

APPENDIX - E
MADURAI KAMARAJ UNIVERSITY
(University with Potential for Excellence)

Syllabus for New Course in
B.Sc. Computer Science (Digital Forensic Science and Cyber Security)
Semester Pattern – CBCS
(With effect from the academic year 2020-21)

REGULATIONS, SCHEME OF EXAMINATION AND SYLLABUS

1. **Course Objectives:**
 - To prepare the students to manage the software components in a computer independently and to be a Programmer.
 - To motivate the students to take up higher studies in Computer Science and other streams.
 2. **Eligibility for Admission :** A candidate should have studied +2 level Mathematics with Physics as one of the subjects in the 10 + 2 stream.
 3. **Duration of the Course :** The students shall undergo the prescribed course of study for a period of not less than three academic year (Six semesters).
 4. **Medium of Instruction :** English
 5. **Subjects/ Structure of Course Study :** See Page No.2.
 6. **Scheme of Examinations/ Structure of Question Paper:** : See Page No.3 to 6.
 7. **Detailed Syllabus:** See Page No.7 onwards.
 8. **Eligibility for the Degree:**
 - a) A candidate shall be eligible for the award of the degree on completion of the prescribed course of study and passing all the prescribed external examinations.
 - b) Attendance progress, internal examinations, conduct certificate from the Head of the Institution shall be required for taking the external examination.
 9. The passing minimum and the ranking are as per the existing rule of the Choice Based Credit System for the affiliated college of the University.
- External - 27 Aggregate - 40, Practical - 21 Aggregate - 40, Project - 28 Aggregate - 40.
10. Non-Major Elective Courses to be offered by the Department of Computer Science to the students other than B.Sc. Computer Science.
 1. NME1 - Introduction to Computers and Office Automation.
 2. NME2 - Introduction to Internet.

(Subject / Structure of Course Study)
B.Sc. Computer Science (Digital Forensic Science and Cyber Security) (Semester)
Choice Based Credit System – Semester Pattern
(With effect from the academic year 2020-2021)

Sem.	Subjects							Total Hours	Total Credits
I	T1(6) [3]	E1(6) [3]	CS1(4) [4]	CS2(6) [4]	AS1(4) [4]	SBS1(2) [2]	VE(2) [2]	30	22
II	T2(6) [3]	E2(6) [3]	CS3(4) [4]	CS4(6) [4]	AS2(4) [4]	SBS2(2) [2]	EVS(2) [2]	30	22
III	T3(6) [3]	E3(6) [3]	CS5(4) [4]	CS6(4) [3]	CS7(4) [4]	AS3(4) [4]	SBS3(2) [2]	30	23
IV	T4(6) [3]	E4(6) [3]	CS8(4) [4]	CS9(4) [3]	CS10(4) [4]	AS4(4) [4]	SBS4(2) [2]	30	23
V	CS11(5) [4]	CS12(5) [4]	CS13(5) [4]	CS14(6) [4]	ES1(5) [4]	NME1(2) [2]	SBS5(2) [2]	30	24
VI	CS15(5) [4]	CS16(6) [4]	CS17(5) [4]	ES2(5) [4]	ES3(5) [5]	NME2(2) [2]	SBS6(2) [2]	30	25
Extension Activities (Semester IV)									1
TOTAL CREDITS									140

() – Number of Hours

[] – Number of Credits

T – Tamil

E – English

CS – Core Subject

AS – Allied Subject

SBS – Skill Based Subject

NME – Non-Major Elective

ES – Elective Subject

VE – Value Education

EVS – Environmental Studies

EA – Extension Activities.

I SEMESTER

S No	CODE	Subject	Hours	Credits	Internal Marks	External Marks
1	T1	Tamil	6	3	25	75
2	E1	English	6	3	25	75
3	CS1	Programming in C	4	4	25	75
4	CS2	Lab 1 : Programming in C	6	4	40	60
5	AS1	Mathematical Foundations I	4	4	25	75
6	SBS1	Lab 2: Office Automation	2	2	40	60
7	VE	Value Education	2	2	25	75
		Total	30	22		

(Subject / Structure of Course Study)
B.Sc. Computer Science (Digital Forensic Science and Cyber Security) (Semester Pattern)
Choice Based Credit System – Semester Pattern
(With effect from the academic year 2020-2021)

Sem.	Subjects							T H
I	T1(6) [3]	E1(6) [3]	CS1(4) [4]	CS2(6) [4]	AS1(4) [4]	SBS1(2) [2]	VE(2) [2]	
II	T2(6) [3]	E2(6) [3]	CS3(4) [4]	CS4(6) [4]	AS2(4) [4]	SBS2(2) [2]	EVS(2) [2]	
III	T3(6) [3]	E3(6) [3]	CS5(4) [4]	CS6(4) [3]	CS7(4) [4]	AS3(4) [4]	SBS3(2) [2]	
IV	T4(6) [3]	E4(6) [3]	CS8(4) [4]	CS9(4) [3]	CS10(4) [4]	AS4(4) [4]	SBS4(2) [2]	
V	CS11(5) [4]	CS12(5) [4]	CS13(5) [4]	CS14(6) [4]	ES1(5) [4]	NME1(2) [2]	SBS5(2) [2]	
VI	CS15(5) [4]	CS16(6) [4]	CS17(5) [4]	ES2(5) [4]	ES3(5) [5]	NME2(2) [2]	SBS6(2) [2]	
Extension Activities (Semester)								
TOTAL CREDITS								

() – Number of Hours

[] – Number of Credits

T – Tamil

E – English

CS – Core Subject

AS – Allied Subject

SBS – Skill Based Subject

NME – Non-Major Elective

ES – Elective Subject

VE – Value Education

EVS – Environmental Studies

EA – Extension Activities

I SEMESTER

S No	CODE	Subject	Hours	Credits	
1	T1	Tamil	6	3	
2	E1	English	6	3	
3	CS1	Programming in C	4	4	
4	CS2	Lab 1 : Programming in C	6	4	
5	AS1	Mathematical Foundations I	4	4	
6	SBS1	Lab 2: Office Automation	2	2	
7	VE	Value Education	2	2	
		Total	30	22	

II SEMESTER

S No	CODE	Subject	Hours	Credits	Internal Marks	External Marks
1	T2	Tamil	6	3	25	75
2	E2	English	6	3	25	75
3	CS3	Data Structures and Computer Algorithms	4	4	25	75
4	CS4	Lab 3: Data Structures and Computer Algorithms Lab	6	4	40	60
5	AS2	Mathematical Foundations II	4	4	25	75
6	SBS2	Lab 4: Operating Systems Lab	2	2	40	60
7	EVS	Environmental Studies	2	2	25	75
		Total	30	22		

III SEMESTER

S No	CODE	Subject	Hours	Credits	Internal Marks	External Marks
1	T3	Tamil	6	3	25	75
2	E3	English	6	3	25	75
3	CS5	Operating System Design and Implementation	4	4	25	75
4	CS6	Lab 5 : Operating System Design and Implementation	4	3	40	60
5	CS7	Digital Principles and Computer Organization	4	4	25	75
6	AS3	Resource Management Techniques	4	4	25	75
7	SBS3	Lab 6: Multimedia	2	2	40	60
		Total	30	23		

S No	CODE	Subject	Hours	Credits	Int Ma
1	T4	Tamil	6	3	2
2	E4	English	6	3	2
3	CS8	Ethical Hacking Fundamentals	4	4	2
4	CS9	Lab 7: Ethical Hacking	4	3	4
5	CS10	Data Communication and Computer Networks	4	4	2
6	AS4	Numerical Methods	4	4	2
7	SBS4	Lab 8: PHP Programming	2	2	4
8	EA	Extension Activities		1	1
		Total	30	24	

V SEMESTER

S No	CODE	Subject	Hours	Credits	In M
1	CS11	Relational Database Management Systems	5	4	
2	CS12	Computer Forensics and Investigation	5	4	
3	CS13	Software Engineering	5	4	
4	CS14	Lab 9 : Computer Forensics	6	4	
5	ES1	1. Fundamentals of Information Security. 2. Basic Principles of Forensic Science and Mathematics. 3. Basic Statistical Methods for Computing.	5	4	
6	SBS5	Lab 10: Python Programming	2	2	
7	NME1	Introduction to Computers and Office Automation.	2	2	
		Total	30	24	

VI SEMESTER

S No	CODE	Subject	Hours	Credits	Internal Marks	External Marks
1	CS15	Technological Methods in Forensic Science	5	4	25	75
2	CS16	Lab 11 : Web Applications Security.	6	4	40	60
3	CS17	Cryptography	5	4	25	75
4	ES2	1. Cyber Criminology. 2. Case Studies and Report writing in Cyber Crimes. 3. Mobile, Wireless and VOIP Security.	5	4	25	75
5	ES3	Project Work / Viva-Voce	5	5	25	75
6	SBS6	Quantitative Aptitude	2	2	25	75
7	NME2	Introduction to Internet	2	2	25	75
		Total	30	25		

Scheme of Examination /Question Paper Pattern Scheme of Evaluation

Theory Subjects

Question Paper Pattern

Time: 3 Hours

Max. Marks: 75

Part – A : Answer all the questions (10*1=10)

Ten Questions, two questions from each Unit: *Multiple Choice Questions*

Part – B : Answer all the questions (5*7=35)

Five Questions, one question set from each Unit: *Either ... Or... type*

Part – C : Answer any three questions (3*10=30)

Five Questions, one question from each Unit

Practical Subjects:

A candidate has to prepare Algorithm / Procedure for both the questions covering both the parts. The following list of parameters is taken into account for the evaluation of practical examination.

Total Marks: 100 (Internal: 40 marks, External: 60 Marks)

VI SEMESTER

S No	CODE	Subject	Hours	Credits	Internal Marks	External Marks
1	CS15	Technological Methods in Forensic Science	5	4	25	75
2	CS16	Lab 11 : Web Applications Security.	6	4	40	60
3	CS17	Cryptography -	5	4	25	75
4	ES2	1. Cyber Criminology. 2. Case Studies and Report writing in Cyber Crimes. 3. Mobile, Wireless and VOIP Security.	5	4	25	75
5	ES3	Project Work / Viva-Voce	5	5	25	75
6	SBS6	Quantitative Aptitude	2	2	25	75
7	NME2	Introduction to Internet	2	2	25	75
		Total	30	25		

Scheme of Examination /Question Paper Pattern Scheme of Evaluation

Theory Subjects

Question Paper Pattern

Time: 3 Hours

Max. Marks: 75

Part - A : Answer all the questions (10*1=10)

Ten Questions, two questions from each Unit: Multiple Choice Questions

Part - B : Answer all the questions (5*7=35)

Five Questions, one question set from each Unit: Either ...Or... type

Part - C : Answer any three questions (3*10=30)

Five Questions, one question from each Unit

Practical Subjects:

A candidate has to prepare Algorithm / Procedure for both the questions covering both the parts. The following list of parameters is taken into account for the evaluation of practical examination.

Total Marks: 100 (Internal: 40 marks, External: 60 Marks)

Parameters

For Internal Marks:

i.	Average of two tests:	25
ii.	Record Work:	10
iii.	Seminar / Quiz / Viva:	5
	Total:	40

For External Marks:

i.	Aim, Procedure / Algorithm and Program:	15
ii.	Coding and Compilation :	10
iii.	Debugging :	15
iv.	Results :	10
v.	Viva – Voce	10
	Total:	60

Note: The External Examiner can fix other exercises also other than those found in the list (*Syllabus*) in consultation with the Internal Examiner without violating the scope of the prescribed syllabus.

For Project Work:

The combined project shall be undertaken by the students as a team of two. The project should be done in the college lab. The following list of parameters is taken into account for the evaluation of Project work and Viva-Voce.

Total Marks: 100 (Internal: 25 marks, External: 75 Marks)

Parameters:

For Internal Marks:	Two review meetings	: 2 x 7.5 = 15 Marks
	Overall Performance	: = 10 Marks
For External Marks:	Project Report	: = 25 Marks
	Project Demo & Presentation :	= 30 Marks
	Viva-Voce	: = 20 Marks

CS1: Programming in C

(Hours : 04 - credits : 04)

UNIT-I : Overview of C: History of C – Importance of C – Basic Structure of C Programs – Programming Style – Character Set – C Tokens – Keywords and Identifiers – Constants, Variables and Data Types – Declaration of Variables – Defining Symbolic Constants – Declaring a variable as a constant – overflow and underflow of data – Operators and Expressions: Arithmetic, relational, logical, assignment operators – increment and decrement operators, conditional operators, bitwise operators, special operators – Arithmetic Expressions- Evaluation of Expressions – Precedence of Arithmetic Operators – Type Conversions in Expressions – Operator Precedence and Associativity – Mathematical functions.

UNIT-II : Managing I/O Operations: Reading and Writing a Character – Formatted Input, Output – Decision Making and Branching: if statement - if else statement - nesting of if else statements - else if ladder – switch statement - operator – goto statement – the while statement – do statement – the for statement – jumps in loops.

UNIT-III : Arrays: One-Dimensional Arrays – Declaration, Initialization – Two-Dimensional Arrays – Multi-dimensional Arrays – Dynamic Arrays – Initialization. Strings: Declaration, Initialization of string variables – reading and writing strings – string handling functions.

UNIT-IV: User-defined functions: Need – multi-function programs – elements of user defined functions – definition – return values and their types – function calls, declaration, category – all types of arguments and return values – nesting of functions – recursion – passing arrays, strings to functions – scope visibility and life time of variables. Structures and Unions: Defining a structure – declaring a structure variable – accessing structure members – initialization – copying and comparing – operation on individual members – array of structures – arrays within structures – structures within structures – structures and functions – unions – size of structures – bit fields.

UNIT-V : Pointers : Understanding Pointers, Accessing the address of a variable – declaring, initialization of pointer variables – accessing a variable through its pointer – chain of pointers – pointer increments and scale factors – pointers and character strings – pointers as function arguments – pointers and structures. Files: Defining, opening, closing a file – IO Operations on files – Error handling during IO operations – command line arguments.

Text Book:

Programming in ANSI C, E.Balagurusamy, 7th Edition, Tata Mc Graw Hill Publishing Company, 2017.

Unit I	: Chapters 1 (Except 1.3-1.7, 1.10-1.12), 2 (Except 2.9, 2.13), 3 (Except 3.13)
Unit II	: Chapters 4 – 6
Unit III	: Chapters 7, 8 (Except 8.5, 8.6, 8.7, 8.9, 8.10)
Unit IV	: Chapters 9 (Except 9.20), 10
Unit V	: Chapters 11 (Except 11.8, 11.10, 11.12, 11.14, 11.15, 11.17), 12 (Except 12.6)

Reference Books:

1. Programming with C, Schaum's Outline Series, Gottfried, Tata Mc Graw Hill, 2006.
2. Programming with ANSI and Turbo C, Ashok N. Kamthane, Pearson Education, 2006.
3. H. Schildt, C: The Complete Reference, 4th Edition, TMH Edition, 2000.
4. Kanetkar Y., Let us C, BPB Pub., New Delhi, 1999.

CS2: Lab 1: Programming in C
(Hours : 06 - credits : 04)

Section A

1. Write a C Program to find the sum of digits.
2. Write a C Program to check whether a given number is Armstrong or not.
3. Write a C Program to check whether a given number is Prime or not.
4. Write a C Program to generate the Fibonacci series.
5. Write a C Program to display the given number is Adam number or not.
6. Write a C Program to print reverse of the given number and string.
7. Write a C Program to find minimum and maximum of 'n' numbers using array.

8. Write a C Program to arrange the given number in ascending order.
9. Write a C Program to add, subtract and multiply two matrices.
10. Write a C Program to calculate NCR and NPR.

Section B

1. Write a C Program to find the grade of a student using else if ladder.
2. Write a C Program to implement the various string handling functions.
3. Write a C Program to create an integer file and display the even numbers only.
4. Write a C Program to calculate quadratic equation using switch-case.
5. Write a C Program to implement the various string handling function.
6. Write a C Program to generate student mark list using array of structures.
7. Write a C Program to create and process the student mark list using file.
8. Write a C Program to create and process pay bill using file.
9. Write a C Program to create and process inventory control using file.
10. Write a C Program to create and process electricity bill using file.

AS 1: Mathematical Foundations-I (Hours : 4 –Credits : 4)

UNIT-I : The Foundations: Logic and Proofs: Propositional logic – Applications of Propositional logic – Propositional equivalences – (Exclude Propositional satisfiability, Applications of satisfiability, Solving satisfiability problems, and its related problems) – Predicates and Quantifiers – Rules of inference.

UNIT-II : Relations: Relations and their properties – Representing relations – Closures of relations – Partial orderings (Theorems statement only; Exclude lexicographic ordering - Exclude Lattices).

UNIT-III : Counting: The basic of counting - The pigeonhole principle -- Permutation and Combinations – Applications of recurrence relations – Solving recurrence relations – Divide and Conquer algorithms and recurrence relations. (All theorems and Results statement only).

UNIT-IV : Graphs: Graphs and Graphs models, (Excluding Biological networks; Tournaments; all its related examples and problems) – Graph terminology and special types of graphs – Representing graphs and Graph isomorphism – Connectivity (paths – connectedness in undirected graphs – paths and isomorphism – counting paths between vertices) – shortest path problems.

UNIT-V : Matrices: Introduction – operations – inverse – Rank of a matrix, solution of simultaneous linear equations – Eigen values and Eigen Vectors.

Text Books:

1. Discrete Mathematics and its applications, Seventh Edition, Kenneth.H.Rosen, Mc Graw Hill Publishing Company, 2012.
2. Discrete Mathematics, M.Venkataraman, N.Sridharan and N.Chandrasekaran, The National Publishing Company, 2009.

Unit I	: Textbook 1	Chapter 1: Sections: 1.1, 1.2, 1.3, 1.4, 1.6
Unit II	: Textbook 1	Chapter 9: Sections: 9.1, 9.3, 9.4, 9.5, 9.6
Unit III	: Textbook 1	Chapter 6: Sections: 6.1, 6.2, 6.3 Chapter 8: Sections: 8.1, 8.2, 8.3 (Pages: 527 -529 only) (Exclude algorithms and relations, on page 507 and its related problems)
Unit IV	: Textbook 1	Chapter 10: Sections: 10.1, 10.2, 10.3, 10.4, 10.6)
Unit V	: Textbook 2	Chapter 6 :Sections :6.1 to 6.5, and 6.7)

Reference Books :

1. Modern Algebra - S.Arumugam and A. Thangapandj Isaac, Scitech Publications 2005.
2. Invitation to Graph Theory - S. Arumugam and S. Ramachandran, Scitech Publications, 2005, Chennai.
3. Discrete Mathematical Structures with applications to Computer Science - Tremblay and Manohar, Mc Graw Hill, 1997.

SBS1: Lab 2: Office Automation (Hours : 2 –Credits : 2)

WORD

1. Open a Word document to prepare your **Resume** by performing the following operations.
 - (a) Formatting the Text- Alignment & Font style
 - (b) Page setup (margin alignment, page height & width)
2. Create a student mark sheet using table, find out the total & average marks and display the result.
3. Design an invitation of your course inauguration function using different fonts, font sizes, bullets and Word Art/ Clip Art
4. Mail Merge Concept
 - (a) Prepare an invitation and to be sent to specific addresses in the data source.

EXCEL

1. Create suitable work sheet with student mark details and use Data sort to display results and make out a suitable chart.
2. Prepare salary bill in a worksheet showing Basic Pay, DA, HRA, Gross salary, PF, Tax and Net salary using suitable Excel Functions.

POWER POINT

1. Create a power point presentation to explain various aspects of your college using auto play.
2. Create a power point presentation to explain the sales performance of a company over a period of five years. Include slides covering the profile of the company, year wise sales and graph with gridlines, legends and titles for axes. Use Clip Art and animation features.

ACCESS

1. Create a table for storing marks of 10 students. The fields of the table are given below: Reg. No., Name, Mark1, and Mark2, Mark3, Test average (Best Two /2), Assignment,

Seminar and Total marks (Test average + Assignment + Seminar). The fields 'Mark1', 'Mark2', 'Mark3' should not allow the user to enter a mark greater than 25 and should display proper message in such case. Similar constraint for the field 'Assignment' in marks and for the field 'Seminar', it is 10 marks.

2. Create a table showing names of authors of at least 10 different books, title of books, the prices of these books, name of publishers and year of publication. Also create Select, Action and Cross-tab queries to display the records from this table meeting the criteria used in these queries.
3. Create a form to enter the data directly into this form. The fields required are: Basic Pay, DA, HRA, Gross salary, PF, Income tax and Net salary.
4. Create a report that displays the customer name, address, phone number, Item code, product quantity of the customers whose orders have been pending for over a month.

CS3: Data Structures and Computer Algorithms (4 Hours - 4 credits)

UNIT - I : Introduction and Overview – Introduction – Basic Terminology; Elements of Data Organization – Data Structure Operations – Complexity of Algorithms – Other Asymptotic Notations for Complexity of Algorithms:

Arrays – Introduction – Linear Arrays – Representation – on Linear Arrays in Memory; Traversing Linear Arrays – Inserting and Deleting – Sorting: Bubble Sort – Searching; Linear Search – Binary Search – Multidimensional Arrays. **Linked List** – Introduction – Link Lists – Representation of Linked Lists in Memory – Traversing a Linked List – Memory Allocation; Garbage Collection – Insertion into a Linked List – Deletion from a Linked list

UNIT-II : Stack: Introduction – Stacks – Array Representation of Stacks – Link Representation of Stacks – Recursion - Tower of Hanoi - Implementation of Recursive Procedures by Stacks - Queue – Linked Representation of Queues – D – Queue.

UNIT- III : Trees – Introduction – Binary Trees – Representing Binary Trees in memory; Traversal Binary Tree – Traversal algorithms using Stacks – Header Nodes; Threads – Binary Search Trees – Searching and Inserting in Binary Search Trees – Deleting in a Binary Search Trees.

Graphs – Introduction – Graph Theory - Terminology – Sequential Representations of Graphs – Adjacency Matrix; Path Matrix – Warshall's Algorithm; Shortest Paths.

UNIT- IV : Algorithms: Introduction: What is an Algorithm? – Algorithm Specification – Performance Analysis – Divide and Conquer: General method – Binary Search – Finding Maximum and minimum – Merge Sort – Quick Sort – Selection – Strassen's Matrix Multiplication

Greedy Method : General Method – Knapsack problem – Job Sequencing with deadlines – Minimum cost spanning trees: Prim's Algorithm – Kruskal Algorithm – Huffman coding on tapes – Optimal merge patterns – single source shortest path.

CS3: Data Structures and Computer Algorithms (4 Hours - 4 credits)

UNIT - I : Introduction and Overview – Introduction – Basic Terminology; Elementary Data Organization – Data Structure Operations – Complexity of Algorithms – Other Asymptotic Notations for Complexity of Algorithms.

Arrays – Introduction – Linear Arrays – Representation – on Linear Arrays in Memory – Traversing Linear Arrays – Inserting and Deleting – Sorting: Bubble Sort – Searching; Linear Search – Binary Search – Multidimensional Arrays. **Linked List** – Introduction – Linked Lists – Representation of Linked Lists in Memory – Traversing a Linked List – Memory Allocation; Garbage Collection – Insertion into a Linked List – Deletion from a Linked list.

UNIT-II : Stack: Introduction – Stacks – Array Representation of Stacks – Linked Representation of Stacks – Recursion - Tower of Hanoi - Implementation of Recursive Procedures by Stacks - Queue - Linked Representation of Queues – D – Queue.

UNIT- III : Trees – Introduction – Binary Trees – Representing Binary Trees in memory – Traversal Binary Tree – Traversal algorithms using Stacks – Header Nodes; Threads – Binary Search Trees – Searching and Inserting in Binary Search Trees – Deleting in a Binary Search Trees.

Graphs – Introduction – Graph Theory - Terminology – Sequential Representations of Graphs – Adjacency Matrix; Path Matrix – Warshall's Algorithm; Shortest Paths.

UNIT- IV : Algorithms: Introduction: What is an Algorithm? – Algorithm Specification - Performance Analysis – Divide and Conquer: General method – Binary Search – Finding the maximum and minimum – Merge Sort – Quick Sort – Selection – Strassen's Matrix Multiplication.

UNIT-V : The Greedy Method : General Method – Knapsack problem – Job Sequencing with deadlines – Minimum cost spanning trees: Prim's Algorithm – Kruskal Algorithm – Optimal Storage on tapes – Optimal merge patterns – single source shortest path.

AS2: MATHEMATICAL FOUNDATIONS - II

(4 Hours – 4 Credits)

UNIT-I : Introduction to statistics – primary and secondary data – classification, tabulation and Diagrammatic Representation of statistical data – Bar-charts, Pie-diagrams – Graphical Representation of data – Histograms, Frequency polygon, Ogives.

UNIT-II : Measures of dispersion – characteristics – coefficient of dispersion – Coefficient of variation – Moments – skewness and kurtosis – Pearson's coefficient of skewness – Bowley's coefficient of Skewness – Coefficient of skewness based upon moments.

UNIT- III : Simple correlation – Karl Pearson's coefficient of correlation – correlation coefficient for A bivariate frequency distribution – Rank correlation – Regression – linear regression – Properties of regression coefficient.

UNIT-IV : Events and sets – sample space – concept of probability – addition and multiplications Theorem on probability – conditional probability and independence of events – Baye's Theorem – concept of random variable – Mathematical Expectation.

UNIT -V : Concept of sampling distributions – standard error – Tests of significance based on t, Chi-square and F distributions with respect to mean, variance.

Text Book: Statistical Methods, S.P.Gupta, Sultan Chand and sons, 2004.

Unit I	: Chapters 1, 2.2, 2.2.1, 2.2.2, 2.2.3 – 2.2.5
Unit II	: Chapters 7 and 8
Unit III	: Chapters 9, 9.1, 9.2, 9.3, 10, 10.1, 10.2, 10.2.1, 10.2.2, 10.2.3, 10.3
Unit IV	: Chapter 16
Unit V	: Chapters 18.3, 18.4, 18.7.1, 18.7.2, 19

Reference Books:

1. Statistics, Dr. S.Arumugam and A.Thangapandi Issac, New Gamma Publications House, 2002.
2. Kishor S.Trivedi - Probability and statistics with reliability queuing and Computer Science Applications - Prentice Hall of India (P) Ltd., New Delhi - 1997.
3. Discrete Mathematics - Seymour Lipschutz, Marc Lars Lipson Schaum's Outline by, 3rd Edition., Tata Mc Graw Hill, Education Pvt. Ltd., New Delhi. 5th Reprint 2000.

SBS2: Lab 4: Operating System Lab

(Hours: 02 Credits: 02)

List of Experiments:

- Installing Windows 7.
- Using Windows Upgrade Advisor or Upgrade Assistance.
- Migrating to Windows 7 using Windows Easy Transfer and User State Migration Tool.
- Capturing image of existing installed operating system and deploys it to another system using image.

- Configuring disk partitions, Virtual HD in Disk Management.
- Installing and configuring device drivers.
- Configuring User Account Control Policy.
- Configuring Shared Folders.
- Configuring NTFS permissions.
- Encrypting and compressing Files.
- Installing printer and configuring basic functions.
- Configuring wireless Ad-Hoc network.
- Configuring Local Security policies.
- Configuring Bit Locker and Bit Locker to Go.
- Configuring application restriction using software restriction policy and AppLocker.
- Configuring Basic and Advanced Windows Firewall.
- Configuring IE8 properties.
- Configure scanning using Windows Defender.
- Configure Remote Desktop and Remote Assistance.
- Configuring Home Group.

CS5- Operating System Design and Implementation (Hours : 04 Credits: 04)

Subject Description: This subject deals with the fundamentals and the concepts of LINUX/ UNIX.

Goals: To learn about the fundamentals and exploring the concepts of LINUX / UNIX.

Objective: On successful completion of the course the student should be able to understand

- Basics in LINUX/ UNIX.
- File Systems
- System Structure
- Process control in Linux

Subject Description: This subject deals with the fundamentals and the concepts of LINUX/ UNIX.

Goals: To learn about the fundamentals and exploring the concepts of LINUX/ UNIX

Objective: On successful completion of the course the student should be able to understand

- Basics in LINUX/ UNIX.
- File Systems
- System Structure
- Process control in Linux

UNIT-I : Introduction - Introduction to LINUX - LINUX distributions - Operating System and LINUX - History of LINUX/ UNIX – LINUX overview – LINUX software – online LINUX information sources – LINUX documentation.

UNIT-II : General Overview of the System - System Structure - User Perspective - Operating System Services -Assumption about Hardware - The Kernel and Buffer Cache Architecture of UNIX Operating System - System Concepts - Buffer Headers - Structure of

the Buffer Pool - Scenarios for Retrieval of the Buffer - Reading and Writing Disk Units - Advantages and Disadvantages of Buffer Cache.

UNIT-III : Exploring Linux Flavors – Software management – Software packaging types – Red hat package Manager – Debian – Installing software from compressed software archives – command and program directories - Ubuntu – History – Versions - Installation – Features - Ubuntu one - Fedora: History, Versions, Installation, Features.

UNIT-IV : File Systems – File Systems: inodes – blocks – super blocks – ext 3 – ext4 – managing file systems: mounting and unmounting local disks – using fsck – Adding a new disk: Overview of partitions – traditional disk and partition naming conventions – Volume Management – Creating file systems.

UNIT-V : Structures of Processes and Process Control - Process States and Transitions Layout of System Memory - The Context of a Process - Manipulation of the Process Address Space - Sleep Process Creation/Termination -The User ID of a Process - Changing the Size of a Process - The Shell - Case Study of Various LINUX Versions.

Text Books:

- Wale Soyinka, "Linux Administration: A Beginners Guide", Sixth Edition (Networking & Communication - OMG), 6 edition, Mc Graw Hill Education, 1 April 2012.
- Neil Matthew, Richard Stones, "Beginning Linux Programming", Third Edition, Wrox, Wiley Publishing Inc., 2004.

Reference Books:

1. Kenneth Rosen, Douglas Host, Rachel Klee, Richard Rosinski, "UNIX: The Complete Reference", Second Edition, Mc Graw Hill Education, 2007.
2. Knowledge flow, "Beginning Linux Programming", Kindle Edition, Knowledge flow (21 April 2015).

CS6 - Lab – Operating System Design and Implementation Lab
(Hours : 04 Credits: 03)

List of Experiments:

- Basic Shell
- Commands Shell

Programs:

- Fibonacci Series
- Designing Calculator
- File Operations
- Base conversion
- Usage of cut and grep commands
- Usage of user defined functions Administration
- Managing User Accounts

- User Quota Management
- Installation of RPM software and Zipping, tar
- Configuring RAID
- Configuring Web server

CS

CS7: Digital Principles and Computer Organization (Hours : 5 – Credits : 4)

UNIT-I : Number Systems and Codes: Binary Number system – Binary to decimal – decimal to binary – hexa decimal – ASCII code – Excess-3 Code – Gray code.
Digital Logic: The Basic Gates – NOT, OR, AND - Universal Logic Gates – NOR, NAND.

UNIT-II : Combinatorial Logic Circuits: Boolean Laws and Theorems. - Sum of Products method - Truth table to Karnaugh Map – Pairs, Quads, Octets – Don't Care Conditions- Product-of sums method -Product-of sums Simplifications.

Data Processing Circuits: Multiplexers – Demultiplexers-1-of-16 Decoder – BCD-to-decimal Decoders – Seven-segment Decoders – Encoders – Exclusive-OR Gates- Parity Generators and Checkers.

UNIT-III :Arithmetic Circuits: Binary Addition- Binary Subtraction – 2'S Complement Representation - 2's Complement Arithmetic – Arithmetic Building Blocks- Adder-Subtractor

Flip-Flops-RS Flip-Flops-Gated Flip-Flops-Edge-triggered RS Flip-Flops-Edge-triggered D Flip-flops--Edge-triggered JK Flip-Flops-JK Master Slave Flip-flops.

UNIT-IV: Types of Registers – Serial In-Serial Out – Serial In-Parallel Out – Parallel In-Parallel Out – Ring Counter –Ripple Counter – Synchronous Counter.

UNIT-V: Instruction Codes – Computer Register – Computer Instructions – Timing and Control – Instruction Cycle. Control Memory – Address Sequencing – General Register Organization – Stack Organization – Instruction Formats – Data Transfer and Manipulations - Addressing Modes – Program Control.

Text Books:

1. Digital Principles and Applications – Donald P Leach, Albert Paul Malvino, Goutam Saha, 8th edition, Mc Graw Hill Education, 3rd reprint 2015.
2. Computer System Architecture, M. Morris Mano, Pearson Education, 3rd Edition-2007.

Unit I	: Textbook 1	Chapters 5: (5.1 to 5.9) and 2: (2.1 to 2.3)
Unit II	: Textbook 1	Chapters 3: (3.1 to 3.8) and 4: (4.1 to 4.7)
Unit III	: Textbook 1	Chapters 6: (6.1 to 6.8) and 8: (8.1 to 8.5,8.8)
Unit IV	: Textbook 1	Chapters 9: (9.1 to 9.6) and 10: (10.1,10.3)
Unit V	: Textbook 2	Chapter 5:(5.1 to 5.5), 7:(7.1,7.2) and Chapter 8 (8.1 to 8.7)

Reference Books:

1. Digital Design, R. Anantha Natarajan, PHI Learning, 2015.
 2. Principles of Digital Electronics, K. Meena, PHI Learning, 2013.
 3. Digital Computer Fundamentals, Thomas C. Bartee TMH 2007.
 4. Digital Circuits and Design, S. Salivahanan and S. Arivazhagan, Vikas Publishers, 2005.
 5. Computer Organization and Architecture, V. Rajaraman and T. Radhakrishnan, PHI learning, 5th Print, 2015.
 6. Computer Organization, Carl Hamacher Zvonko Vranesic Safwat Zaky, Mc Graw Hill Education, 5th Edition, 11th reprint, 2015.
- Computer Organization and Architecture, Smruti Ranjan Sarangi, McGraw Hill Education.

AS3: Resource Management Techniques

(4 Hours – 4 Credits)

UNIT- I : Development of OR: Definition of OR – Modeling - Characteristics and Phases - Tools, Techniques and Methods - scope of OR.

UNIT –II : Linear Programming Problem: Formulation - Slack and surplus variables - Graphical solution of LPP.

UNIT – III : Simplex Method: Computational Procedure - Big-M method - Concept of duality in LPP - Definition of primal dual problems - General rules for converting any primal into its dual.

Unit - IV: Duality Theorems: (without proof) Primal dual correspondence - Duality and Simplex method - Mathematical formulation of assignment problem - Method for solving assignment problem.

UNIT-V: Mathematical formulation of Transportation Problem: Methods for finding IBFS for the Transportation Problems.

Text Book : Operations Research, S.D. Sharma, Kedar Nath Ram Nath & Co.

- Unit I** : Chapter-1(1.1, 1.2, 1.4, 1.1, 1.8, 1.9, 1.10, 1.11)
Unit II : Chapter-3 (3.1, 3.2, 3.3, 3.3.1, 3.3.2, 3.3.3, 3.3.4, 3.4.3.5)
Unit III : Chapter-5 (5.1, 5.2, 5.2.1, 5.3, 5.4, 5.5.4)
Chapter- 7 (7.1, 7.2, 7.3, 7.4)
Unit IV : Chapter-7 (7.5) (Statements only); 7.6, 7.7
Chapter 11(11.2, 11.3, 11.4)
Unit V : Chapter-12 (12.2 to 12.8)

Reference Books:

1. Operation Research, Nita H. Shah, Ravi M. Gor and Hardik soni, Prentice-Hall of India Pvt. Ltd., New Delhi 2008.

2. Operation Research, R.Sivarethinamohan, Tata Mc Graw Hill, 2005.
3. Operations Research – An Introduction by Hamdy A.Taha. Ninth Edition, Dorling Kindersley Pvt. Ltd., Noida, India, 2012.

SBS3: Lab 6: Multimedia

(2 hours - 2 Credits)

Photoshop

1. Basic tools used in Photoshop.
2. Design an image by cutting the objects from 3 files and organize them in a single file and apply feather effects.
3. Design an image by applying mirror effect.
4. Design an image by extracting flower only from given photographic image.
5. Design an image by applying Text and Transform Tool.
6. Design an image by using patch or healing brush tool to remove damaged parts of an image.
7. Design an image by applying Color Balance to change the color of an image.
8. Design an image by applying Lighting Effect Filter.
9. Design an image by applying Blending options to make a text effect.
10. Design an image by applying rainbow effect.
11. Design an image by applying text masking effect.
12. Design a college id card using any tools.
13. Design a banner for your college with images and text.

Flash

1. Basic tools used in Flash.
2. Develop a Flash application using motion tween.
3. Develop a Flash application using shape tween.
4. Develop a Flash application for ball bouncing using motion guide path.
5. Develop a Flash application for masking effect.
6. Develop a Flash application using layer based animation.
7. Develop a Flash application to represent the growing moon.
8. Write action script to play and stop an animation.
9. Create an appealing animation movie of your choice combining both Motion tweening and Shape tweening. Also add appropriate sound effects.

CS8: - Ethical hacking Fundamentals (Hours : 04 Credits: 04)

Subject Description: This subject deals with the information systems security assessment

Goals: To learn about the Ethical Hacking, Attacking methodology, Web and Network hacking, Report writing and Mitigation.

Objective : On successful completion of this subject the students should have understood basic of Hacking and Penetration

UNIT-I : Introduction to Ethical Hacking – Ethical Hacking – Difference between hacking and ethical hacking - Hacking Methodology - Process of Malicious Hacking - Foot printing and Scanning- Enumeration - System Hacking and Trojans and Black Box Vs White Box Techniques.

UNIT-II : Attacking methodology - Denial of Service - Sniffers - Session Hijacking and Hacking Web Servers - Session Hijacking - Hacking Web Servers - Web Application Vulnerabilities and Web Techniques Based Password Cracking - Web Application Vulnerabilities - Web Based Password Cracking Techniques.

UNIT-III : Web and Network hacking - SQL Injection - Hacking Wireless Networking - Viruses - Worms and Physical Security - Linux Hacking - Evading IDS and Firewalls.

UNIT-IV : Report writing - Introduction to Report Writing - Demonstration of vulnerabilities.

UNIT-V : Mitigation - Mitigation - requirements for low level reporting and high level reporting of Penetration testing results - Mitigation of issues identified including tracking.

Text Books :

1. Stuart McClure, Joel Scambray, George Kurtz, "Hacking Exposed" 7th Edition, McGraw Hill, 1 August 2012.
2. Dexter Jackson, "Hacking: Ultimate Beginner's Guide to Computer Hacking in 2016; Hacking for Beginners, Hacking University, Hacking Made Easy, Hacking Exposed, Hacking Basics", Create Space Independent Publishing Platform (30 August 2016).

Reference Books:

- Patrick Engerbrestson, "Basic of Hacking and Penetration: Ethical Hacking and Penetration Testing Made Easy", Syngress; 2 edition (12 September 2013).
- Justin Hatmaker, "Hacking:: Penetration Testing, Basic Security and How To Hack", CreateSpace Independent Publishing Platform (19 January 2016).

CS9- LAB -7 - Ethical hacking Lab (Hours : 2 Credits: 3)

List of Experiments:

1. Passive Reconnaissance using "Who is" and Online tools.
2. Active Reconnaissance using "Sampad" and web site details.
3. Full Scan, Half Open Scan and Stealth scan using "nmap".
4. UDP and Ping Scanning using "Advance Lan Scanner" and "Superscan".
5. Packet crafting using "Packet creator" tools.
6. Exploiting NetBIOS vulnerability.
7. Password Revelation from browsers and social networking application.
8. Creating and Analyzing spoofed emails.
9. Creating and Analyzing Trojans.
10. OS password cracking.

CS10: Data Communication and Computer Networks
(5 Hours – 4 Credits)

UNIT-I: Introduction : A Brief History – Applications – Computer Networks – Categories of Networks – Standards and Standards Organizations – Network Architecture – Open Systems and OSI Model – TCP/IP Architecture. **Communication Media and Data Transmission:** Fourier Analysis – Analog and Digital Data Transmission – Modulation and Demodulation – Transmission Media – Wireless Communications – Data Transmission Basics – Transmission Mode – Interfacing – Multiplexing. **Error Detection and Correction:** Types of Errors – Error Detection – Error Correction.

Data Link Control and Protocol Concepts: Flow Control – Error Control – Asynchronous Protocols – Synchronous Protocols – High-Level Data Link Control (HDLC).

UNIT-II : Local Area Networks: Types of Networks and Topology – LAN Transmission Equipment – LAN Installation and Performance.

Ethernet: IEEE Standard 802.3 **Token Bus:** IEEE Standard 802.4 **Token Ring:** IEEE Standard 802.5 – Fiber Distributed Data Interface (FDDI) – **Distributed Queue Dual Bus (DQDB):** IEEE Standard 802.6 – LAN Operating Systems and Protocols – Ethernet Technologies.

Wide Area Networks: WAN Transmission Methods – WAN Carrier Types – WAN Transmission Equipments – WAN Design and Multicast Considerations – WAN Protocols.

UNIT-III: Integrated Services and Routing Protocols: Integrating Services – ISDN Services – ISDN Topology – ISDN Protocols – Broadband ISDN – Asynchronous Transfer Mode (ATM) – Principal Characteristics of ATM – Frame Relay – Comparison of ISDN, ATM and Frame Relay.

Wireless LANS: WLAN Applications – Wireless LAN Requirements – Planning for Wireless LANs – Wireless LAN Architecture – IEEE 802.11 Protocol Layer – IEEE 802.11 Physical Layer – Designing the Wireless LAN Layout – WAP Services.

UNIT-IV : Internet Working: Principles of Internet Working – Routing Principles – Internetwork Protocols (IP) – Shortcomings of IPv4 – IP Next Generation.

TCP Reliable Transport Service: Transport Protocols – The Service TCP Provides to Applications – End-to-End Service and Datagrams – Transmission Control Protocol – User Datagram Protocol.

Unit- V: Network Applications: Client-Server Model – Domain Name System (DNS) – Telnet – File Transfer and Remote File access – Electronic Mail – World Wide Web (WWW)

Network Management: Goal of Network Management – Network Management Standards – Network Management Model – Infrastructure for Network Management – Simple Network Management Protocol (SNMP).

Text Book :

Data Communications and Computer Networks, Brijendra Singh, Second Edition, PHI, 2006.

Unit I	:	Chapters 1,2,3,5
Unit II	:	Chapters 6, 7
Unit III	:	Chapters 8, 9
Unit IV	:	Chapters 10,11
Unit V	:	Chapter 12

Reference Books:

1. Computer Networks, Andrew S Tanenbaum, 4th Ed, Prentice Hall of India, 2006.
2. Data Communications and Computer Networks, Prakash C. Gupta, Prentice Hall of India, 2005.
3. Data and Computer Communications, William Stallings, PHI, 2007.
4. Data Communication and Networking, Behrouz A. Forouzan, TMH, 2005.
5. Data Communications and Networks, Achyut S Godbole, TMH, 2005.
- 6.

AS4: Numerical Methods (4 Hours – 4 Credits)

UNIT-I : Algebraic and Transcendental Equations: Errors in numerical computation-Iteration method-Bisection method-Regula-Falsi method-Newton-Raphson method-Horner's method.

UNIT-II : Simultaneous Equations: Introduction-Simultaneous equations-Back substitution-Gauss Elimination method-Gauss –Jordan Elimination method-Calculation of Inverse of a matrix-Crout's method-Iterative methods-Gauss-Jacobi Iteration method-Gauss seidal Iteration method-Newton Raphson's method for simultaneous equations.

UNIT-III : Interpolation and Introduction: Newton's interpolation Formulae-Central difference Interpolation formulae-Gauss forward, Gauss backward, Lagrange's interpolation formulae-Divided differences-Newton's divided difference formula-Inverse Interpolation.

UNIT-IV : Numerical Differentiation and Integration: Introduction-Derivates using Newton's forward difference formula-Derivates using Newton's backward difference formula-Numerical Integration-Newton-cotes quadrature formula-Trapezoidal Rule-Simpson's one third rule-Simpson's 3/8 th rule.

UNIT-V : Numerical Solution of Ordinary Differential Equations: Introduction-Taylor series method-Picard's method-Euler's method-Runge-kutta method of second, third, fourth order-Predictor and corrector methods-Mile's method.

Text Book : Numerical Methods, Second Edition, S.Arumugam, A.Thangapandi Issac, A.Somasundaram, SCITECH publications, 2009.

Unit I	: Chapter-3
Unit II	: Chapter-4 (excluding Relation method and its related problems)
Unit III	: Chapter-7 (Sections: 7.0, 7.1, 7.2((i), (ii) and related problems); 7.3,7.4,7.5,7.6)
Unit IV	: Chapter-8 (Sections: 8.0,8.1,8.2 related problems, 8.5 (excluding Weddles rule, Booles rule, Romberg's method and related problems))
Unit V	: Chapter-10 (Sections : 10.0,10.1,10.2,10.3(excluding modified Euler's method & its related problems) 10.4,10.5,10.6)

Reference Books:

1. Mathews J.H. Numerical Method for Maths, Science and Engineering; PHI. New Delhi, 2001.
2. Iqbal H. Khan & Q. Hassan Numerical Methods for Engineers and Scientist - Galgotia Publications (P) Ltd., New Delhi - 1997.
3. M.K. Jain, S.R.K. Iyengar & R.K.Jain - Numerical Methods for Scientific and Engineering Computation - New Age International(P) Ltd., New Delhi – 1996.

SBS4: Lab-8: PHP Programming (2 Hours - 2 Credits)

Write PHP programs for the following:

- 1) To demonstrate all array operations.
(array_search(),array_diff(),array_combine(),array_match(),sort()).
- 2) To demonstrate all control statements (find factorial of the given number using IF, While, Do-while).
- 3) To display inventory table using Key and value pairs.

- 4) To print student table using key and value pairs and search particular student number (whether it is present or not).
- 5) To illustrate user defined function (define all function type).
 1. Function without input argument and no return value.
 2. Function without input argument and return value.
 3. Function with input argument and no return value.
 4. Function with input argument and return value.
 5. Function with default argument.
- 6) To find factorial of the given number using recursion.
- 7) To calculate nCr using include command to include the factorial function.
- 8) Write a PHP program to store current date-time in a COOKIE and display the 'Last visited on' date-time on the web page upon reopening of the same page. To perform string manipulation.
- 9) To process personal details using File.
- 10) To design an student mark database using HTML Form and process using PHP.

CS11: Relational Database Management Systems

(5 Hours- 4 Credits)

UNIT-I : Overview of database systems: Managing Data – A Historical Perspective – File Systems Versus a DBMS – Advantages of a DBMS – Describing and Storing Data in a DBMS – Queries in a DBMS – Transaction Management – Structure of a DBMS – People Who Work with Databases.

Introduction to database design: Database Design and ER Diagrams – Entities, Attributes, and Entity Sets – Relationships and Relationship Sets – Additional Features of ER Model – Conceptual Design with the ER Model.

UNIT-II : The relational model: Introduction to the Relational Model – Integrity Constraints over Relations – Enforcing Integrity Constraints – Querying Relational Data – Logical Database Design: ER to Relational – Introduction to Views – Destroying / Altering Tables and Views.

Relational algebra and calculus: Preliminaries – Relational Algebra: Selection and Projection – Set Operations – Renaming – Joins – Division Relational Calculus: Tuple Relational Calculus – Domain Relational Calculus.

UNIT-III : SQL queries, constraints, triggers: The Form of a Basic SQL Query - UNION, INTERSECT, and EXCEPT – Nested Queries – Aggregate Operators – Null Values – Complex Integrity Constraints in SQL – Triggers and Active Databases – Designing Active Databases

UNIT- IV: Schema refinement and normal forms: Introduction to Schema Refinement – Functional Dependencies – Reasoning about FD's – Normal Forms – Properties of Decompositions – Normalization – Schema Refinement in Database Design – Other Kinds of Dependencies.

UNIT-V: Overview of transaction management: The ACID Properties – Transactions and Schedules – Concurrent Execution of transactions – Lock Based Concurrency Control – Performance of Locking – Transaction Support in SQL – Introduction to Crash Recovery.

Security and authorization: Introduction to Database Security - Access Control – Discretionary Access Control – Mandatory Access Control – Security for Internet Applications – Additional Issues Related to Security.

Text book : Database Management Systems, Raghu Ramakrishnan and Johannes Gehrke, Mc Graw Hill International Edition, Third Edition, 2003.

Unit I	:	Chapters 1.1 – 1.9, 2.1 – 2.5
Unit II	:	Chapters 3.1 – 3.7, 4.1 – 4.3
Unit III	:	Chapters 5.2 – 5.9
Unit IV	:	Chapters 19.1 – 19.8
Unit V	:	Chapters 16.1 – 16.7, 21.1 – 21.6

Reference Books:

1. Database Management Systems - Alexis Leon and Mathews Leon, Vikas Publishing, Chennai, 2002.
2. Database Management Systems - G.K. Gupta, Mc Graw Hill Education, 4th reprint 2015, Pearson Education Asia, 2001.
3. Database System Concepts - Abraham Silberschatz, Henry F.Korth, S.Sudarshan, 6th Edition, Mc Graw Hill, 2010.
4. Database Management Systems - R.Pannerselvam, 2nd Edition, PHI Learning, 2015.
5. Database Systems Models, Languages, Design and application Programming - R.Elmasri and S.B.Navathe, 6th Edition, Pearson Education, 2013.
6. Teach yourself SQL in 21 days - Ryan K.Stephens, Ronald Plew Bryan Morgan and Jeff Perkins, 2nd Edition, SAMS Publishing.

CS12: Computer Forensics and Investigation

(Hours : 05 Credits: 04)

Subject Description: This course deals with Computer Forensics and Investigation.

Goals: Knowledge on Computer Forensics and Investigation.

Objective: On successful completion of this subject the students should have understood

- Computer Forensics
- Storage Devices
- Forensics Techniques
- Cyber Law

UNIT-I : Computer Forensics - Introduction to Computer Forensics - Forms of Cyber Crime - First Responder Procedure- Non-technical staff - Technical Staff - Forensics Expert and Computer Investigation procedure.

UNIT-II : Storage Devices & Data Recover Methods - Storage Devices- Magnetic Medium - Non- magnetic medium and Optical Medium - Working of Storage devices-Platter - Head assembly- spindle motor - Data Acquisition - Data deletion and data recovery method and techniques.

UNIT-III : Forensics Techniques - Windows forensics - Linux Forensics - Mobile Forensics - Steganography - Application Password cracking - Brute force -Dictionary attack - Rainbow attack - Email Tacking - Header option of SMTP, POP3, IMAP.

UNIT-IV : Cyber Law - Corporate espionage - Evidence handling procedure - Chain of custody - Main features of Indian IT Act 2008 (Amendment).

UNIT-V : Role of Digital Evidence - Digital Evidence - Authentication of Evidence - Importance of digital evidences in investigation and in court of law - Capabilities of a digital forensic investigator.

Text Book :

1. B. Nelson, "Guide to Computer Forensics and Investigations", 3rd Edition, Cengage, 2010 BBS.
2. Marie-Helen Maras, "Computer Forensics: Cyber Criminals, Laws and Evidence", 1st edition, Jones and Bartlett Publishers, 1 February 2011.
3. John.R.Vacca, "Computer Forensics, Computer Crime Scene Investigation", 2nd Edition, Charles River Media Publication, 15 June 2002.

Reference Books:

1. Aaron Philipp, David Cowen, Chris Davis, "Hacking Exposed Computer Forensics", Pub: Mc Graw Hill-2011.
2. Albert Marcella, Jr., Doug Menendez, "Cyber Forensics: A field manual for collecting, Examining, preserving evidence of computer crimes", Second Edition, CRC Press 2007.
3. Bill Nelson, Amelia Phillips, Christopher Steuart, "Guide to Computer Forensics and Investigations, Processing Digital Evidence", 4th edition, Delmar Cengage Learning, 28 Oct 2009.
4. Larry Daniel, Lars Daniel, "Digital Forensics for Legal Professionals - Understanding Digital Evidence from the Warrant to the Courtroom", 1st edition, Syngress, 14 October 2011.

CS13: Software Engineering (Hours : 05 Credits :04)

UNIT-I : Introduction to Software Engineering: Some Definitions – Some Size factors – Quality and Productivity Factors – Managerial Issues. **Planning a Software Project:** Defining the Problem – Developing a Solution Strategy – Planning the Development Process – Planning an Organizational Structure – Other Planning Activities.

UNIT-II : Software Cost Estimation: Software Cost Factors – Software Cost Estimation Techniques – Staffing-Level Estimation – Estimating Software Maintenance Costs.

UNIT-III : Software Requirements Definitions: The Software Requirements Specification – Formal Specification Techniques – Languages and Processors for Requirements Specification.

UNIT-IV: Software Design: Fundamental Design Concepts – Modules and Modularization Criteria – Design Notations – Design Techniques – Detailed Design Considerations – Real-Time and Distributed System Design – Test Plans – Milestones, Walkthroughs, and Inspections - Design Guidelines.

UNIT-V : Verification and Validation Techniques: Quality Assurance – Static Analysis – Symbolic Execution – Unit Testing and Debugging – System Testing – Formal Verification.
Software Maintenance: Enhancing Maintainability During Development – Managerial Aspects of Software Maintenance – Configuration Management – Source-Code Metrics – Other Maintenance Tools and Techniques.

Text book :

Software Engineering Concepts, Richard Fairley, Tata Mc Graw Hill Publishing Company Limited, New Delhi, 1997.

Unit I	:	Chapters: 1.1 – 1.4, 2.1-2.5
Unit II	:	Chapters: 3.1 - 3.4
Unit III	:	Chapters: 4.1 – 4.3
Unit IV	:	Chapters: 5.1 – 5.9
Unit V	:	Chapters: 8.1, 8.3 – 8.7, 9.1 – 9.5

Reference Books :

1. Software Engineering – K.L.James, Prentice Hall of India Pvt. Ltd., New Delhi, 2009.
2. Fundamentals of Software Engineering – Rajib Mall, Prentice Hall of India Pvt. Ltd., New Delhi, 2003.

3. Software Engineering (A Practitioner's Approach) - Roger. S.Pressman. Mc Graw Hill Publication, International Edition, 5th Edition. 2001.

CS14 - Computer Forensics Lab
(Hours : 06 Credits: 04)

List of Experiments:

- Physical Collection of electronic evidence using forensic standards.
- Dismantling and re-building PCs in order to access the storage media safely.
- Boot sequence and Power On Self-Test mode analysis.
- Examination of File systems of Windows, Linux and Mac.
- Analysing Word processing and Graphic file format.
- Network data sniffing and analyzing.
- Password and encryption techniques.
- Internet forensic and Malware analysis.
- Data recovery techniques for hard drive.
- Data recovery techniques for Pen drive and CD.

ES1.1: Fundamentals of Information Security
(Hours : 5 Credits: 04)

Subject Description: This subject deals with Security Threats and Vulnerabilities, Information Security Domains.

Goals: It helps the students to acquire knowledge on confidentiality, integrity and authenticity, Security Threats and Vulnerabilities.

Objective: Students will be able to:

- State the basic concepts in information security, including security policies, security models, and various security mechanisms.
- Understand the fundamentals of information security risk assessments.
- Identify and Analyze the vulnerabilities in any computing system.
- Identify and classify the assets as per asset classification policy.

UNIT-I : Basics of Information Security and Threats: Introduction to Information Security – Common threats: Errors and Omissions – Fraud and Theft – Malicious hackers – Malicious Code – Denial of Service attacks – Social Engineering – Common types of Social Engineering.

UNIT-II : Information Classification : Definitions – Information, Data, Information System, Difference between data and information - Information system Asset inventory, Asset Classification criteria, roles and responsibilities – Methodology - Declassification or Reclassification - Retention and Disposal of Information Assets - Provide Authorization for Access.

UNIT-III : Access Control – Definition of Access control – Types of Access Control - Access control policies – User access management – System and network Access Control – Operating System - Access Control – Monitoring system access.

UNIT-IV : Risk Analysis and risk Management – Definition of Risk , Information Security Risk, Risk Management - Risk analysis, Information Security Lifecycle – Risk analysis process - Need for Risk Assessment - Risk Assessment Methodology - Risk Assessment Components - Risk Mitigation Techniques.

UNIT-V : Introduction to Security Domains – Application Security, Legal & Compliance, Business Continuity Management, Cryptography, Physical & Environmental Security and Security Operations.

Text Books :

1. Thomas R. Peltier, "Information Security Fundamentals", Second Edition, Auerbach Publications, (19 November 2013).
2. Dr. Timothy Shimeall & Jonathan Spring "Introduction to Information Security - A Strategic based approach", 1st Edition, Syngress Publication.

Reference Books :

1. Ronald L. Krutz, Russel Dean Vines "The CISSP Prep Guide: Gold Edition", Gold Edition, Wiley Publication.
2. Ed Tittel, Mike Chapple, James Michael Stewart "Certified Information Systems Security Professional, Study Guide", 6th Edition, Sybex Publication.
3. Robert Orfali, Dan Harkey and Jeri Edwards, The Essential Client/Server Survival Guide , Galgotia Publications Pvt. Ltd., 2002.

ES1.2: Basic Principles of Forensic Science and Mathematics
(Hours : 05 Credits: 04)

Subject Description: This course presents the properties of matrices and concepts of probability.

Goals: To enable the student to learn the mathematical foundations of computer science.

Objective: On successful completion of the course the student should have:

- The significance of forensic science to human society.
- The fundamental principles and functions of forensic science.
- The divisions in a forensic science laboratory.
- The working of the forensic establishments in India and abroad.
- Understood the mathematical logic grammars and languages.
- Learned probability concepts.

UNIT-I : History of Development of Forensic Science in India - Functions of forensic science - Historical aspects of forensic science - Definitions and concepts in forensic science - Scope of forensic science - Need of forensic science - Basic principles of forensic science - Frye case and Daubert standard.

UNIT-II : Tools and Techniques in Forensic Science - Branches of Forensic Science - Forensic Science in international perspectives, including set up of INTERPOL and FBI - Duties of forensic scientists - Code of conduct for forensic scientists - Qualifications of forensic scientists - Data depiction - Report writing.

UNIT-III : Organizational set up of Forensic Science Laboratories in India - Hierarchical set up of Central Forensic Science Laboratories - State Forensic Science Laboratories - Government Examiners of Questioned Documents - Fingerprint Bureaus - National Crime Records Bureau - Police and Detective Training Schools - Bureau of Police Research and Development - Directorate of Forensic Science and Mobile Crime Laboratories - Police Academies. Police dogs - Services of crime laboratories - Basic services and optional services.

UNIT-IV : Matrices and Probability: Types of Matrices - Matrix Operations - Inverse of a Matrix - Properties of Determinants - Eigen Values - Cayley-Hamilton Theorem. Set Theory: Basic Set Operations - Relations and Functions - Relation Matrices - Principle of Mathematical Induction - Sample Space and Events - Axioms of Probability - Conditional Probability - Independence of Events - Bayes Theorem. Regression and Correlation: Introduction - Linear Regression - Method of Least Squares - Normal Regression Analysis - Normal Correlation Analysis.

UNIT-V: Grammars, Languages and Numerical Methods Finding Roots: Context Free Grammars - Introduction - Context Free Grammars - Derivation Trees. Finite Automata: Finite State Systems - Basic Definitions - Non Deterministic Finite Automata - Bisection Method - Regular - Falsi Method - Newton- Raphson Method. Solution of Simultaneous Linear Equations: Gaussian Elimination - Gauss-Seidal Method. Numerical Integration: Trapezoidal Rule - Simpsons Rule.

Text Books :

1. M. K. Venkataraman, "Engineering Mathematics", Volume II, National Publishing Company.
2. John E. Freunds, Irwin Miller, Marylees Miller, "Mathematical Statistics, Pearson Education, Sixth Edition.
3. Hopcroft and Ullman, "Introduction to Automata Theory, Languages and Computation , Pearson Education, Second Edition.
4. Tremblay and Manohar, "Discrete Mathematical Structures with Applications to Computer Science , Tata Mc Graw Hill.
5. B.B. Nanda and R.K. Tiwari, Forensic Science in India: A Vision for the Twenty First Century, Select Publishers, New Delhi (2001).

Reference Books :

1. Rama B. Bhat, Snehashish Chakraverty, "Numerical Analysis in Engineering , Narosa Publishing House, 2004.
2. Radha Muthu, T. Santha, "Discrete Mathematics for Computer Science and Applications. Kalai kathir Achchagam, Coimbatore, 2003.
3. B.B. Nanda and R.K. Tiwari, Forensic Science in India: A Vision for the Twenty First Century, Select Publishers, New Delhi (2001).
4. M.K. Bhasin and S. Nath, Role of Forensic Science in the New Millennium, University of Delhi, New Delhi (2002).

ES1.3: Basic Statistical Methods for Computing (Hours : 05 Credits: 05)

Subject Description : This subject deals with the concepts of Statistical Methods for Computing.

Goals : To learn about the fundamentals and exploring the concepts of Statistical methods for Computing

Objectives : On successful completion of the course the student should be able to understand

- Graphical methods
- Descriptive Statistics
- Symmetric frequency distribution
- Probability and Non Probability Methods of Statistics

UNIT-I : Data condensation and Graphical methods - Raw data, attributes and variables, discrete and continuous variables - Presentation of data using frequency distribution and cumulative frequency distribution - Graphical Presentation of frequency distribution - histogram, stem and leaf chart, less than and more than type of curves - Numerical problems related to real life situations.

UNIT-II : Review / Revision of Descriptive Statistics - Measures of Central tendency: Mean, Mode, Median. Examples - Partition values - Quartiles, Box-Plot - Measures of Dispersion: Variance, Standard Deviation, and Coefficient of Variation.

UNIT-III : Concept of symmetric frequency distribution, skewness, positive and negative skewness - Measures of skewness - Pearson's measure, Bowley's measure, β_1, γ_1 . - Kurtosis of a frequency distribution, measure of kurtosis (β_2, γ_2) based upon moments, type of kurtosis: leptokurtic, platykurtic and mesokurtic - Numerical problems related to real life situations - Discrete Random variable.

UNIT-IV : Correlation (for bivariate raw data) - Bivariate data, Scatter diagram - Correlation, Positive Correlation, Negative Correlation, Zero Correlation - Karl Pearson's coefficient of correlation (r), limits of r ($-1 \leq r \leq 1$), interpretation of r , Coefficient of determination (r^2), Auto-correlation upto lags 2 - Numerical Problems - Regression - Types of Regression - Application of Regression Techniques.

UNIT-V: Probability and Non Probability Methods of Statistics - Theories of Probability - Counting Principles, Permutation, and Combination - Deterministic and non-determination models- Random Experiment, Sample Spaces (finite and countably infinite) - Events: types of events, Operations on events- Probability - classical definition, probability models, axioms of probability, probability of an event.

Text Books:

1. Geof H. Givens, Jennifer A. Hoeting, Computational Statistics (Wiley Series in Probability and Statistics), Wiley-Blackwell (18 February 2005).
2. James E. Gentle, Computational Statistics (Statistics and Computing), Springer; 2009 edition (14 March 2012).

Reference Books:

1. Günther Sawitzki, Computational Statistics: An Introduction to R, 1st, Kindle Edition, Chapman and Hall/CRC; 1 edition (26 January 2009).
2. James E. Gentle, Elements of Computational Statistics (Statistics and Computing), Springer; Softcover reprint of the original 1st ed. 2002 edition (4 December 2010).

SBS 5: Lab 10: Python Programming
(Hours : 02 Credits: 02)

List of Exercises for Python Programming:

Section: A (Simple programs)

1. Write a menu driven program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice.
2. WAP to calculate total marks, percentage and grade of a student. Marks obtained in each of the three subjects are to be input by the user. Assign grades according to the following criteria:
Grade A: Percentage ≥ 80
Grade B: Percentage ≥ 70 and < 80
Grade C: Percentage ≥ 60 and < 70

Grade D: Percentage ≥ 40 and < 60

Grade E: Percentage < 40

3. Write a menu-driven program, using user-defined functions to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.
4. WAP to display the first 'n' terms of Fibonacci series.
5. WAP to find factorial of the given number.
6. WAP to find sum of the following series for n terms: $1 - 2/2! + 3/3! - \dots - n/n!$
7. WAP to calculate the sum and product of two compatible matrices.

Section: B (Visual Python)

All the programs should be written using user defined functions, wherever possible.

1. Write a menu-driven program to create mathematical 3D objects.
 - i. curve
 - ii. sphere
 - iii. cone
 - iv. arrow
 - v. ring
 - vi. cylinder
2. WAP to read n integers and display them as a histogram.
3. WAP to display sine, cosine, polynomial and exponential curves.
4. WAP to plot a graph of people with pulse rate p vs. height h. The values of p and h are to be entered by the user.
5. WAP to calculate the mass m in a chemical reaction. The mass m (in gms) disintegrates according to the formula $m=60/(t+2)$, where t is the time in hours. Sketch a graph for t vs. m, where $t \geq 0$.
6. Input initial velocity and acceleration, and plot the following graphs depicting equations of motion:
 - i. velocity wrt time ($v=u+at$)
 - ii. distance wrt time ($s=u*t+0.5*a*t*t$)
 - iii. distance wrt velocity ($s=(v*v-u*u)/2*a$)

Reference Books :

1. T. Budd, Exploring Python, TMH, 1st Ed, 2011.
2. John V. Guttag, Introduction to computation and programming using Python, Revised and Expanded edition, PHI, 2015.
3. Python Tutorial / Documentation www.python.org, 2015.
4. Allen Downey, Jeffrey Elkner, Chris Meyers, How to think like a computer scientist: learning with Python, Freely available online 2012.
5. <http://docs.python.org/3/tutorial/index.html>.
6. <http://interactivepython.org/courselib/static/python>.
7. <http://www.ibiblio.org/g2swap/byteofpython/read/>.

NME-1: Introduction to Computers and Office Automation (Hours : 02 Credits : 02)

UNIT-I :Introduction to Computer and Information Technology: History, Computer system concepts-Computer system characteristics- Capabilities and limitations- Types of computers-

Generations. **Computer organization and working:** Introduction-The Control Unit ALU - Memory-Read Only Memory (ROM).

UNIT-II : Input Devices: Introduction- Keyboards-Mouse-Joysticks-Optical Recognition input-Scanners-Bar coders-Digital camera-MICR-Card reader-Web Cameras-Light pens-Trackball-Touch screens-Touch pad-Digitizer-Voice input-Voice recognizers. **Output Devices:** Introduction-Monitors and Displays- Multimedia Projector-Printers-Graphics Output Devices-Plotters-Flatbed Plotters-Drum Plotters. **Storage Devices:** Introduction- Hard Disk Drives -CD-ROMs and DVDs -Magnetic tape -Erasable disks.

UNIT-III : Microsoft Office 2007 and Word Processing : Introduction to Microsoft Office 2007 - Microsoft Word Screen. **Microsoft Word:** Working with Document in Word 2007 - Introduction - saving the file - Formatting, Alignment of text, Applying fonts-Spell checking- Borders and shading - Closing of the file, Editing document, Autocorrect-Auto format-Find and Replace, Page numbering, header and footer- Footnotes and endnotes-splitting panes-Tiling of the documents-using mail merge in Word 2007.

UNIT-IV : Microsoft Office Excel 2007: Understanding Spreadsheets-Creating a Worksheet in Microsoft Excel 2007- Copying formula - Styles -functions in Excel - Using Auto calculate - References -Sum, Average functions.

UNIT-V : Creating Charts in Excel 2007-Auditing a workbook - Comments Inserting - Function wizard-Goal seeking- Typing with Auto fill- Formatting numbers and Labels - changing the size of Rows and columns- Add or Remove a sheet - Protect a worksheet-Appling themes.

Text Book :

Learning computer fundamentals, MS Office and Internet & Web technology, Dinesh Maidasani, Firewall Media, Third Edition, 2014.

- | | |
|------------|---|
| Unit I : | Section A-1, 2 |
| Unit II : | Section A- 3, 4, 5 |
| Unit III : | Section B- 2, 3 |
| Unit IV : | Section B- 4 (up to Functions in Excel) |
| Unit V :- | Section B- 4(From Creating Charts in Excel) |

Reference Books:

1. A Beginners Guide to Computers - Alexis Leon & Mathews Leon-Vikas Publishing House Pvt. Ltd., 2001.
2. Fundamentals of Computers, P. Mohan, Himalaya Publishing House, Revised Edition, 2010.
3. Fundamentals of Computers, V. Rajaraman, PHI Publication, Fifth Edition, 2010.

CS15- Technological Methods in Forensic Science
(Hours : 05 Credits: 04)

Objective: After studying this paper the students will know -

- The causes of criminal behavior.
- The elements of criminal justice system.
- The significance of criminal profiling to mitigate crime.
- The importance of chromatographic and spectroscopic techniques in processing crime scene evidence.
- The utility of colorimetry, electrophoresis and neutron activation analysis in identifying chemical and biological materials.

- The significance of microscopy in visualizing trace evidence and comparing it with control samples.
- The fundamental principles on which the science of fingerprinting is based.
- Fingerprints are the most infallible means of identification.
- The world's first fingerprint bureau was established in India.
- The method of classifying criminal record by fingerprints was worked out in India, and by Indians.
- The physical and chemical techniques of developing fingerprints on crime scene evidence.
- The significance of foot, palm, ear and lip prints.

UNIT-I: Crimes and Criminology: Definition, aims and scope - Theories of criminal behavior - classical, positivist, sociological - Criminal anthropology - Criminal profiling - Understanding modus operandi - Investigative strategy - Role of media - Elements, nature, causes and consequences of crime - Deviant behavior - Hate crimes, organized crimes and public disorder, domestic violence and workplace violence - White collar crimes - Victimology - Juvenile delinquency - Social change and crime - Psychological Disorders and Criminality - Situational crime prevention - Broad components of criminal justice system - Policing styles and principles - Police's power of investigation - Filing of criminal charges - Community policing - Policing a heterogeneous society - Correctional measures and rehabilitation of offenders - Human rights and criminal justice system in India.

UNIT-II: Instrumentation: Sample preparation for chromatographic and spectroscopic evidence - Chromatographic methods - Fundamental principles and forensic applications of thin layer chromatography, gas chromatography and liquid chromatography - Spectroscopic methods.

UNIT-III: Microscopy Technique: Fundamental principles and forensic applications of Ultraviolet-visible spectroscopy, infrared spectroscopy, atomic absorption spectroscopy, atomic emission spectroscopy and mass spectroscopy - X-ray spectrometry - Colorimetric analysis and Lambert-Beer law - Electrophoresis - fundamental principles and forensic applications - Neutron activation analysis - fundamental principles and forensic applications - Fundamental principles - Different types of microscopes - Electron microscope - Comparison Microscope - Forensic applications of microscopy - Basic principles and applications of photography in forensic science - 3D photography - Photographic evidence - Infrared and ultraviolet photography - Digital photography - Videography - Crime scene and laboratory photography.

UNIT-IV: Biological Evidence: Nature and importance of biological evidence - Significance of hair evidence - Transfer, persistence and recovery of hair evidence - Structure of human hair - Comparison of hair samples - Morphology and biochemistry of human hair - Comparison of human and animal hair - Types and identification of microbial organisms of forensic significance - Identification of wood, leaves, pollens and juices as botanical evidence - Diatoms and their forensic significance - Collection of specimens - Polymerase chain reaction - historical perspective, sequence polymorphisms, individualization of evidence - Short Tandem Repeats (STR) - role of fluorescent dyes, nature of STR loci - Restriction Fragment Length Polymorphism (RFLP) - genetic markers used in RFLP, typing procedure and interpretation of results - Touch DNA.

UNIT-V: Finger Print and Hand Writing Identification: Introduction and history, with special reference to India - Biological basis of fingerprints - Formation of ridges. Fundamental principles of finger printing. Types of fingerprints - Fingerprint patterns - Fingerprint characters/minutiae - Plain

and rolled fingerprints - Classification and cataloguing of fingerprint record - Automated Fingerprint Identification System - Significance of poroscopy and edgeoscopy - Latent prints - Constituents of sweat residue - Latent fingerprints' detection by physical and chemical techniques - Mechanism of detection of fingerprints by different developing reagents - Application of light sources in fingerprint detection - Preservation of developed fingerprints - Digital imaging for fingerprint enhancement - Fingerprinting the deceased - Developing fingerprints on gloves - Importance of footprints - Casting of foot prints, Electrostatic lifting of latent foot prints - Palm prints - Lip prints - Nature, location, collection and examination of lip prints - Ear prints and their significance - Palm prints and their historical importance.

Text Books :

1. J.E. Cowger, *Friction Ridge Skin*, CRC Press, Boca Raton (1983).
2. D.A. Ashbaugh, *Quantitative-Qualitative Friction Ridge Analysis*, CRC Press, Boca Raton (2000).
3. R.C. Nigam, *Law of Crimes in India*, Volume I, Asia Publishing House, New Delhi (1965).
4. (Chief Justice) M. Monir, *Law of Evidence*, 6th Edition, Universal Law Publishing Co. Pvt. Ltd., New Delhi (2002).
5. S.H. James and J.J. Nordby, *Forensic Science: An Introduction to Scientific and Investigative Techniques*, 2nd Edition, CRC Press, Boca Raton (2005).
6. D.E. Zulawski and D.E. Wicklander, *Practical Aspects of Interview and Interrogation*, CRC Press, Boca Raton (2002).

CS16: Lab 11: Web Applications Security Lab (Hours : 06 Credits: 04)

List of Experiments:

- URL Interpretation attacks.
- Input Validation attacks.
- SQL Injection attacks.
- Impersonation attacks.
- Buffer Overflow attacks.

CS 17- SBS 4 – Biometrics (Hours : 02 Credits: 02)

Subject Description: This course deals with Biometrics and Leading Technologies.

Goals: To learn about Benefits of Biometrics, Leading Technologies, biometric applications, Privacy and Standards.

Objective: To inculcate knowledge on Leading Technologies and Biometric Standards

UNIT-I: Biometrics: Benefits of Biometrics versus Traditional – Benefits of Biometrics in Identification systems – Verification, Identification and biometric matching – Performance measures in biometric systems.

UNIT-II: Leading Technologies: Finger scan – facial scan – Iris scan – Voice scan Retina scan – components, working principles, competing technologies, strengths and weaknesses.

UNIT-III: Other Leading Technologies: Automated fingerprint identification systems - Signature-scan - Keystroke scan - components, working principles, strengths and weaknesses.

UNIT-IV: Categorizing biometric applications - citizen identification – criminal identification – Surveillance – PC/ Network Access – Physical Access/ Time/ Attendance – Customer facing applications: e Commerce/ Telephony – Retail/ ATM/ Point of sale.

UNIT-V: Privacy and Standards in Biometric System Design: Assessing the privacy risks of Biometrics – designing privacy – sympathetic biometric systems – Biometric Standards.

Text Books:

1. Samir Nanavati, Michael Thieme, Raj Nanavati, "Biometrics: Identity Verification in a Networked World (Technology Briefs Series)", John Wiley & Sons (12 April 2002).
2. Paul Reid, "Biometrics for Network Security", Pearson Education, New Delhi, 2004.

Reference Books:

1. John R Vacca, "Biometric Technologies and Verification Systems", Elsevier Inc, 2007.
2. Anil K Jain, Patrick Flynn, Arun A Ross, "Handbook of Biometrics", Springer, 2008.

CS17: Cryptography
-(Hours : 05 Credits: 04)

Subject Description: This course deals with an overview of Cryptography.

Goals: The goal of this paper is to make a student learn the basic concepts of Cryptography, Algorithms, Key Management, and Encryption Techniques.

Objective: To inculcate knowledge on Cryptography and its Techniques.

UNIT-I: Introduction to Cryptography - Defining Cryptography, Privacy, Authentication, Shift Cipher - The Confidentiality - Integrity and Availability (CIA) Triad - Cryptographic concepts - methodologies and practices – Symmetric and Asymmetric cryptography – public and private keys - Cryptographic algorithms and uses – Construction and use of Digital signatures.

UNIT-II: Types of Algorithms - The basic functionality of hash/crypto algorithms (DES, RSA, SHA, MD5, HMAC, DSA) and effects on key length concepts in Elliptical Curve Cryptography and Quantum Cryptography.

UNIT-III: Key Management - The basic functions involved in key management including creation – distribution – verification - revocation and destruction – storage - recovery and life span and how these functions affect cryptographic integrity.

UNIT-IV: Application of Cryptography - Major key distribution methods and algorithms including Kerberos - ISAKMP etc., - Vulnerabilities to cryptographic functions - the Use and functions of Certifying Authorities (CAs) - Public Key Infrastructure (PKI) and System architecture requirements for implementing cryptographic functions.

UNIT-V: Cryptology - Classical Encryption Techniques - Substitution Techniques - Transposition Techniques – Permutation Methods - Confidentiality using conventional encryption - Placement of Encryption - Symmetric and Asymmetric crypto systems – common crypto standards and applications.

Text Books :

1. V. V. I Ashehenko, "Cryptography: An Introduction", Pub: American Mathematical Society 2002.
2. John E. Hershey, "Cryptography demystified", Mc Graw Hill Education (1 September 2002).

Reference Books :

1. Song Y. Yan, "Cryptanalytic attacks on RSA", Springer; Softcover reprint of hard cover, 1st ed. 2008 edition (12 February 2010).
2. Harold F. Tipton, "Official (ISC)2 Guide to the CISSP CBK", Second Edition – 2005.

ES2.1: Cyber Criminology (Hours : 05 Credits: 04)

Subject Description: This course deals with the fundamentals of cyber Criminology.

Goals: The goal of this paper is to make a student learn the basic concepts of Criminology and Cyber Criminology.

Objective: On successful completion of the course the student should have understood both investigative and preventative techniques.

UNIT-I : Cyber Criminology Concepts – Definitions of Cyber Crime, Cyber Criminology, Cyber Psychology, Criminal Psychology, Offender, Victimology, Victim Assistance, GRC, Incident Response.

UNIT-II : Understanding criminal behavior – Psychological Perspective – Theories of Personality – Freud, Erickson, Eysenck, Theories of Motivation – Maslow, Alderfer's ERG theory, Acquired Needs Theory (McClelland) – Theories of Learning – Reinforcement learning, social learning, Sutherland's Differential Association Theory.

UNIT-III: Understanding criminal behavior – Sociological Perspective – Robert Merton's Anomie theory, Social Control Theories, Labelling Theory, Broken Window Theory, Shaming and Reintegration theory, Routine Activities Theory, Rational Choice Theory.

UNIT-IV: Understanding Victim logical perspectives – Victim precipitation, Victim proneness, victim responsiveness, – Life Style Exposure theory – Victim Assistance – Compensation and Restitution – UN Basic Principles of the Rights of Victims of Crime and Abuse of Power.

UNIT-V: Criminal Justice System – Three Pillars of CJS – Setup, Role and Functions of State and Central Police – F.I.R., Charge Sheet, Investigation and Investigation Procedure - Central Police Establishments – Cyber Crime Police Stations – Courts, Types of Courts, setup and their functions – Cyber Crime Appellate Tribunals – Sentencing.

Text Books:

1. Sudhir Naib, "The Information Technology Act, 2005: A Handbook", OUP, New York, (2011).
2. S. R. Bhansali, "Information Technology Act, 2000", University Book House Pvt. Ltd, Jaipur (2003).
3. Vasu Deva, "Cyber Crimes and Law Enforcement", Commonwealth Publishers, New Delhi, (2003).

Reference Books:

1. Chris Reed & John Angel, "Computer Law", OUP, New York, (2007).
2. Justice Yatindra Singh, "Cyber Laws", Universal Law Publishing Co, New Delhi, (2012).
3. Verma S, K, Mittal Raman, "Legal Dimensions of Cyber Space", Indian Law Institute, New Delhi, (2004).
4. Jonthan Rosenoer, "Cyber Law", Springer, New York, (1997).

**ES.2:2 Case Studies and Report Writing in Cyber Crimes
(Hours : 05 Credits: 04)**

Subject Description: This course deals with case studies and report writing in cyber crimes.

Goals: To learn about the case studies, planning a case study, case studies in cyber crimes, report Writing.

Objective: On successful completion of this subject the students should have understood case studies and report writing in cyber crimes.

UNIT-I: Introduction to Case Study - Different types of case Studies – Case Study models with examples.

UNIT-II: Planning a Case Study - Researching a Case Study - Strengths and Weaknesses of Case Studies - Writing a Case Study.

UNIT -III: Case Studies in Cyber Crimes – Select case studies for various types of cyber crimes and frauds in India and abroad.

UNIT-IV: Case study research in cyber crimes – Pilot Study – Main Study – Choosing a case study – Tools and softwares for understanding case studies – Plagiarism – Popular websites for social sciences and scientific researches.

UNIT-V: Report Writing – Definition – Types of Report Writing – Templates and sample report writing for cyber crime cases and information security field – ethics of report writing.

Text Books:

1. Jonathan Reuvid, Managing Cyber Security Risk: Cases Studies and Solutions, Legend Press; 2 edition (31 October 2017).
2. Prakash Prasad, A Brief Introduction on Cyber Crime Cases under Information. Technology Act: Details & Analysis | Handbook | Cyber Law Cases Indian Context, Create Space Independent Publishing Platform; First edition (14 March 2017).

Reference Book :

1. M Dasgupta, Cyber Crime in India: A Comparative Study, Eastern Law House Pvt Ltd (1993).

ES2.3: Mobile, Wireless and VOIP Security
(Hours : 05 Credits: 05)

Subject Description: This course deals with Mobile, Wireless and VOIP Security.

Goals: Knowledge on Mobile communication, Wireless Security, Voice over Internet Protocol (VOIP) Security, Mobile Forensics & Data Extraction.

Objective: On successful completion of this subject the students should have understood

- Mobile communication
- Wireless Security
- Voice over Internet Protocol (VOIP) Security
- Mobile Forensics & Data Extraction

UNIT -I: Introduction to Mobile communication - Mobile and Telecommunication protocols and their vulnerabilities - Gain knowledge of managerial - technical and procedural controls to address Mobile and Telecommunication vulnerabilities.

UNIT-II: Wireless Security - Wireless protocols and their vulnerabilities - Gain knowledge of managerial - technical and procedural controls to address Wireless vulnerabilities.

UNIT-III : Voice over Internet Protocol (VOIP) Security - VOIP concepts - protocols and vulnerabilities - Gain knowledge of managerial - technical and procedural controls to address VOIP vulnerabilities.

UNIT-IV : Mobile Forensics and Data Extraction - Mobile forensics process including seizure - data acquisition types like Physical - Logical - Manual - External and Internal memory - storage - analysis using Tools and Techniques.

UNIT -V : Vulnerabilities, Threats of Mobile Devices and Countermeasures - Understanding Attack vectors, Overview of various Mobile Malwares, Network Attacks, Mobile malware defenses: Advantages and disadvantages.

Text Books:

1. John R. Vacca, "Computer and Information Security Handbook (The Morgan Kaufmann Series in Computer Security)", Morgan Kaufmann (7 July 2009).
2. Himanshu Dwivedi, "Mobile Application Security", 1st Edition, Mc Graw Hill Education, February 5, 2010.
3. Jim Doherty, "Wireless and Mobile Device Security", 1st Edition, Jones and Barlett Publication, 2014.

Reference Books:

1. Timothy Speed, Darla Nykamp, Mary Heiser, Joseph Anderson, Jaya Nampalli, "Mobile Security: How to Secure, Privatize, and Recover your devices", reprint edition, Packt Publication, 2013.
2. Stephen Fried, "Mobile Device Security: A comprehensive guide to securing your Information in a Moving World", Illustrated edition, Taylor & Francis Publication, 2010.

SBS 6: Quantitative Aptitude
(Hours : 02 Credits : 02)

- UNIT-I :** Numbers - HCF & LCM of numbers – Decimal Fractions
UNIT-II : Square roots and Cube roots- Average – Problems on ages.
UNIT-III : Percentage – Profit and Loss – Ratio and Proportion.
UNIT-IV : Time and Work – Time and Distance.
UNIT-V : Simple Interest – Compound Interest.

Text Book:

Quantitative Aptitude, R.S. Aggarwal, S. Chand & Company Ltd, New Delhi, Reprint 2011.

Unit I	: Page nos. 3-29, 30-45, 46-66
Unit II	: Page nos. 117-138, 139-160, 182-194
Unit III	: Page nos. 208-250, 251-293, 294-310
Unit IV	: Page nos. 341-370, 384-404
Unit V	: Page nos. 445-465, 466-486

Reference Books:

1. Quantitative Aptitude and reasoning, R.V. Praveen, PHI Learning, 2nd Edition 2013.
2. Magical book on Quicker Maths, M.Tyra, BSC Publishing Co. Pvt.Ltd, Delhi. Reprint, 2011.
3. Quantitative Aptitude for Competitive Exams, Abhijit Guha, 4th Edition, Tata Mc Graw Hill Company, New Delhi.

NME-2: Introduction to Internet
(Hours : 02 Credits : 02)

UNIT-I : Introduction to internet: Internet- Growth of Internet and ARPA Net - Owners of the Internet -Anatomy of Internet – History of WWW - Basic Internet Terminologies – Net etiquette - Internet Applications - Commerce on the Internet – Governance on the Internet - Impact of Internet on Society. **TCP/IP Internet Technology and Protocols:** Packet Switching Technology - Internet Protocols - TCP/IP – Router - Internet Addressing Scheme- Machine Addressing - E-mail Addresses – Resource Addresses.

UNIT-II : Interconnectivity: Connectivity types - Setting up a connection - Hardware requirements-Selection of a modem - Software requirements – Internet accounts by ISP-ISDN- Protocol options-Service options. **Internet Network:** Network Definition-Common terminologies – Node - Host- Workstation -Network Administrator - Network security - Network Components – Servers – Client Server- Communication Media - Types of Networks - Addressing in Internet – DNS - Network topologies – Ethernet – FDDI - ATM.

UNIT-III : Browsers and Search engines: Browsers - What is a browser - Parts of a browser window -Running a browser - working with a Browser. **Search Engines;** What is search engine ? - Types of search engines - Search and meta search engines.

UNIT-IV: E-mail : E-mail Networks and Servers - E-mail Protocols - Structure of E-mail - Attachments - E- mail Clients - E-mail Clients - web based E-mail-Address book - Signature File.

UNIT-V : HTML Programming Basics: Introduction to HTML - HTML browsers - Different versions of HTML-HTML tags - Document overview - Header elements - Section headings - Block headings - Lists-Inline elements - Images - working with Tables, Forms, Frames.

Text book:

Internet Technology and Web design, Ramesh Bangia, Firewall Media, (An imprint of Lakshmi Publications Pvt. Ltd.), Third Edition, 2011.

Unit I	:	Chapters 1 and 2
Unit II	:	Chapters 3 and 4
Unit III	:	Chapter 5(5.6), Chapter 8(8.11 &8.13)
Unit IV	:	Chapter 5 (5.1) & Chapter 6
Unit V	:	Chapter 9

Reference Books:

1. The Internet Book, Douglas E. Comer, Fourth Edition, PHI Learning Pvt. Ltd., New Delhi, 2009.
2. Using the Internet the Easy Way, Young Kai Seng, Minerva Publications, First Edition, 2000.
3. Fundamentals of Information Technology By Alexis Leon and Mathews Leon, Vikas Publishing House Pvt. Ltd., Revised Edition.
