School of Computer Applications
Scheme and Syllabus

S.No.	Subject	Code	Category	L	T	P	Credits
	MCA						
	SEMESTER I						
1	**English Communication**	**HUL-219**	**HU**	**2**	**0**	**2**	**3**
2	**Graphics and Multimedia**	**CSL-782**	**DC**	**3**	**1**	**0**	**4**
3	**Software Engineering**	**CSL-740**	**DC**	**3**	**1**	**0**	**4**
4	**Advanced Database management system**	**CSL-753**	**DC**	**3**	**1**	**2**	**5**
5	**Internet and Java Programming**	**CSL 712**	**DC**	**3**	**1**	**0**	**4**
6	**Cloud Computing**	**CSL-771**	**DE**	**4**	**0**	**0**	**4**
7	**Java Lab**	**CSP 781**	**DC**	**0**	**0**	**2**	**1**
8	**Web Technologies with PHP**	**CSL-775**	**DC**	**3**	**1**	**2**	**4**
9	**Graphics & Multimedia Lab**	**CSP-741**	**DC**	**0**	**0**	**2**	**1**
10	**Distributed Operating System**	**CSL772**	**DC**	**3**	**0**	**0**	**3**
						Total Credits	**33**

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HUL-219   **English Communication**

3 credits (2-0-2)

Unit-1: Introduction to Communication
Definition, types of Communication: Verbal and non- verbal, process; importance of listening, group communication.

Unit-2: Proposal Writing
Definition and purpose of proposal, Types of proposals, characteristics, structure and body of proposal, style and appearance and evaluation of proposals.

Unit-3: Technical Communication
Nature, salient features, scope and significance, forms of Technical Communication, difference between General writing and Technical Communication
Definition of report, types of report, objective of report, format and layout of detailed report, short report, memorandum, laboratory report, and routine report. Letter Writing

Unit-4: Effective presentation strategies & Group Discussion
MS-PowerPoint, Planning a Presentation, Outlining and structuring a presentation, stage fright and nervousness, use of props, audio video aids and animations, strategy for effective delivery. GD- Dos and Donts, Effective strategies to crack GD

Unit-5: Personal Etiquettes & Social and Corporate Etiquettes
Meeting etiquettes, table etiquettes and telephonic etiquettes, Corporate behavior, building: corporate conduct, team building, ethical decision making, alignment of individual, organization goal, table etiquettes.

Text Books:
1. Raman Meenakshi & Sharma Sangeeta, *Technical Communication-Principles & Practice* – O.U.P. New Delhi. 2007.
2. Mitra Barum K., *Effective Technical Communication* – O.U.P. New Delhi. 2006.

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CSL-782   **Computer Graphics and Multimedia**
4 credits (3-1-0)

Unit-1:
Graphics Primitives: Display Devices: Refresh Cathode Ray Tube, Raster Scan Display, Random scan Display, Plasma display, Liquid Crystal display, Aliasing and anti-aliasing in Raster technology.

Input Devices: Keyboard, Trackball, Joystick, Mouse, Light Pen, Tablet, and Digitizing Camera.

Input Techniques: Positioning techniques, Positioning Constraints, Scales & Guidelines, Rubber-Band techniques, Dragging, Dimensioning techniques and Graphical Potentiometers, Pointing and Selection: the use of selection points, defining a boundary rectangle, multiple selections, and Menu selection.

Unit-2:
Mathematics for Computer Graphics: Point representation, Vector representation, Matrices and operations related to matrices, Vector addition and vector multiplication, Scalar product of two vectors, Vector product of two vectors.

Line Drawing Algorithms: DDA algorithm for line, Bresenham's Line algorithm. Circle generating algorithms: DDA algorithm, Bresenham's algorithm, mid-point algorithm, polynomial algorithm, trigonometric algorithm, ellipse generating mid-point algorithm.

Segment & Display files: Segments, Functions for segmenting the display file, Posting and unposting a segment, segment naming schemes, Default error conditions, Appending to segments, Refresh concurrent with reconstruction, Free storage allocation, Display file Structure.

Graphics Operations: Clipping: Point Clipping, Line Clipping. Polygon Clipping.

Filling: Inside Tests, Flood fill algorithm, Boundary-Fill Algorithm and scan-line polygon fill algorithm.

Unit-3:
Conics, Curves and Surfaces: Quadric surfaces: Sphere, Ellipsoid, and Torus. Superquadrics: Superellipse, super ellipsoid. Spline & Bezier Representations: Interpolation and approximation splines curves, parametric continuity conditions, Geometric Continuity Conditions, Spline specifications. Bezier curves and surfaces.

Unit-4:
Transformation: 2D transformation, Basic Transformations, Composite transformations: Reflection, Shearing, And Transformation between coordinate systems.

3 D Graphics: 3 D Display Methods, 3 D modeling, 3 D transformations, Parallel projection, Perspective projection, Visible lines and surfaces identification, Hidden surface removal.

Unit-5:
Multimedia Terms, Hardware, Hardware peripherals, Basic tools in multimedia, Multimedia Building Blocks -Media Forms, elements, Sound, Image, Animation, Video, MPEG,JPEG,Graphic file formats, Multimedia Applications.

Animation: Introduction to Animation, Principles of Animation, Types of Animation, Types of Animation Systems: Scripting, Procedural, Representational, Stochastic, etc.

Animation Tools:

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Hardware –SGI, PC's, Amiga etc.

Software: Adobe Photoshop, Animation studio, Wave front etc.

Gif Animator: Microsoft GIF Animation, GIF Construction, GIFmation etc. **GKS:** GKS Standards, GKS Primitives – Polyline, Polymarker, and Fill area, Text, GKS Workstation and Metafiles.

Text Book:
1. Donald Hearn and M. Pauline Baker, "Computer Graphics", PHI
2. Computer Graphics Scheaum' series
3. Prabhat K Andleigh and Kiran Thakrar, "Multimedia Systems and Design", PHI, 2003
4. Mark J. Bunzel and Sandra K. Morris "Multimedia Application Development" Mcgraw-Hill Osborne Media; 2nd edition (September 1993)

Reference Books:

1. Rogers, "Procedural Elements of Computer Graphics", McGraw Hill
2. Bing J. Sheu and Mohammed Ismail "Multimedia Technology for Applications" Wiley-IEEE Press (June 22, 1998)

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CSL-740   Software Engineering
4 credits (3-1-0)

Unit-1:
Introduction: Introduction to software engineering, Importance of software, The evolving role of software, Software Characteristics, Software Components, Software Applications, Software Crisis, Software engineering problems, Software Development Life Cycle, Software Process.

Unit-2:
Software Requirement Specification: Analysis Principles, Water Fall Model, The Incremental Model, Prototyping, Spiral Model, Role of management in software development, Role of matrices and Measurement, Problem Analysis, Requirement specification, Monitoring and Control.
Software-Design: Design principles, problem partitioning, abstraction, and top down and bottom up design, Structured approach, functional versus object oriented approach, design specifications and verification, Monitoring and control, Cohesion, Coupling, Fourth generation techniques, Functional independence, Software Architecture, Transaction and Transform Mapping, Component – level Design, Fourth Generation Techniques

Unit-3:
Coding: Top-Down and Bottom –Up programming, structured programming, information hiding, programming style and internal documentation.

Testing: Testing principles, Levels of testing, functional testing, structural testing, test plane, test case specification, reliability assessment, software testing strategies, Verification & validation, Unit testing, Integration Testing, Alpha & Beta testing, system testing and debugging

Unit-4:
Software Project Management: The Management spectrum- (The people, the product, the process, the project), cost estimation, project scheduling, staffing, software configuration management, Structured Vs Unstructured maintenance, quality assurance, project monitoring, risk management.

Unit-5:

Software Reliability & Quality Assurance: Reliability issues, Reliability metrics, Reliability growth modeling, Software quality, ISO 9000 certification for software industry, SEI capability maturity model, comparison between ISO & SEI CMM.

CASE (Computer Aided Software Engineering): CASE and its Scope, CASE support in software life cycle, documentation, project management, Reverse Software Engineering, Architecture of CASE environment.

Text Books:
1. Pressman, Roger S., "Software Engineering: A Practitioner's Approach", McGraw Hill
2.   Jalote, Pankaj, "Software Engineering", Narosa
3. Schaum's Series, "Software Engineering", TMH

Reference Books:
1. Alexis, Leon and Mathews Leon, "Fundamental of Software Engineering", Vikas
2. Sommerville, Ian, "Software Engineering", AWL, 2000

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CSL-751   Advance Database Management System
4 credits (3-0-2)

Unit-1:
Introduction: Elements of Database System, Characteristics of database approach, File system versus DBMS, data models, DBMS architecture and data independence. Role of DBA, DDL, DML and DCL.

Unit-2:
E-R Modeling: Entity types, entity set, attribute and key, relationships, relation types, roles and structural constraints, weak entities, enhanced E-R and overview of object modeling. Specialization and generalization.

Unit-3:
Relational Data Model: Relational model concepts: The catalog, base tables and views. Relational Data Objects **-** Domains and Relations: Domains, relations, kinds of relations, relations and predicates, relational databases. Relational constraints, relational algebra.

SQL: SQL queries, programming using SQL (PL/SQL), Integrity Constraints, Roles and privileges. PL/SQL – Introduction to PL/SQL – Declare, begin statements, Variables, Control Structure, PL/SQL Transactions – Savepoint, Cursor, PL/SQL Database Objects – Procedures, Functions, Packages, Triggers. Programmatic SQL – Embedded SQL

Unit-4:
Data Normalization: Functional dependencies, Normal form up to 3rd normal form & BCNF

File and system structure : overall system structure, file organization, logical and physical file organization, sequential and random, hierarchical, inverted, multi list, indexing and hashing, Btree index files.

Unit-5:
Concurrency Control: Transaction processing, locking techniques, database recovery, security and authorization. Overview of recovery techniques and Database Security.

Text Books:
1. Silberschatz Abraham, Korth Henry & Sudarshan S., Database Systems Concepts, McGraw Hill, 1997.
2. Date C.J., an Introduction to Database Systems, Addition Wiley.

Reference Books:
1. Bipin Desai, An Introduction to Database Systems, Galgotia Publications, 1991.

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CSL-712   Internet and Java Programming
4 credits (3-1-0)

Unit-I
Core Java:
Introduction, Operator, Data type, Variable, Arrays, Control Statements, Methods & Classes, Inheritance, Package and Interface, Exception Handling, Multithread programming, I/O

Unit-II
Java Applet, String handling, Networking, Event handling, Introduction to AWT, AWT controls, Layout managers, Menus, Images, Graphics.

Unit-III
Java Swing:
Creating a Swing Applet and Application, Programming using Panes, Pluggable Look and feel, Labels, Text fields, Buttons, Toggle buttons, Checkboxes, Radio Buttons, View ports, Scroll Panes, Scroll Bars, Lists, Combo box, Progress Bar, Menus and Toolbars, Layered Panes, Tabbed Panes, Split Panes, Layouts, Windows, Dialog Boxes, Inner frame.

Unit-IV
JDBC:
The connectivity Model, JDBC/ODBC Bridge, java.sql package, connectivity to remote database, navigating through multiple rows retrieved from a database. EJB: Session Beans, Entity Beans, Introduction to Enterprise Java beans (EJB), Introduction to RMI (Remote Method Invocation), A simple client-server application using RMI.

Unit-V
Java Servlets:
Servlet basics, Servlet API basic, Life cycle of a Servlet, Running Servlet, Debugging Servlets, Thread-safe Servlets, HTTP Redirects, Cookies, Introduction to Java Server Pages (JSP).

Text Books:
1. Margaret Levine Young, "The Complete Reference Internet", TMH
2. Naughton, Schildt, "The Complete Reference JAVA2", TMH

Reference Books:
1. Balagurusamy E, "Programming in JAVA", TMH
2. Dustin R. Callway, "Inside Servlets", Addison Wesley
3. Mark Wutica, "Java Enterprise Edition", QUE
4. Steven Holzner, "Java2 Black book", Dreamtech

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CSL-771   Cloud Computing
4 credits (4-0-0)

Unit I
Cloud Computing: Existing usage of cloud computing; New paradigm in the cloud; Applications. Cloud Computing Architectural Framework: Cloud: Benefits, Vocabulary, Business scenarios, Essential characteristics, Deployment models, Service models, Multi-tenancy, Approaches to create a barrier between the tenants.

Unit II
Vendor Lock-in and Efforts at Standardization: Need of migration; Preventing vendor locking, Comparison chart., Data Center Operations: The anatomy of cloud infrastructure, Data Center Operations, Security challenge, implements "Five Principal Characteristics of Cloud Computing, Data center Security Recommendations. Introducing Identity Services, Enterprise Architecture with IDaaS , IDaaS Security Recommendations, data Security in Cloud, technologies for data security.

Unit III
Governance and Enterprise Risk Management: Information security governance processes, Governance and enterprise risk management in Cloud Computing, Governance Recommendations, Enterprise Risk Management Recommendations, Information Risk Management Recommendations and Third Party Management Recommendations

Unit IV
Cloud Reliability, Fault Tolerance and Response Time: Business continuity management: System reliability, Case studies on designing for reliability; Concept of fault tolerance; Response time. Internet Cloud Security: Introduction; Potential threats; Security as a service by cloud providers; Fraud theory and Intellectual property.
Information Lifecycle Management: Key challenges regarding data lifecycle security, Data Security Recommendations by Cloud Computing

Unit V
Traditional Security, Business Continuity, and Disaster Recovery: Risk of insider abuse, Security baseline, Customers actions, Contract, Documentation, Recovery Time Objectives (RTOs), Customers responsibility Case Studies : Amazon's cloud services (AWS)

Text Books:
1. David, E.Y. Sarna, *Implementing and Developing Cloud Computing Applications*, CRC Press.
2. Dimitris, N. Chorafas*, Cloud Computing Strategies, C*RC Press.
3. Rajkumar Buyya, James Broberg, Andrzej M. Goscinsk, Cloud Computing: Principles and Paradigms, Wiley Publications

Reference Books:
1 Mather, T.*, Cloud Security and Privacy: An Enterprise Perspective On Risks And Compliance,* O'Relly
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CSL-772   Distributed Operating System
3 credits (3-0-0)
Unit - I
Introduction to Distributed Systems, What is a Distributed System?, Hardware concepts, Software concepts, Design issues.
Communication in Distributed Systems, Lay red Protocols, ATM networks, The Client – sever model, Remote Procedure call, Group communication.
Unit - II
Synchronization in Distributed System, Clock Synchronization, Mutual Exclusion, Election algorithms, Atomic transactions, Deadlocks in Distributed Systems.
Process and processors in Distributed System threads, System Models, Processors allocation, Scheduling in Distributed System, Fault tolerance, Real time Distributed System.
Unit – III
Distributed File Systems, Distributed File System Design, Distributed File System implementation, Trends in Distributed File System.
Unit – IV
Distributed Shared Memory, Introduction, What is Shared memory?, Consistency models, Page based Distributed Shared memory, Shared – variable Distributed Shared memory, Object based Distributed Shared Memory
Unit V
Distributed Web-based Systems
Architecture, Processes, Communication, Naming, Synchronization, Consistency and Replication: Web Proxy Caching, Replication for Web Hosting Systems, Replication of Web Applications
Security
Introduction of Security in Distributed OS, Overview of security techniques, features, Need, Access Control, Security Management

Reference Books:
1. Distributed Operating Systems Concepts and Design, Pradeep K. Sinha, PHI
2. Distributed Systems: Concepts and Design by George Coulouris, Jean Dollimore,Tim Kindberg, Pearson
3. Distributed Operating Systems by Andrew S Tannebaum, Pearson

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S.No.	Subject	Code	Category	L	T	P	Credits
	MCA						
	SEMESTER II						
1	Programming with Python	CSL 813	DC	3	0	2	4
2	Data Communication & Computer Networks	CSL814	DC	3	1	0	4
3	Ethical Hacking	CSL 815	DC	3	1	0	4
4	Artificial Intelligence	CSL 816	DE	3	0	0	3
5	ASP .Net with C#	CSL 817	DC	3	0	2	4
6	Unix and Shell Programming	CSL-818	DC	3	0	2	4
7	Analysis and Design of Algorithm	CSL-621	DE	3	0	0	3
8	R Programming for Data Analysis	CSL-819	DE	3	0	2	4
9	Minor project in java/.Net	CSD 850	DC	0	0	0	2
						Total Credits	32

CSL 813 Programming with Python
4 Credits (3-0-2)

Unit-I
Introduction History, Features, Setting up path, Working with Python, Basic Syntax ,Variable and Data Types , Operator Conditional Statements If ,If- else ,Nested if-else Looping For, While ,Nested loops Control Statements Break, Continue

Unit-II
String Manipulation Accessing Strings ,Basic Operations ,String slices ,Function and Methods Lists Introduction ,Accessing list ,Operations ,Working with lists ,Function and Methods Tuple Introduction ,Accessing tuples ,Operations ,Working ,Functions and Methods

Unit-III
Dictionaries Introduction, Accessing values in dictionaries ,Working with dictionaries ,Properties ,Functions Functions Defining a function , Calling a function, Types of functions ,Function Arguments ,Anonymous functions ,Global and local variables

Unit-IV
Modules Importing module ,Math module ,Random module ,Packages ,Composition InputOutput Printing on screen ,Reading data from keyboard ,Opening and closing file ,Reading and writing files ,Functions

Unit-V
Exception Handling Exception ,Exception Handling ,Except clause ,Try ? finally clause ,User Defined Exceptions OOPs concept Class and object , Attributes ,Inheritance ,Overloading ,Overriding ,Data hiding

Text Books:
1. Learning Python by Mark Lutz, David Ascher Shop O'Reilly - O'Reilly Media
2. Beginning Python Magnus Lie Hetland , Goodreads
3. Python Programming for the Absolute Beginner third edition Ross Dawson Goodreads
References:
1. Practical Programming: An introduction to Computer Science Using Python, second edition, Paul Gries, Jennifer Campbell, Jason Montojo, The Pragmatic Bookshelf.
2. Python for Informatics: Exploring Information, Charles Severance 3. Learning Python, Fourth Edition, Mark Lutz, O'Reilly publication 4. Introduction to Python for Computational Science and Engineering (A beginner's guide), Hans Fangohr,

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CSL 814 Data Communication & Computer Networks
4 Credits (3-1-0)

Unit 1
Data Communications
Introduction, Communication Systems, Signal and data, Transmission modes, Synchronous and synchronous transmission, Circuits, channels and multichanneling, Signaling, Encoding and decoding, Error detection and Recovery, Flow control, Sliding Window, Congestion Management, Multiplexing [FDM, TDM, CDM, WDM] and Spreading [DS. FH], Concept of Modulation, Baseband versus Broadband; Pulse Code Modulation (PCM), Shift Keying [ASK, FSK, PSK, QPSK, DPSK]; Encoding techniques and CODEC; Classification of Modems, Standards and Protocols, Protocols used by Modem to Transfer files, Establishing a Connection (Internet connectivity); Digital Subscriber Loop (DSL)

Unit 2
Communication Network Fundamentals
Introduction, Switching techniques: Circuit Switching, Packet switching, Datagram, Virtual circuit and Permanent Virtual Circuit, Connectionless and connection oriented communication, Message switching, Cell switching (ATM); Telephone network signaling Network topologies, Layering the communication process, Open Systems Interconnection (OSI) model, Data encapsulation; Protocols, services and layering, PDU/SDU; TCP/IP suite, Hour-glass model, Internet Architecture and Protocol overview.

Unit 3
Media Access Control
Introduction, Access Techniques (STDM, FDMA, TDMA, Spread Spectrum techniques and CDMA, DSSS, FHSS); Media Access Control: Aloha and Slotted Aloha, Media Access Control Address, Polling, CSMA, CSMA/CA, CSMA/CD and Reservation Aloha, Digital hierarchies [SONET/SDH]
Network Components
Introduction, LAN Hardware, LAN Operating Systems, Transmission Media: Guided Media (Twisted pair, Co-axial cable, Optical fiber); Unguided Media (Radio, VHF, microwave, satellite, Infrared); Fiber Optics Communication Components (Source, Channel Detector.

Unit 4
Link Control and MAC Protocols
Framing, Error Detection and Correction; Window-based Flow Control; Logical Link Control, HDLC Protocol, Point-to-Point Protocol (PPP), X.25 CCITT standard for packet data transmission; Media access control, Random Access Techniques, Scheduling Mechanisms.
Local Area Network (LAN)
LAN topologies and protocols; IEEE 802 Standard; Ethernet (Standard, Fast, Gigabit), Token Ring, FDDI, Wireless LANs (802.11x); Connecting LANs: Repeaters, Bridges, Switches, Routers; Virtual LANs

Unit 5
Wide Area Network (WAN)
Network Layer Addressing and Routing concepts (Forwarding Function, Filtering Function); Routing Methods (Static and dynamic routing, Distributed routing, Hierarchical Routing); Distance Vector Protocol, Link State protocol, Open Shortest Path First (OSPF); Internet Protocol (IP): Addressing & Routing; Internet Control Message Protocol, (ICMP), Address Resolution Protocol (ARP), Dynamic Host Control Protocol (DHCP), Network Address Translation (NAT), IPv6, Mobile IP Process-to-Process delivery in Transport Layer: User Datagram Protocol (UDP), Transmission Control Protocol (TCP), congestion control
Wireless Networks
Radio Communications, Cellular Radio, Mobile Telephony (GSM & CDMA), Satellite Networks (VSAT), Mobile Adhoc Networks (MANET).
Security and Management
Cryptography, IPsec, SSL/TLS, PGP, secure HTTP, proxy, firewall, VPN; Simple Network Management Protocol (SNMP), Network policies.

Suggested reading:
Text Books:
1. Behrouz A Forouzan, "Data Communication and Networking", Tata McGraw-Hill, 2008.
2. William Stallings, "Data and Computer Communications", Pearson Education, 2008.
3. Tomasi Wayne, "Introduction to Data Communications and Networking", Pearson Education, 2007.

ReferenceBooks:

1. A. S. Tanenbaum, "Computer Networks", Fourth Edition, Pearson Education.
2. A. Leon-Gracia and I. Widjaja, "Communication Networks", Tata McGraw Hill, 2004.
3. K. Pahlavan and P. Krishnamurthy, "Principles of Wireless Networks", EEE/ Prentice Hall of India, 2003.

CSL815 Ethical Hacking
4 Credits (3-1-0)

Unit I:
Introduction to Ethical Hacking: Understanding the importance of security, Concept of ethical hacking and essential Terminologies-Threat, Attack, Vulnerabilities, Target of Evaluation, Exploit. Hacking Methodology, Process of Malicious Hacking, Phases involved in hacking and Foot printing and scanning: Foot printing : Introduction to foot printing, Understanding the information gathering methodology of the hackers,Tools used for the reconnaissance phase , scanning. Enumeration: Enumeration. System Hacking and Trojans: System Hacking, Trojans and Black Box Vs. White Box Techniques

Unit II :
Hacking Methodology: Denial of Service, Sniffers: Understanding Sniffers ,Comprehending Active and Passive Sniffing, ARP Spoofing and Redirection, DNS and IP Sniffing, HTTPS Sniffing, Session Hijacking and Hacking Web Servers: Understanding Session Hijacking, Phases involved in Session Hijacking, Types of Session Hijacking, Session Hijacking Tools, Hacking Web Servers. Web Application Vulnerabilities and Web Techniques Based Password Cracking: Web Application Vulnerabilities, Web Application Threats, Web Based Password Cracking Techniques, Web Application Hacking, Cross Site Scripting / XSS Flaws / Countermeasures Correct Web Application Set-up

Unit III:
Web and Network Hacking: SQL Injection Attacking SQL Servers, Sniffing, Brute Forcing and finding Application Configuration Files, Input validation attacks. Preventive Measures, Hacking Wireless Networking, Viruses, Worms and Physical Security: Viruses and Worms, Physical Security. Linux Hacking: Linux Hacking. Evading IDS and Firewalls: Evading IDS and Firewalls. Demonstration of vulnerabilities and Mitigation of issues identified including tracking.

Unit IV:
Report writing & Mitigation: Introduction to Report Writing & Mitigation, requirements for low level reporting & high level reporting of Penetration testing results,

Unit V:
Ethical Hacking Laws and Tests : An introduction to the particular legal, professional and ethical issues likely to face the domain of ethical hacking, ethical responsibilities, professional integrity and making appropriate use of the tools and techniques associated with ethical hacking – Social Engineering, Host Reconnaissance.
Text Books:
1. Michael T. Simpson, Kent Backman, James E. "Corley, Hands-On Ethical Hacking and Nework Defense", Second Edition, CENGAGE Course.
2. The CEH Prep Guide: The Comprehensive Guide to Certified Ethical Hacking, by Ronald L. Kurtz (Author), Russell Dean Vines, Wiley Publications, First Edition
3. Rajat Khare, "Network Seuciryt and Ethical Hacking", Luniver Press, 2006

Reference Books:
1. Steven DeFino, Barry Kaufman, Nick Valenteen, "Official Certified Ethical Hacker Review Guide", CENGAGE Course.
2. Patrick Engebretson, "The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy"
, Syngress Basics Series‐Elsevier.
3. Whitaker & Newman, " Penetration Testing and Network Defense" , Cisco Press,
Indianapolis.

CSL818 Unix/Linux & Shell Programming
4 Credits (3-0-2)

Unit – I

Overview of Linux:
Introduction to operating system, features and roles, Open Source advantages, Introducing Linux as operating system, Exploring Linux distributions, Architecture of Linux, types of shell, File System, File management- types of files, absolute and relative

paths, reference directories, looking for files in the file system, Boot process and Linux loaders, Linux Graphical Environments – X Window system, GNOME and KDE desktop.

Unit - II
Linux Commands:
Basic Commands, Internal and External Commands, Managing File Permissions, Locating files, Common filter commands, Using MAIL, Host Information, Daemons and Clocks, Printing and Networking Commands, Process Management- components of process, life cycle, parent-child relationship, monitor process, signals, scheduling priority, process states, Periodic process and System variables.
Shell Meta Characters: Filename Substitution Meta characters, Redirection Meta characters, Process Execution Meta characters, Conditional Execution Using && and ||, Quoting Meta characters, Positional Parameters and Special Parameters.

Unit - III
Linux Editor:
Introducing vim: A Modal Editor, modes of vim, status line commands, Opening & modifying a file, Saving a file and exiting vim, Search and Replace, undoing changes, yanking, Accessing multiple files, Window Commands, Interacting with system, Macros, vim configuration. Ex basics, syntax of ex commands, Addresses, Address symbols, options.
sed Editor: overview, uses of sed, sed operation, standard operations, pattern addressing, regular expressions, line information, I/O processing, yanking, putting, branching commands, multiline input processing.

Unit - IV
Linux Programming:
Bash scripting: Variables- variable assignment and variable scope, Operators, Command Line Arguments, Setting Values of Positional Parameters, Using Shifton Positional Parameters, Control Flow Statements-Decision, loops and case statements, Arithmetic in Shell Script, Array, File and String Tests.
gawk programming: overview, command line syntax, standard options, Built in variables, operators, variable and array assignment, escape sequences, patterns and procedures, functions,
file inclusion, output redirections, printf formats.

Unit - V
Linux Basic administration: System administrator roles and responsibilities, user account management, monitoring system performance, configuring hardware, Managing File Systems, using su, sudo, sticky bits, using configuration and log files, maintaining effective data backup strategy, managing run levels, using graphical administration tools, managing security – using password protection, using shadow password file, using log files, using secure shell tools – ssh, sftp, scp.

Text Books:
1. Sumitaba Das, Unix Shell Programming, TMH
2. Ellen Siever, Linux in a nutshell, O'REILLY
3. Christopher Negus, Linux Bible, edition-2011
Reference Books:
1. Evi Nemeth, Unix and Linux System Administration hand book, pearson
2. MachteltGarrels, Introduction to Linux

CSL621 Analysis and Design of Algorithms

Unit 1:

Introduction:
The role of Algorithms in Computing, Analyzing algorithms, Designing algorithms, Asymptotic notations Introduction to arrays, linked lists, stacks, queues, priority queue, heap, binary tree and search trees

Unit II

Divide and Conquer Technique:
The substitution method for solving recurrences, The recursion tree method for solving recurrences, The master method for solving recurrences

Sorting
Insertion,Merge, quick, radix

Heapsort:
Heaps, Maintaining the heap property , Building a heap, The heapsort algorithm, Priority queues

Unit III

Red-Black Trees:
Properties of red – black trees , Rotations , Insertion , Deletion
Dynamic Programming:
Matrix-chain multiplication , Longest common subsequences

Unit IV
Greedy Technique:
An activity selection problem , Elements of greedy strategy , Huffman codes
Single –Source Shortest Paths:
The Bellman-Ford algorithm , Single-source shortest paths in directed acyclic graphs , Dijkstra's algorithm

Unit V
String Matching:
The naïve string matching algorithm, The Rabin Karp algorithm
NP-Completeness and the P & NP Classes:
Introduction , Polynomial Time & Verification , NP-Completeness and Reducibility , The Traveling Salesman Problem

Text Books :
Computer Algorithms by Horowitz, Sahni and Rajasekaran, Computer Science Press (1997) ISBN 0-7167-8315-0 (-8316-9)

Reference Books :
Algorithm Design, Jon Kleinberg and Eva Tardos, Addison Wesley, ISBN 0-321-29535-8

CSL 818 Artificial Intelligence
3 Credits (3-0-0)

Unit I
General Issues and overview of AI:
The AI problems: what is an AI technique; Characteristics of AI applications Problem Solving, Search and Control Strategies General Problem solving; Production systems; Control strategies; forward and backward chaining Exhaustive searches: Depth first Breadth first search.

Unit II
Heuristic Search Techniques:
Hill climbing; Branch and Bound technique; Best first search and A* algorithm; AND/OR Graphs; Problem reduction and AO* algorithm; Constraint Satisfaction problems Game Playing Min Max Search procedure; Alpha-Beta cutoff; Additional Refinements.

Unit III
Knowledge Representation:
First Order Predicate Calculus; Skolemnisation; Resolution Principle and Unification; Inference Mechanisms Horn's Clauses; Semantic Networks; Frame Systems and Value Inheritance; Scripts; Conceptual Dependency AI Programming Languages Introduction to LISP, Syntax and Numeric Function; List manipulation functions; Iteration and Recursion; Property list and Arrays, Introduction to PROLOG.

Unit IV
Natural Language Processing and Parsing Techniques :
Context – Free Grammar; Recursive Transition Nets (RTN); Augmented Transition Nets (ATN); Semantic Analysis, Case and Logic Grammars; Planning Overview – An Example Domain: The Blocks Word; Component of Planning Systems; Goal Stack Planning (linear planning); Non-linear Planning using constraint posting; Probabilistic Reasoning and Uncertainty; Probability theory; Bayes Theorem and Bayesian networks; Certainty Factor.

Unit V
Expert Systems:

Introduction to Expert Systems, Architecture of Expert Systems; Expert System Shells; Knowledge Acquisition; Expert system development life cycle: Problem selection, Prototype construction, Formalization, Implementation, Evaluation, Knowledge acquisition: Knowledge engineer, Cognitive behavior, Acquisition techniques, Knowledge representation: Level of representation, Knowledge representation schemes, Formal logic, Inference Engine, Semantic net, Frame, Scripts
Fuzzy logic : Definition, Difference between Boolean and Fuzzy logic, fuzzy subset, fuzzy membership function, fuzzy expert system, Inference process for fuzzy expert system, fuzzy controller.

Text Books
1. Elaine Rich and Kevin Knight: Artificial Intelligence – Tata McGraw Hill.
2. Dan W.Patterson, Introduction to Artificial Intelligence and Expert Systems – Prentice Hal of India.

Reference Books
1. Nils J. Nilsson: Principles of Artificial Intelligence – Narosa Publication house.
2. Artificial Intelligence : A Modern Approach, Stuart Rusell, Peter Norving, Pearson Education 2nd Edition.
3. Artificial Intelligence, Winston, Patrick, Henry, Pearson Education.

CSL-817 ASP .Net with C#

4 credits (3-0-2)

Unit—I
Architecture of the .Net Framework Development Platform: Compiling Source Code into Managed Code, Metadata, Intermediate Language (IL), Common Language Runtime Services, Common Type System, Common Language Specification The .Net Framework Class Library, Just-In-Time Compilation, Unified Classes.
C# Basics: Data Types, Literals and Variables, Operator, Program Control Statements, Class and Object, Arrays and Strings,
A Closer Look at Methods and Classes: C# Access Modifiers, Use ref and out parameter, Variable number of Arguments, Concept of Return Object and Array. Method Overloading, Overloading Constructors, Optional Arguments, Named Arguments, Recursion, Understanding Static.

Unit—II
Operator Overloading, Indexers and Properties, **Inheritance :** Member Access using Protected Access, Calling Base Class Constructor, Name Hiding, Virtual Methods and Overriding, Abstract Classes, Using sealed to Prevent Inheritance, Boxing and Unboxing. Interfaces, Exception Handling. Using I/O.

Unit-III
Delegates and Events, Namespaces and Assemblies, Reflection, Unsafe Code, Networking and Socket. **Multithreading :** Thread Class, Determining when a Thread Ends, Thread Priorities, Synchronization, Thread Communication using Wait(), Pulse() and PulseAll(), Using the Mutex and a Semaphore. Collections. Windows Forms (IDE Environment)

Unit—IV
Advanced Features Using C#: Windows Services, Web Services.
Introduction to ADO.Net: Connected v/s. Disconnected Data Access. ADO.Net Architecture, Connection Object, SQL Command Object, Data Adapter, Data Reader, DataSet.

Asp.net Web Form Controls. State Management, Grid View Control, Validation Controls. Programming Configuration Files, Encrypting Configuration Sections Themes and Master Pages Creating a Consistent Web Site, ASP.NET Themes , Master Pages, Concepts of Paging, Database connectivity with authentication and authorization.

Unit—V
Advanced Features Using C#: ManagingState : Preserving State in Web Applications ,Page-Level State , Using Cookies to Preserve State , ASP.NET Session State , Storing Objects in Session State , Configuring Session State , Setting Up an Out-of-Process State Server , Storing Session State in SQL Server , Using Cookieless Session IDs , Application State Using the DataList and Repeater Controls , Overview of List-Bound Controls |Creating a Repeater Control Distributed Application in C#, Graphical Device interface with C#,
Enumeration.

Text books:
1. Wiley," Beginning Visual C# 2008", Wrox
2. ".Net professional framework 4.0", Wrox
3. "Black Book .Net Framework 4.0". DreamTech

4. "C# 4.0 Complete Reference", by Herbert Schildt
5. "Professional ASP.NET 4.5 in C# and VB" by Bill Evjen, Scott Hanselman, Devin Rader, Wrox

Reference Books:
1. C#.Net Developers Guide- Greg Hack, Jason Werry, SaurabhNandu. (SyngRess)

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MCA							
SEMESTER III							
S.No.	**Subject**	**Code**	**Category**	**L**	**T**	**P**	**Credits**
1	**Advanced Java programming**	**CSL-874**	DC	3	1	0	4
2	**Cryptography and Computer Security**	**CSL-759**	DC	3	1	0	4
3	**Application Development with Android**	**CSL-889**	DC	3	0	2	4
4	**Professional Ethics**	**SML886**	DC	3	0	0	3
5	**Cluster and Grid Computing**	**CSL-842**	DE	3	1	0	4
6	**Advanced .NET with AJAX and MVC**	**CSL-894**	DE	3	0	2	4
7	**Cyber Crime and Digital Forensics**	**CSL778**	DE	3	1	0	4
8	**Seminar - Research Paper**	**CSD-740**	DC	0	1	2	2
9	**Advanced Java Lab**	**CSP-876**	DC	0	0	4	2
						Total Credits	**31**

CSL-874 Advanced Java programming
4 credits (4-0-0)

Unit-1:
Java Database Connectivity: JDBC Product, Types of Drivers, Two-Tier Client/Server Model,Three-Tier Client/Sever Model, Basic Steps of JDBC, Creating and Executing SQL Statement, The Result Set Object, Working with Database MetaData, Interface

Unit-2:
Servlets:
Servlet Interaction & Advanced Servlets, Life cycle of Servlet, Java Servlet Development Kit, Javax.servlet package, Reading Servlet Parameters, Reading Initialization Parameters, The javax.servlet.http Package Handling HTTP

Unit-3:
JavaServer Pages:
JSP Technologies, Understanding the Client-Server Model, Understanding Web server software Configuring the JSP Server, Handling JSP Errors, JSP Translation Time Errors, JSP Request Time Errors, Creating a JSP Error Page

Unit-4:
RMI: RMI Architecture, Designing RMI application, Executing RMI application

EJB: Types of EnterpriseJava beans, Session Bean & Entity Bean, Features of Session Bean, Life-cycle of Stateful Seession Bean, Features of Entity Bean, Life-cycle of Entity Bean, Container-managed Transactions & Bean-managed Transactions, Implementing a container-manged Entity Bean

Unit-5:
XML: What is XML?, XML Syntax Rules

Struts
Introduction to the Apache Struts, MVC Architecture, Struts Architecture, How Struts Works?, Introduction to the Struts Controller, Introduction to the Struts Action Class, Using Struts ActionFrom Class, Using Struts HTML Tags, Introduction to Struts Validator Framework, Client Side Address Validation in Struts, Custom Validators Example, Developing Application with Struts Tiles

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CSL-759 Cryptography and Network Security
4 credits (4-0-0)

Unit-1:
Network Security: Attacks; Services & Mechanisms; Conventional Encryption: Classical Encryption Techniques, Model and Steganography.
Unit-2:
Encryption Schemes: DES: Standard, Strength; Block Cipher Design Principles; Block Cipher Modes of

Operation: Triples DES; Placement & Encryption Function: Key Distribution, Random Number Generation, Placement of Encryption Function.

Unit-3:
Public-Key Cryptography: Principles; RSA Algorithm; Key Management; Fermat's & Euler's Theorems; Primarily Miller Test; Chinese Remainder Theorem.

Unit-4:
Message Authentication & Hash Functions: Authentication: Requirements, Protocol, Functions, Message Authentication Codes, Hash Functions, Birthday Attacks, Security Of Hash Function & MACS, MD5 Message Digest Algorithm, Secure Hash Algorithm (SHA)

Digital Signatures: Digital Signature Standard (DSS), Proof of Digital Signature Algorithm.

Unit-5:
IP Security: Electronic Mail Security; Pretty Good Privacy (PGP); S/MIME; Authentication Header; Encapsulating Security Payloads; Combining Security Associations; Key Management,.

Web Security: Secure Socket Layer & Transport Layer Security, Secure Electronic Transaction (Set);

System Security: Intruders; Viruses; Firewall Design Principles; Trusted Systems.

Text Book
1. Stallings, W., Cryptography and Network Security: Principles and Practice, Prentice Hall.
2. Kahate, A., Cryptography and Network Security, Tata McGraw Hill.

Reference Book
1. Johannes, A. B., Introduction to Cryptography, Springer.

CSL-894 Advanced .NET with AJAX and MVC
4 credits (3-0-2)

Unit-1:
Concept of server side and client side languages, Web Architecture of ASP. Net Visual Studio, Creating a Simple ASP.NET Application, ASPX and C# Files, the ASPX File, The C# File, More Visual Studio Tools, Other Tools for ASP.NET Development with C#, C# and ASP.NET, Standard Web Controls: Basic Web Controls, Control Events and Event Handlers.
Events and Event Handling, Validation Controls, Client-Side Validation, Types of Validation, RequiredFieldValidator, Visual Validation, RangeValidator, RegularExpressionValidator, CompareValidator, CustomValidator

Unit-2:
Rich Data Controls,Calendar Web Control,Easy Style,Changing Selections,Soccer Mom's Calendar,Property,AdRotator Web Server Control.
ADO.NET: Creating a Database,Working with the Server Explorer, Adding a Table to the Database, Adding Data to a Table, Making a Table Query, Creating Web Sites for Database Use, First Use the SqlClient Namespace, Building a Web Site for Database Retrieval, Entering Data from a Web Site, Automatic Data Entry, Adding Data with INSERT, Programming INSERT in C#,Dynamic Data Entry, Changing Data with UPDATE, Removing Data with DELETE.

What Is Data Binding, Basic Binding,Repeater, Basic Templates, DataListk, DataGrid Made Easy, ListView, LINQ Basics,ASP.NET 3.5 and LINQ,

Security: Putting Web.config to Work , Using Multiple Web.config Files ,Developing a Forms Authentication Configuration ,First Login Application, Membership Security ,Remote Registration ,How to Get to the Registration Page.

Unit-3:
MVC Framework - ASP.NET Forms, Introduction, MVC Components, ASP.NET MVC Features, Developing applications, MVC framework folders, Modals, Controllers, Views, Layouts, Routine Engines, Action Filters, AJAX Support, Bundling

Unit-4:
Introducing ASP.NET AJAX: What is Ajax,Ajax components, Asynchronous web programming**,** The XMLHttpRequest object,Ajax development issues,ASP.NET AJAX architecture: Client framework,Server framework,ASP.NET AJAX goals, ASP.NET AJAX in action,Simple servercentric solution, UpdateProgress control, Library features, Ajax-enabling an ASP.NET page, Script versions, The Application model, Client components,Client-page lifecycle, Working with the DOM, The abstraction API, A dynamic, cross-browser text box, CSS and positioning, Client delegates, $addHandlers and $clearHandlers ,Callbacks, Making development with JavaScript easier, The String object , Sys.StringBuilder, The Array object, Globalization, Browser detection.

Unit-5:
Objects, Arrays, Functions, The prototype object, Extending a JavaScript type, Working with JSON, JSON structures, JSON and the Microsoft Ajax Library, Classes in JavaScript, Understanding interfaces and enumerations, Interfaces, Enumerations, Using type reflection, Reflection methods, Object typing, Building, a simple class browser, Working with events.
Exploring the Ajax server extensions: Ajax for ASP.NET developers, What are the Ajax server extensions,Enhancing an existing ASP.NET site, Configuring an existing ASP.NET site, ScriptManager: the brains of an Ajax page, Understanding the ScriptManager,Deploying JavaScript files,Registering services, Localization, Using the ScriptManager Proxy, Partial-page updates, Introducing the UpdatePanel control. Umbraco Framework

Text Books:
ASP.Net 3.5 – A Beginners Guide - William B. Sanders
Asp.net Ajax in Action – By: Alessandro Gallo, vavilala – HanningPress.

CSL-889 Application Development with Android   *4 credits (3-0-2)*

Unit-l
Java Fundamentals
Class and Object, this and super, Static and Non static Members, Constructor, Sub classes, Interface, importing a Package, Exception handling and event handling

Unit-II
Introduction of Android & Environment setup
Android, Android Architecture, Creating and configuration AVD, Launching emulator, Editing emulator settings Creating Android Application, Android Application structure, AndroidManifest.xml, Resources & R.java, Compile Android application, Publishing App on Mobile and Play store

Unit-III
Basic UI design
Working with layouts, Linear Layout, Relative Layout, Table Layout, Grid Layout, Create Custom Layouts Working with Simple UI controls TextView, EditText, Button, Checkbox Radio and RadioGroup, Rating Bar, Progress Bar, SeekBar, WebView Exploring properties and events of controls

Working with Advance UI Controls: Spinner, List view, Menu, popupmenu, Adding Actionbar, dialogs like alert, toast, DatePicker, Time Picker.

Unit-IV
Storage in Android, Shared Preferences Shared Preferences Layout, Work with SD Card and Files
Database in Android, Introduction to SQLite, SqliteOpenHelperClass, Create, Open and Close Database, Database Insert, Update, Delete Read Data with Cursor, Handling Database Operations using PHP/MySQL,Managing Data using PHP Admin Panel HTTP API and Use Remote Database using Hosting Panel.

Unit-V

Creating Google Map, Work with Location, Location service with Location Manager, Find Current Location, Geocoding, Animation, Multimedia in Android, Play Audio Files, Play Video Files, BroadcastReceiver,Web Service & Parsing, Introduction of XML, Creating XML File, Parsing XML, DOM Parsing, JSON Parsing, Access web data with JSON, Connect to Web Services, Camera, Bluetooth, wifi, Making call, sending SMS, Firebase Integration, Firebase Login, Firebase Database Implementation, REST API, Payment Gateway, Signing Keys,Deployment of Android APK, Publish on Google Play Store

CSL-842 Cluster and Grid Computing
4 credits (4-0-0)

Unit-1:
Grid Computing:
Data & Computational Grids, Grid Architectures and its relations to various Distributed Technologies, Autonomic Computing, Examples of the Grid Computing Efforts (IBM), Application Management, Grid Application , Description Languages, Application Partitioning

Unit-2:
Meta-scheduling,GridScheduling and Resource Management-Scheduling Paradigms- Working principles of Scheduling -A Review of Condor, SGE, PBS and LSF-Grid Scheduling with QoS Mapping,Monitoring,Web Services, Grid Portals,Clouds, Grid Security-A Brief Security Primer-PKI-X509 Certificates-Grid Security, List of globally available Middlewares - Case Studies- Recent version of Globus Toolkit and gLite - Architecture

Unit-3:
Cluster Computing Overview of Cluster Computing, The Role of Clusters , Definition and Taxonomy, Distributed Computing , Limitations , Cluster Planning, Architecture and Cluster Software, Design Decisions, Network Hardware, Network Software, Protocols

Unit-4:
Cluster Computing 2: Distributed shared memory, parallel I/O Clusters, Jib and Resource management system, scheduling parallel jobs on clusters, Virtualization technologies, Benchmarks

Unit-5:
Cluster Computing 3: Load sharing and Fault tolerance manager, parallel programming scheduling techniques, Dynamic load balancing, Example Cluster System – Beowlf, COMPaS and NanOS

Text Book:
1. Maozhen Li, Mark Baker, The Grid Core Technologies, John Wiley & Sons ,2005
Reference Books:
1. Joshy Joseph & Craig Fellenstein, "Grid Computing", Pearson Education 2004.
2. Raj Kumar Buyya, High performanc
e cluster computing, PEA.
 3. A networking approach to Grid Computing , Minoli, Wiley

CSL-778 Cyber Law and Digital Forensic
4 credits (3-1-0)
Unit-I:
Introduction to Cyber Security : Overview of Cyber Security, Internet Governance – Challenges and Constraints, Cyber Threats:- Cyber Warfare-Cyber CrimeCyber terrorism-Cyber Espionage, Need for a Comprehensive Cyber Security Policy, Need for a Nodal Authority, Need for an International convention on Cyberspace.

Unit II:

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Cyber Security Vulnerabilities and Cyber Security Safeguards : Cyber Security Vulnerabilities-Overview, vulnerabilities in software, System administration, Complex Network Architectures, Open Access to Organizational Data, Weak Authentication, Unprotected Broadband communications, Poor Cyber Security Awareness. Cyber Security Safeguards- Overview, Access control, Audit, Authentication, Biometrics, Cryptography, Deception, Denial of Service Filters, Ethical Hacking, Firewalls, Intrusion Detection Systems, Response, Scanning, Security policy, Threat Management.

Unit – III:
Cyberspace and the Law :Introduction to cyber crime and cyber law, cyber space and information technology, Nature and scope of cyber crime, Jurisdiction of cyber crime, Important definitions under IT Act 2000, Cyber crime issues: unauthorized access, White collar crimes, viruses, malwares, worms, Trojans, logic bomb, Cyber stalking, voyeurism, obscenity in internet, Software piracy, Digital Signature, E Signature, Electronic Records, Electronic Evidence and Electronic Governance. Controller, Certifying Authority and Cyber Appellate Tribunal.(Rules announced under the Act).

Unit –IV:
Fundamentals of Cyber Forensics :Cyber Forensic Basics- Introduction to Cyber Forensics, Introduction to Identity Theft & Identity Fraud. Types of CF techniques - Incident and incident response methodology - Forensic duplication and investigation. Preparation for IR: Creating response tool kit and IR team. - Forensics Technology and Systems - Understanding Computer Investigation – Data Acquisition. Data Recovery Tools, Data Recovery Procedures and Ethics : Gathering Evidence- Precautions, Preserving and safely handling original media for its admissibility, Document a Chain of Custody and its importance, Complete time line analysis of computer files based on file creation, file modification and file access, Recover Internet Usage Data, Use computer forensics software tools .

Unit – V:
Cyber Forensics Investigation : Introduction to Cyber Forensic Investigation, Investigation Tools, eDiscovery, Digital Evidence Collection, Evidence Preservation, E-Mail Investigation, E-Mail Tracking, IP Tracking, E-Mail Recovery, Encryption and Decryption methods, Search and Seizure of Computers, Recovering deleted evidences, Password Cracking, Work on open Source, Commercial tools and Cyber range.

Text Books :
1. Craig, B. Cyber Law: The Law of the Internet and Information Technology. Pearson Education
2. Prosise, C. &Mandia, K. (2003). Incident response & computer forensics (2nd ed.). New York, NY: McGraw-Hill Companies.

Reference Books :
1. John R.Vacca, Computer Forensics‖, Cengage Learning, 2005
2. MarjieT.Britz, Computer Forensics and Cyber Crime: An Introduction,3rd Edition, Prentice Hall,2013.
3. Gregory J. Touhill ,C. Joseph Touhill ,Cybersecurity for Beginners, Wiley-AIChE; 1 edition (July 8, 2014)