for Servers, Host Security for Servers, Securing Web Applications

**UNIT - III**

**Database Security**

Recent Advances in Access Control, Access Control Models for XML, Database Issues in Trust Management and Trust Negotiation, Security in Data Warehouses and OLAP Systems

**UNIT - IV**

**Security Re-engineering for Databases**

Concepts and Techniques, Database Watermarking for Copyright Protection, Trustworthy Records Retention, Damage Quarantine and Recovery in Data Processing Systems, Hippocratic Databases: Current Capabilities and

**UNIT - V**

**Future Trends Privacy in Database Publishing**

A Bayesian Perspective, Privacy-enhanced Location-based Access Control, Efficiently Enforcing the Security and Privacy Policies in a Mobile Environment

**Text Books:**

1. Web Security, Privacy and Commerce, Simson G. Arfinkel, Gene Spafford, O' Reilly.
2. Handbook on Database security applications and trends, Michael Gertz, Sushil Jajodia.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**  
**M. Tech. (CNIS/CN/Cyber Security) – I Year – II Semester**  
**Common to CNIS, CN and Cyber Security**

**INTRUSION DETECTION & PREVENTION SYSTEMS (Professional Elective - III)**

**Course Objectives:**

- To understand about the intruders.
- To know the intrusion detection and prevention policies

**UNIT- I**

**Introduction:** Understanding Intrusion Detection – Intrusion detection and prevention basics – IDS and IPS analysis schemes, Attacks, Detection approaches – Misuse detection – anomaly detection – specification-based detection – hybrid detection  
**THEORETICAL FOUNDATIONS OF DETECTION:** Taxonomy of anomaly detection system – fuzzy logic – Bayes theory – Artificial Neural networks – Support vector machine – Evolutionary computation – Association rules – Clustering

**UNIT- II**

**Architecture and Implementation:** Centralized – Distributed – Cooperative Intrusion Detection - Tiered architecture

**UNIT- III**

**Justifying Intrusion Detection:** Intrusion detection in security – Threat Briefing – Quantifying risk – Return on Investment (ROI)

**UNIT- IV**

**Applications and Tools:** Tool Selection and Acquisition Process - Bro Intrusion Detection – Prelude Intrusion Detection - Cisco Security IDS - Snorts Intrusion Detection – NFR security

**UNIT- V**

**Legal Issues and Organizations Standards:** Law Enforcement / Criminal Prosecutions – Standard of Due Care – Evidentiary Issues, Organizations and Standardizations.

**References:**

1. Ali A. Ghorbani, Wei Lu, "Network Intrusion Detection and Prevention: Concepts and Techniques", Springer, 2010.
2. Carl Enrolf, Eugene Schultz, Jim Mellander, "Intrusion detection and Prevention", McGraw Hill, 2004
3. Paul E. Proctor, "The Practical Intrusion Detection Handbook ", Prentice Hall, 2001.
4. Ankit Fadia and Mnu Zacharia, "Intrusion Alert", Vikas Publishing house Pvt., Ltd, 2007.
5. Earl Carter, Jonathan Hogue, "Intrusion Prevention Fundamentals", Pearson Education, 2006.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**  
**M. Tech. (CNIS/CN/Cyber Security) – I Year – II Semester**  
**Common to CNIS, CN and Cyber Security**

**INTERNET OF THINGS (Professional Elective - III)**

**Course Objectives:**

- To introduce the terminology, technology and its applications
- To introduce the concept of M2M (machine to machine) with necessary protocols
- To introduce the Python Scripting Language which is used in many IoT devices
- To introduce the Raspberry PI platform, that is widely used in IoT applications
- To introduce the implementation of web-based services on 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  
Webserver – 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.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**  
**M. Tech. (CNIS/CN/Cyber Security) – I Year – II Semester**  
**Common to CNIS, CN and Cyber Security**

**CLOUD SECURITY (Professional Elective - III)**

**Course Objectives:**

- Understand the fundamentals of cloud computing.
- Understand the requirements for an application to be deployed in a cloud. 3. Become knowledgeable in the methods to secure cloud.

**UNIT – I**

**Cloud Computing Fundamentals:** Cloud Computing definition, private, public and hybrid cloud. Cloud types; IaaS, PaaS, SaaS. Benefits and challenges of cloud computing, public vs private clouds, role of virtualization in enabling the cloud; Business Agility: Benefits and challenges to Cloud architecture.

**UNIT – II**

**Cloud Applications:** Technologies and the processes required when deploying web services- Deploying a web service from inside and outside a cloud architecture, advantages and disadvantages- Development environments for service development; Amazon, Azure, Google App.

**UNIT – III**

**Securing The Cloud:** Security Concepts - Confidentiality, privacy, integrity, authentication, nonrepudiation, availability, access control, defence in depth, least privilege- how these concepts apply in the cloud and their importance in PaaS, IaaS and SaaS. e.g. User authentication in the cloud

**UNIT - IV**

**Virtualization Security:** Multi-tenancy Issues: Isolation of users/VMs from each other- How the cloud provider can provide this- Virtualization System Security Issues: e.g. ESX and ESXi Security, ESX file system security- storage considerations, backup and recovery- Virtualization System Vulnerabilities.

**UNIT - V**

**Cloud Security Management:** Security management in the cloud – security management standards- SaaS, PaaS, IaaS availability management- access control- Data security and storage in cloud.

**References:**

1. Gautam Shroff, "Enterprise Cloud Computing Technology Architecture Applications", Cambridge University Press; 1 edition [ISBN: 978- 0521137355], 2010.
2. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", Tata McGraw-Hill Osborne Media; 1 edition 22, [ISBN: 0071626948], 2009.
3. Tim Mather, Subra Kumaraswamy, Shahed Latif, "Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance", O'Reilly Media; 1 edition, [ISBN: 0596802765], 2009.
4. Ronald L. Krutz, Russell Dean Vines, "Cloud Security", Wiley [ISBN: 0470589876], , 2010.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**  
**M. Tech. (CNIS/CN/Cyber Security) – I Year – II Semester**  
**Common to CNIS, CN and Cyber Security**

**DIGITAL IMAGE PROCESSING (Professional Elective - IV)**

**Prerequisites:**

1. Students are expected to have knowledge in linear signals and systems, Fourier Transform, basic linear algebra, basic probability theory and basic programming techniques; knowledge of Digital Signal Processing is desirable.
2. A course on “Computational Mathematics”
3. A course on “Computer Oriented Statistical Methods”

**Course Objectives**

1. Provide a theoretical and mathematical foundation of fundamental Digital Image Processing concepts.
2. The topics include image acquisition; sampling and quantization; preprocessing; enhancement; restoration; segmentation; and compression.

**Course Outcomes**

1. Demonstrate the knowledge of the basic concepts of two-dimensional signal acquisition, sampling, and quantization.
2. Demonstrate the knowledge of filtering techniques.
3. Demonstrate the knowledge of 2D transformation techniques.
4. Demonstrate the knowledge of image enhancement, segmentation, restoration and compression techniques.

**UNIT - I**

**Digital Image Fundamentals:** Digital Image through Scanner, Digital Camera. Concept of Gray Levels. Gray Level to Binary Image Conversion. Sampling and Quantization. Relationship between Pixels. Imaging Geometry. 2D Transformations-DFT, DCT, KLT and SVD.

**UNIT - II**

Image Enhancement in Spatial Domain Point Processing, Histogram Processing, Spatial Filtering, Enhancement in Frequency Domain, Image Smoothing, Image Sharpening.

**UNIT - III**

Image Restoration Degradation Model, Algebraic Approach to Restoration, Inverse Filtering, Least Mean Square Filters, Constrained Least Squares Restoration, Interactive Restoration.

**UNIT - IV**

Image Segmentation Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding, Region Oriented Segmentation.

**UNIT - V**

Image Compression Redundancies and their Removal Methods, Fidelity Criteria, Image Compression Models, Source Encoder and Decoder, Error Free Compression, Lossy Compression.

**Text Book:**

1. Digital Image Processing: **R.C. Gonzalez & R.E. Woods**, Addison Wesley/ Pearson Education, 2<sup>nd</sup> Ed, 2004.

**References:**

1. Fundamentals of Digital Image Processing: **A.K.Jain** , PHI.
2. Digital Image Processing using MAT LAB: **Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins**: Pearson Education India, 2004.
3. Digital Image Processing: **William K. Pratt, John Wilely**, 3<sup>rd</sup> Edition, 2004.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**  
**M. Tech. (CNIS/CN/Cyber Security) – I Year – II Semester**  
**Common to CNIS, CN and Cyber Security**

**BLOCKCHAIN TECHNOLOGY (Professional Elective - IV)**

**Prerequisites**

1. Knowledge in security and applied cryptography;
2. Knowledge in distributed databases

**Course Objective:**

1. Introduce block chain technology and Cryptocurrency

**Course Outcome:**

1. Learn about research advances related to one of the most popular technological areas today.

**UNIT- I**

Introduction: Block chain or distributed trust, Protocol, Currency, Cryptocurrency, How a Cryptocurrency works, Crowdfunding

**UNIT- II**

Extensibility of Blockchain concepts, Digital Identity verification, Block chain Neutrality, Digital art, Blockchain Environment

**UNIT- III**

Blockchain Science: Gridcoin , Folding coin, Blockchain Genomics ,Bitcoin MOOCs

**UNIT - IV**

Currency, Token, Tokenizing, Campuscoin, Coindrop as a strategy for Public adoption, Currency Mut iplicity, Demurrage currency

**UNIT - V**

Technical challenges, Business model challenges, Scandals and Public perception, Government Regulations

**Text Book:**

1. Blockchain Blue print for Economy by Melanie Swan

**Reference:**

1. Blockchain Basics: A Non-Technical Introduction in 25 Steps 1st ed. Edition, by Daniel Drescher

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**  
**M. Tech. (CNIS/CN/Cyber Security) – I Year – II Semester**  
**Common to CNIS, CN and Cyber Security**

**BIOMETRICS (Professional Elective - IV)**

**Course Objectives:**

- To learn the biometric technologies.
- To learn the computational methods involved in the biometric systems.
- To learn methods for evaluation of the reliability and quality of the biometric systems.

**UNIT – I**

**Introduction & Handwritten Character Recognition** Introduction – history – type of Biometrics – General Architecture of Biometric Systems – Basic Working of biometric Matching – Biometric System Error and performance Measures – Design of Biometric Systems – Applications of Biometrics – Benefits of Biometrics Versus Traditional Authentication Methods – character Recognition – System Overview – Geature Extraction for character Recognition – Neura; Network for handwritten Charater Recognition – Multilayer Neural Network for Handwritten Character Recognition – Devanagari Numeral Recognition – Isolated Handwritten Devanagari Charater Recognition suing Fourier Descriptor and Hidden markov Model.

**UNIT – II**

**Face Biometrics & Retina And Iris Biometrics** Introduction –Background of Face Recognition – Design of Face Recognition System – Neural Network for Face Recognition – Face Detection in Video Sequences – Challenges in Face Biometrices – Face Recognition Methods – Advantages and Disadvantages – Performance of Biometrics – Design of Retina Biometrics – Iris Segmentation Method – Determination of Iris Region – Experimental Results of Iris Localization – Applications of Iris Biometrics – Advantages and Disadvantages. **VEIN AND FINGERPRINT BIOMETRICS & BIOMETRIC HAND GESTURE RECOGNITION FOR INDIAN SIGN LANGUAGE.** Biometrics Using Vein Pattern of Palm – Fingerprint Biometrics – Fingerprint Recognition System – Minutiae Extraction – Fingerprint Indexing – Experimental Results – Advantages and Disadvantages – Basics of Hand Geometry – Sign Language – Indian Sign Language – SIFT Algorithms- Practical Approach Advantages and Disadvantages.

**UNIT – III**

**Privacy Enhancement Using Biometrics & Biometric Cryptography And Multimodal Biometrics** Introduction – Privacy Concerns Associated with Biometric Developments – Identity and Privacy – Privacy Concerns – Biometrics with Privacy Enhancement – Comparison of Various Biometrics in Terms of Privacy – Soft Biometrics - Introduction to Biometric Cryptography – General Purpose Cryptosystem – Modern Cryptography and Attacks – Symmetric Key Ciphers – Cryptographic Algorithms – Introduction to Multimodal Biometrics – Basic Architecture of Multimodal Biometrics – Multimodal Biometrics Using Face and Ear – Characteristics and Advantages of Multimodal Biometrics Characters – AADHAAR : An Application of Multimodal Biometrics.

**UNIT – IV.**

**Watermarking Techniques & Biometrics: Scope and Future**

Introduction – Data Hiding Methods – Basic Framework of Watermarking – Classification of Watermarking – Applications of Watermarking – Attacks on Watermarks – Performance Evaluation – Characteristics of Watermarks – General Watermarking Process – Image Watermarking Techniques – Watermarking Algorithm – Experimental Results – Effect of Attacks on Watermarking Techniques –



Scope and Future Market of Biometrics – Biometric Technologies – Applications of Biometrics - Biometrics – and Information Technology Infrastructure – Role of Biometrics in Enterprise Security – Role of Biometrics in Border Security – Smart Card Technology and Biometric – Radio Frequency Identification Biometrics – DNA Biometrics – Comparative Study of Various Biometrics Techniques.

#### **UNIT – V**

##### **Image Enhancement Techniques & Biometrics Stands**

Introduction – current Research in image Enhancement Techniques – Image Enhancement – Frequency Domain Filters – Databases and Implementation – Standard Development Organizations – Application Programming Interface – Information Security and Biometric Standards – Biometric Template Interoperability.

##### **Text Books:**

1. Biometrics: Concepts and Applications by G R Sinha and Sandeep B. Patil, Wiley, 2013.
2. Biometrics for Network Security – Paul Reid, Pearson Education.

##### **References:**

1. Biometrics – Identity verification in a networked world – Samir Nanavathi, Micheal Thieme, Raj Nanavathi, Wiley – dream Tech.
2. Biometrics – The Ultimate Reference – John D. Woodward, Jr.Wiley Dreamtech.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**  
**M. Tech. (CNIS/CN/Cyber Security) – I Year – II Semester**  
**Common to CNIS, CN and Cyber Security**

**WEB AND DATABASE SECURITY LAB (Lab - III)**

**Pre-requisites:** Database Management Systems, Practical exposure on Commercial Database Management Systems, Web Security,

**Course Outcomes:** At the end of the course the student will be able to:

- Design of access control methods for secure web & database application development
- Analyse and Classify the vulnerabilities in the Web and Database applications.
- Design & implementation various methods for web & database intrusion detection.
- Design and Implementation security audit methods.

**List of Experiments:**

1. Creation and manipulation of database using SQL scripts and graphical interfaces.
2. Implementing DAC: Implementation of database security policies using DAC in oracle 10g/SQL server
3. Implementing of MAC to ensure confidentiality and control information flow using either Oracle 10g or SQL server. This provides exposure to understand the concepts of MAC and Trojan horse
4. Implementation of Virtual Private Database using View using Oracle 10g or SQL server
5. Design a method to simulate the HTML injections and cross-site scripting (XSS) to exploit the attackers.
6. Determine HTML injection bugs and possible measures to prevent HTML injection exploits.
7. Implement Secure coding for buffer flow heap attacks.
8. Implementation of Design methods to break authentication schemes
9. Implementation of methods for abusing Design Deficiencies against web sites

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**  
**M. Tech. (CNIS/CN/Cyber Security) – I Year – II Semester**  
**Common to CNIS, CN and Cyber Security**

**INTERNET OF THINGS LAB (Lab - IV)**

**Course Objectives:**

1. To introduce the raspberry PI platform, that is widely used in IoT applications
2. To introduce the implementation of distance sensor on IoT devices

**Course Outcomes**

1. Ability to introduce the concept of M2M (machine to machine) with necessary protocols and get awareness in implementation of distance sensor
2. Get the skill to program using python scripting language which is used in many IoT devices

**List of Experiments**

1. Using raspberry pi
  - a. Calculate the distance using distance sensor.
  - b. Basic LED functionality.
2. Using Arduino
  - a. Calculate the distance using distance sensor.
  - b. Basic LED functionality.
  - c. Calculate temperature using temperature sensor.
3. Using Node MCU
  - a. Calculate the distance using distance sensor.
  - b. Basic LED functionality.Calculate temperature using temperature sensor.

**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: 978935023975

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**  
**M. Tech. (CNIS/CN/Cyber Security) – II Year – I Semester**  
**Common to CNIS, CN and Cyber Security**

**DIGITAL FORENSICS (Professional Elective - V)**

**Pre-Requisites:** Cybercrime and Information Warfare, Computer Networks

**Course Objectives:**

- Provides an in-depth study of the rapidly changing and fascinating field of computer forensics.
- Combines both the technical expertise and the knowledge required to investigate, detect and prevent digital crimes.
- Knowledge on digital forensics legislations, digital crime, forensics processes and procedures, data acquisition and validation, e-discovery tools
- E-evidence collection and preservation, investigating operating systems and file systems, network forensics, art of steganography and mobile device forensics

**Course Outcomes:** On completion of the course the student should be able to

- Understand relevant legislation and codes of ethics.
- Computer forensics and digital detective and various processes, policies and procedures.
- E-discovery, guidelines and standards, E-evidence, tools and environment.
- Email and web forensics and network forensics.

**UNIT - I**

**Digital Forensics Science:** Forensics science, computer forensics, and digital forensics.

**Computer Crime:** Criminalistics as it relates to the investigative process, analysis of cyber-criminalistics area, holistic approach to cyber-forensics

**UNIT - II**

**Cyber Crime Scene Analysis:**

Discuss the various court orders etc., methods to search and seizure electronic evidence, retrieved and un-retrieved communications, Discuss the importance of understanding what court documents would be required for a criminal investigation.

**UNIT - III**

**Evidence Management & Presentation:**

Create and manage shared folders using operating system, importance of the forensic mindset, define the workload of law enforcement, Explain what the normal case would look like, Define who should be notified of a crime, parts of gathering evidence, Define and apply probable cause.

**UNIT - IV**

**Computer Forensics:** Prepare a case, Begin an investigation, Understand computer forensics workstations and software, Conduct an investigation, Complete a case, Critique a case,

**Network Forensics:** open-source security tools for network forensic analysis, requirements for preservation of network data.

**UNIT - V**

**Mobile Forensics:** mobile forensics techniques, mobile forensics tools.

**Legal Aspects of Digital Forensics:** IT Act 2000, amendment of IT Act 2008.

Recent trends in mobile forensic technique and methods to search and seizure electronic evidence

**References:**

1. John Sammons, The Basics of Digital Forensics, Elsevier
2. John Vacca, Computer Forensics: Computer Crime Scene Investigation, Laxmi Publications

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**  
**M. Tech. (CNIS/CN/Cyber Security) – II Year – I Semester**  
**Common to CNIS, CN and Cyber Security**

**SURVEILLANCE & VIDEO ANALYTICS (Professional Elective - V)**

**Course Outcomes:**

- Understand the algorithms available for performing analysis on video data and address the challenges
- Understand the approaches for identifying and tracking objects and person with motion-based algorithms.
- Understand the algorithms available for searching and matching in video content
- Analyze approaches for action representation and recognition
- Identify, Analyze and apply algorithms for developing solutions for real world problems

**UNIT - I**

Introduction:

Video Analytics. Computer Vision: Challenges- Spatial Domain Processing – Frequency Domain Processing-Background Modeling-Shadow Detection-Eigen Faces - Object Detection -Local Features-Mean Shift: Clustering, Tracking - Object Tracking using Active Contours –

**UNIT - II**

Tracking & Video Analysis: Tracking and Motion Understanding – Kalman filters, condensation, particle, Bayesian filters, hidden Markov models, change detection and model-based tracking- Motion estimation and Compensation-Block Matching Method, Hierarchical Block Matching,

**UNIT - III**

Overlapped Block Motion and compensation, Pel-Recursive Motion Estimation, Mesh Based Method, Optical Flow Method - Motion Segmentation -Thresholding for Change Detection, Estimation of Model parameters - Optical Flow Segmentation-Modified Hough Transform Method-

**UNIT - IV**

Segmentation for Layered Video Representation-Bayesian Segmentation -Simultaneous Estimation and Segmentation-Motion Field Model –

Action Recognition - Low Level Image Processing for Action Recognition: Segmentation and Extraction, Local Binary Pattern, Structure from Motion –

**UNIT - V**

Action Representation Approaches: Classification of Various Dimension of Representation, View Invariant Methods, Gesture Recognition and Analysis, Action Segmentation.

Case Study: Face Detection and Recognition, Natural Scene Videos, Crowd Analysis, Video Surveillance, Traffic Monitoring, Intelligent Transport System.

**Text Books/References:**

1. Richard Szeliski, "Computer Vision: Algorithms and Applications", Springer, 2011.
2. Yao Wang, JornOstermann and Ya-Qin Zhang, "Video Processing and Communications", Prentice Hall, 2001.
3. A.MuratTekalp, "Digital Video Processing", Pearson, 1995
4. Thierry Bouwmans, FatihPorikli, Benjamin Höferlin and Antoine Vacavant, "Background Modeling and Foreground Detection for Video Surveillance: Traditional and Recent Approaches, Implementations, Benchmarking and Evaluation", CRC Press, Taylor and Francis Group, 2014.

5. Md. Atiqur Rahman Ahad, "Computer Vision and Action Recognition-A Guide for Image Processing and Computer Vision Community for Action Understanding", Atlantis Press, 2011.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**  
**M. Tech. (CNIS/CN/Cyber Security) – II Year – I Semester**  
**Common to CNIS, CN and Cyber Security**

**DATA ANALYTICS FOR FRAUD DETECTION (Professional Elective - V)**

**Course Objectives:**

1. Discuss the overall process of how data analytics is applied
2. Discuss how data analytics can be used to better address and identify risks
3. Help mitigate risks from fraud and waste for our clients and organizations

**Course Outcomes:**

1. Formulate reasons for using data analysis to detect fraud.
2. Explain characteristics and components of the data and assess its completeness.
3. Identify known fraud symptoms and use digital analysis to identify unknown fraud symptoms.
4. Automate the detection process.
5. Verify results and understand how to prosecute fraud

**UNIT - I**

Introduction: Defining Fraud, Anomalies versus, Fraud, Types of Fraud, Assess the Risk of Fraud, Fraud Detection, Recognizing Fraud, Data Mining versus Data Analysis and Analytics, Data Analytical Software, Anomalies versus Fraud within Data, Fraudulent Data Inclusions and Deletions

**UNIT - II**

The Data Analysis Cycle, Evaluation and Analysis, Obtaining Data Files, Performing the Audit, File Format Types, Preparation for Data Analysis, Arranging and Organizing Data, Statistics and Sampling, Descriptive Statistics, Inferential Statistics

**UNIT - III**

Data Analytical Tests, Benford's Law, Number Duplication Test , Z-Score, Relative Size Factor Test, Same-Same-Same Test , Same-Same-Different Test

**UNIT - IV**

Advanced Data Analytical Tests

Correlation, Trend Analysis, , GEL-1 and GEL-2 , Skimming and Cash Larceny, Billing schemes : and Data Familiarization, , Benford's Law Tests, Relative Size Factor Test , Match Employee Address to Supplier data

**UNIT - V**

Payroll Fraud, Expense Reimbursement Schemes, Register disbursement schemes

**Text Book:**

1. Fraud and Fraud Detection: A Data Analytics Approach by Sunder Gee, Wiley



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**  
**M. Tech. (CNIS/CN/Cyber Security)**

**ENGLISH FOR RESEARCH PAPER WRITING (Audit Course - I & II)**

**Prerequisite:** None

**Course objectives:** Students will be able to:

- Understand that how to improve your writing skills and level of readability
- Learn about what to write in each section
- Understand the skills needed when writing a Title Ensure the good quality of paper at very first-time submission

**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 Criticizing, 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 first- time submission

**TEXT BOOKS/ REFERENCES:**

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.
4. Adrian Wallwork, English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**  
**M. Tech. (CNIS/CN/Cyber Security)**

**DISASTER MANAGEMENT (Audit Course - I & II)**

**Prerequisite:** None

**Course Objectives:** Students will be able to

- learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.
- critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
- develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
- critically understand the strengths and weaknesses of disaster management approaches,
- planning and programming in different countries, particularly their home country or the countries they work in

**UNIT-I:**

**Introduction:**

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

**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-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 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-IV:**

**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.

**UNIT-V:**

**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.

**TEXT BOOKS/ REFERENCES:**

1. R. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies "New Royal book Company.
2. Sahni, Pardeep Et. Al. (Eds.)," Disaster Mitigation Experiences and Reflections", Prentice Hall of India, New Delhi.
3. Goel S. L., Disaster Administration and Management Text and Case Studies", Deep &Deep Publication Pvt. Ltd., New Delhi.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**  
**M. Tech. (CNIS/CN/Cyber Security)**

**SANSKRIT FOR TECHNICAL KNOWLEDGE (Audit Course - I & II)**

**Prerequisite:** None

**Course Objectives:**

- To get a working knowledge in illustrious Sanskrit, the scientific language in the world
- Learning of Sanskrit to improve brain functioning
- Learning of Sanskrit to develop the logic in mathematics, science & other subjects enhancing the memory power
- The engineering scholars equipped with Sanskrit will be able to explore the huge knowledge from ancient literature

**Course Outcomes:** Students will be able to

- Understanding basic Sanskrit language
- Ancient Sanskrit literature about science & technology can be understood
- Being a logical language will help to develop logic in students

**UNIT-I:**

Alphabets in Sanskrit,

**UNIT-II:**

Past/Present/Future Tense, Simple Sentences

**UNIT-III:**

Order, Introduction of roots,

**UNIT-IV:**

Technical information about Sanskrit Literature

**UNIT-V:**

Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics

**TEXT BOOKS/ REFERENCES:**

1. "Abhyaspustakam" – Dr. Vishwas, Samskrita-Bharti Publication, New Delhi
2. "Teach Yourself Sanskrit" Prathama Deeksha-Vempati Kutumbshastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication
3. "India's Glorious Scientific Tradition" Suresh Soni, Ocean books (P) Ltd., New Delhi.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**  
**M. Tech. (CNIS/CN/Cyber Security)**

**VALUE EDUCATION (Audit Course - I & II)**

**Prerequisite:** None

**Course Objectives:** Students will be able to

- Understand value of education and self- development
- Imbibe good values in students
- Let the should know about the importance of character

**Course outcomes:** Students will be able to

- Knowledge of self-development
- Learn the importance of Human values
- Developing the overall personality

**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.

**UNIT-IV:**

Avoid fault Thinking. Free from anger, Dignity of labour. Universal brotherhood and religious tolerance. True friendship. Happiness Vs suffering, love for truth. Aware of self-destructive habits. Association and Cooperation. Doing best for saving nature

**UNIT-V:**

Character and Competence –Holy books vs Blind faith. Self-management and Good health. Science of reincarnation, Equality, Nonviolence, Humility, Role of Women. All religions and same message. Mind your Mind, Self-control. Honesty, Studying effectively

**TEXT BOOKS/ REFERENCES:**

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

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**  
**M. Tech. (CNIS/CN/Cyber Security)**

**CONSTITUTION OF INDIA (Audit Course - I & II)**

**Prerequisite:** None

**Course Objectives:** Students will be able to:

- Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
- To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

**Course Outcomes:** Students will be able to:

- Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
- Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
- Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
- Discuss the passage of the Hindu Code Bill of 1956.

**UNIT-I:**

**History of Making of the Indian Constitution:** History Drafting Committee, (Composition & Working), **Philosophy of the Indian Constitution:** Preamble, Salient Features.

**UNIT-II:**

**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-III:**

**Organs of Governance:** Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualification, Powers and Functions.

**UNIT-IV:**

**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, Importance of grass root democracy.

**UNIT-V:**

**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.

**TEXT BOOKS/ REFERENCES:**

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.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**  
**M. Tech. (CNIS/CN/Cyber Security)**

**PEDAGOGY STUDIES (Audit Course - I & II)**

**Prerequisite:** None

**Course Objectives:** Students will be able to:

- Review existing evidence on the review topic to inform programme design and policy making undertaken by the DfID, other agencies and researchers.
- Identify critical evidence gaps to guide the development.

**Course Outcomes:** Students will be able to understand:

- What pedagogical practices are being used by teachers in formal and informal classrooms in developing countries?
- What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?
- How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?

**UNIT-I:**

**Introduction and Methodology:** Aims and rationale, Policy background, Conceptual framework and terminology Theories of learning, Curriculum, Teacher education. Conceptual framework, Research questions. Overview of methodology and Searching.

**UNIT-II:**

**Thematic overview:** Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. Curriculum, Teacher education.

**UNIT-III:**

Evidence on the effectiveness of pedagogical practices, Methodology for the indepth stage: quality assessment of included studies. How can teacher education (curriculum and practicum) and the scho curriculum and guidance materials best support effective pedagogy? Theory of change. Strength and nature of the body of evidence for effective pedagogical practices. Pedagogic theory and pedagogical approaches. Teachers' attitudes and beliefs and Pedagogic strategies.

**UNIT-IV:**

**Professional development:** alignment with classroom practices and follow-up support, Peer support, Support from the head teacher and the community. Curriculum and assessment, Barriers to learning: limited resources and large class sizes

**UNIT-V:**

**Research gaps and future directions:** Research design, Contexts, Pedagogy, Teacher education, Curriculum and assessment, Dissemination and research impact.

**TEXT BOOKS/ REFERENCES:**

1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2): 245-261.
2. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379.
3. Akyeamong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.



4. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? *International Journal Educational Development*, 33 (3): 272–282.
5. Alexander RJ (2001) *Culture and pedagogy: International comparisons in primary education*. Oxford and Boston: Blackwell.
6. Chavan M (2003) Read India: A mass scale, rapid, 'learning to read' campaign.
7. [www.pratham.org/images/resource%20working%20paper%202.pdf](http://www.pratham.org/images/resource%20working%20paper%202.pdf).

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**  
**M. Tech. (CNIS/CN/Cyber Security)**

**STRESS MANAGEMENT BY YOGA (Audit Course - I & II)**

**Prerequisite:** None

**Course Objectives:**

- To achieve overall health of body and mind
- To overcome stress

**Course Outcomes:** Students will be able to:

- Develop healthy mind in a healthy body thus improving social health also
- Improve efficiency

**UNIT-I:**

Definitions of Eight parts of yog. (Ashtanga)

**UNIT-II:**

Yam and Niyam.

**UNIT-III:**

Do`s and Don`ts in life.

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

**UNIT-IV:**

Asan and Pranayam

**UNIT-V:**

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

**TEXT BOOKS/ REFERENCES:**

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

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**  
**M. Tech. (CNIS/CN/Cyber Security)**

**PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS**  
**(Audit Course - I & II)**

**Prerequisite:** None

**Course Objectives:**

- To learn to achieve the highest goal happily
- To become a person with stable mind, pleasing personality and determination
- To awaken wisdom in students

**Course Outcomes:** Students will be able to

- Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life
- The person who has studied Geeta will lead the nation and mankind to peace and prosperity
- Study of Neetishatakam will help in developing versatile personality of students

**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)

**UNIT-II:**

Neetisatakam-Holistic development of personality

- Verses- 52,53,59 (dont's)
- Verses- 71,73,75,78 (do's)

**UNIT-III:**

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-IV:**

Statements of basic knowledge.

- Shrimad Bhagwad Geeta: Chapter2-Verses 56, 62, 68
- Chapter 12 -Verses 13, 14, 15, 16,17, 18
- Personality of Role model. Shrimad Bhagwad Geeta:

**UNIT-V:**

- Chapter2-Verses 17, Chapter 3-Verses 36,37,42,
- Chapter 4-Verses 18, 38,39
- Chapter18 – Verses 37,38,63

**TEXT BOOKS/ REFERENCES:**

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.