Mahatma Gandhi University
Priyadarshini Hills P.O.Kottayam, Kerala, India

Bachelor of Science in Cyber Forensics

Prepared By

Expert Committee in Cyber Forensics
Faculty of Technology and Applied Sciences
May 2019
(2019 Admissions Onwards)

B. Sc. Cyber Forensics

1. About the Programme

This innovative programme is designed to create graduates specialised in Cyber Forensics having expert, technical and legal knowledge.Those who undergo this programme will be able to make a major contribution to information security and computer forensics investigation. IT professionals involved in this work need an understanding of information security and network security measures, intrusion prevention and detection, and forensic analysis of compromised systems. They also need to be skilled to accurately report, orally and in writing to colleagues and others with in the criminal investigation teams and to the courts of law.This programme offers knowledge of cyber law, investigation, analysis of digital data and how various security measures can be implemented exclusive to hacking.

2. Objectives

The BSc Cyber Forensics Programme is designed with the following specific objectives.

   i)   This innovative programme is designed to create well trained and skilled graduates specialising in Cyber Forensics.

   ii)   The programme aims to developIT professionals skilled in information/network security and forensic analysis of compromised systems and who are efficient in documentation pertaining to cyber forensic analysis to be provided to the courts of law.

   iii)   In future these experts will be an asset to this country for serving in the fields of information security and digital forensics.

3. Admission

The eligibility for admission to BSc Cyber Forensics Degree under Mahatma Gandhi University is a pass in Plus Two with Mathermatics as one of the optionals, anda minimum of 50%marks in Mathematics and an aggregate of 50% for the other optional subjects.

4. Duration of Programme

The programme shall normally extend over a period of three academic years consisting of six semesters.

B Sc CYBER FORENSICS (2019 Admission)

CONSOLIDATED SCHEME

Sem	Title with Course Code	Course Category	Hrs per week	Credits	Marks		
					Intl	Extl	Total
I	EN1CCT01 Fine-Tune Your English	Common	5	4	20	80	100
	MM1CMT03 Discrete Mathematics 1	Complementary	4	4	20	80	100
	CF1CRT01 Computer Organization	Core	4	4	20	80	100
	CF1CRT02 Introduction to Programming	Core	4	3	20	80	100
	EL1CMT06 Fundamentals of Digital Systems	Complementary	4	4	20	80	100
	CF1CRP01 Software Lab 1	Core	**4**	2	20	80	100
		Total	**25**	**21**			**600**
II	EN2CCT03 Issues that Matter	Common	5	4	20	80	100
	MM2CMT03 Discrete Mathematics 2	Complementary	4	4	20	80	100
	CF2CRT03 Introduction to Cyber Forensics & Cyber Laws	Core	4	4	20	80	100
	CF2CRT04 Data Structures using C++	Core	4	3	20	80	100
	EL2CMT07 Data Communication	Complementary	4	4	20	80	100
	CF2CRP02 Software Lab 2	Core	**4**	2	20	80	100
		Total	**25**	**21**			**600**
III	CF3CRT05 Operating Systems and System Software	Core	4	4	20	80	100
	CF3CRT06 Computer Networks and Network Security	Core	4	3	20	80	100
	CF3CRT07 Biometric Security	Core	4	4	20	80	100
	CF3CRT08 Microprocessors	Core	4	4	20	80	100
	CF3CRT09 Linux and Java Programming	Core	4	3	20	80	100
	CF3CRP03 Software Lab 3 and Security Lab 1	Core	**5**	2	20	80	100
		Total	**25**	**20**			**600**

	MM4CMT03 Operations Research	**Compleme ntary**	4	4	20	80	100
IV	CF4CRT10 Database Management Systems and Security	**Core**	4	3	20	80	100
	CF4CRT11 Software Engineering	**Core**	4	4	20	80	100
	CF4CRT12 Applied Cryptography	**Core**	4	4	20	80	100
	CF4CRP04 Software Lab 4	**Core**	5	2	20	80	100
	CF4CRP05 Security Lab 2	**Core**	**4**	2	20	80	100
		Total	**25**	**19**			**600**
V	CF5CRT13 Programming in Python	**Core**	4	3	20	80	100
	CF5CRT14 Web Programming using .net	**Core**	4	3	20	80	100
	CF5CRT15 Preserving and Recovering Digital Evidence	**Core**	4	4	20	80	100
	CF5CRT16 Environmental Studies and Human Rights	**Core**	4	4	20	80	100
	OPEN COURSE	**Core**	**4**	3	20	80	100
	CF5CRP06 Mini Project using Python	**Core**	**5**	2	20	80	100
		Total	**25**	**19**			**600**
VI	CF6CRT17 Ethical Hacking And Digital Forensics	**Core**	5	4	20	80	100
	CF6CRT18 Mobile and Wireless Security	**Core**	5	4	20	80	100
	CF6CBT0* Elective	**Core**	5	4	20	80	100
	CF6SMP07 Seminar	**Core**	**2**	2	100	0	100
	CF6PRP08 Project	**Core**	**8**	5	20	80	100
	CF6VVP01 Viva-Voce	**Core**		1		100	100
		Total	**25**	**20**			**600**
Grand Total				**120**			**3600**

Electives

CF6CBT01 Security Threats & Vulnerabilities
CF6CBT02 Information Security, Management and Standards
CF6CBT03 Multimedia Security
CF6CBT04 Digital Image Processing

Open Courses

CF5OPT01 Computer Security
CF5OPT02 Computer Forensics

SEMESTER 1

EN1CCT01 FINE-TUNE YOURENGLISH

Theory: 5 hrs per Week

Credits: 4

SECTION A: The Sentence and its Structure

CHAPTER ONE: How to Write Effective Sentences

CHAPTER TWO: Phrases—What are They?

CHAPTER THREE: The Noun Clauses

CHAPTER FOUR: The Adverb Clause

CHAPTER FIVE: "If All the Trees Were Bread and Cheese"

CHAPTER SIX: The Relative Clause

CHAPTER SEVEN: How Clauses are Conjoined

SECTIONB:Word-Classes and Related Topics

CHAPTER EIGHT: Understanding the Verb

CHAPTER NINE: Understanding Auxiliary Verbs

CHAPTER TEN: Understanding Adverbs

CHAPTER ELEVEN: Understanding Pronouns

CHAPTER TWELVE: The Reflexive Pronoun

CHAPTER THIRTEEN: The Articles I

CHAPTER FOURTEEN: The Articles II

CHAPTER FIFTEEN: The Adjective

CHAPTER SIXTEEN: Phrasal Verbs

CHAPTER SEVENTEEN: Mind your Prepositions

SECTIONC: To Erris Human

CHAPTER EIGHTEEN: Concord

CHAPTER TWENTY: Errors, Common and Uncommon

CHAPTER TWENTY-ONE: False Witnesses

SECTION D: The World of Words

CHAPTER THIRTY-TWO: Word Formation

CHAPTER THIRTY-THREE: Using the Specific Word

CHAPTER THIRTY-SEVEN: Body Vocabulary

SECTION G:Tense and RelatedTopics

CHAPTER FORTY-SEVEN: 'Presentness' and Present Tenses

CHAPTER FORTY-EIGHT: The 'Presentness' of a Past Action

CHAPTER FORTY-NINE: Futurity in English

CHAPTER FIFTY: Passivisation

SECTIONH: Idiomatic Language

CHAPTER FIFTY-ONE: 'Animal' Expressions

CHAPTER FIFTY-TWO: Idiomatic Phrases

SECTION I: Interrogatives and Negatives

CHAPTER FIFTY-FIVE: Negatives

CHAPTER FIFTY-SIX: How to Frame Questions

CHAPTER FIFTY-SEVEN: What's What?

CHAPTER FIFTY-EIGHT: The Question Tag

SECTION J:ConversationalEnglish

CHAPTER SIXTY-TWO: Is John There Please?

SECTIONK:Miscellaneous and General Topics

CHAPTER SEVENTY-THREE: Letter Writing

In addition there will be an essay question on a general topic.

CoreText: *Fine-tuneYourEnglish*byDrMathewJoseph.OrientBlackswanand Mahatma Gandhi University

MM1CMT03 DISCRETE MATHEMATICS 1

Theory: 4 hours per week

Credits: 4

Module 1: Logic

Propositional Logic, Propositional Equivalence, Predicates and Quantifiers and Rules of Inference

Chapter 1 (Sections 1.1, 1.2, 1.3 and 1.5only)

Module II: Basic Structures

Sets, Set Operations, Functions, Sequences and Summations

Chapter 2 (Sections 2.1, 2.2, 2.3 and 2.4)

Module III: Number Theory and Cryptosystem

The Integers and Division, Primes and Greatest Common Divisors, Applications of Number Theory.

Chapter 3 (Sections 3.4, 3.5 and 3.7 Only)

Module IV: Relations

Relations and Their Properties, Representing Relations, Equivalence Relations, Partial Orderings.

Chapter 7 (Sections 7.1, 7.3, 7.5 and 7.6)

References

1. Kenneth H Rosen ; Discrete Mathematics And Its Applications ; 6th Edition ; Tata McGraw-Hill Publishing Company Limited

1. Clifford Stien, Robert L Drysdale, KennethBogart ; Discrete Mathematics for Computer Scientists; Pearson Education; Dorling Kindersley India Pvt. Ltd

2. Kenneth A Ross; Charles R.B. Wright ; Discrete Mathematics; Pearson Education; Dorling Kindersley India Pvt.Ltd

3. Ralph P. Grimaldi, B.V.Ramana; Discrete And Combinatorial Mathematics ; Pearson Education; Dorling Kindersley India Pvt. Ltd

4. Richard Johnsonbaugh; Discrete Mathematics; Pearson Education; Dorling Kindersley India Pvt.Ltd

5. Winfried Karl Grassman, Jean-Paul Tremblay; Logic And Discrete Mathematics A

Computer Science Perspective ; Pearson Education; Dorling Kindersley India Pvt. Ltd

CF1CRT01COMPUTER ORGANIZATION

Theory: 4 Hrs per week

Credits: 4

Module I
Introduction: Parts of Computer System- Hardware, Software, Data, Users, Different types of computers, Computer Languages - Machine , Assembly Language andHigher Level languages - 3GL, 4GL, 5GL, Input Devices - Key Board, Mouse, Variants of Mouse, Hand held devices, Optical Input devices. Output Devices: Monitors, Sound Systems, and Printers. Types of Storage Devices - Magnetic Storage Devices,Data storage and organization on a Magnetic Disk, Diskettes - Hard Disks- Tape drives- Optical Storage devices ,Solid state storage devices.

Module II

Functional units, Basic operational concepts, Bus structures, numbers, arithmetic operations and characters, memory locations, and address, memory operations, instruction execution and straight line sequencing, branching, control codes, addressing modes.

Module III

The memory system: basic concepts, Read Only Memories-. ROM,PROM, EPROM, EEPROM, Flash memory,RAM-SRAM,DRAM, Cache memories. Arithmetic unit: addition and subtraction of signed numbers, addition/subtraction logic unit, design of fast adders, multiplication of positive numbers, signed operand multiplication, Booth algorithm. Fast multiplication, bit pair recording of multiplication, carry save addition of summands, integer division.

Module IV

Processing unit: Fundamental concepts, register transfers, performing an arithmetic or logic operations, fetching a word in memory, execution of a complete instruction, branch instruction, hardwired control.

Module V

Input/Output organization: accessing I/O devices, Interrupts- enabling and disabling interrupts, Direct memory access, bus arbitration.

References

1. Introduction to Computers,Peter Norton, Sixth Edition, 2008,Tata McGraw Hill

 2 Computer Organisation-HamacherVranesicZaky, Fith Edition,2011, Tata McGraw-Hill
 3. Computer Fundamentals , P K Sinha&PritiSinha, Fourth Edition, Reprint 2018,BPB Publications

 4. Introduction to Computer Science, Fouth impression, 2009, ITL Education Solutions limited.

 5. Structured Computer Organisation, Andrew s Tannenbaum, Sixth edition, 2016, Pearson

 6. Computer Organisation and Architecture, William Stallings, Seventh edition, Fourth impression 2009, Pearson education.

CF1CRT02 INTRODUCTION TO PROGRAMMING

Theory: 4 hrs. Per week

Credits: 3

Module I

Introduction to programming, Classification of computer languages, Language translators (Assembler, Compiler, Interpreter), Linker, Characteristics of a good programming language, Factors for selecting a language, Subprogram, Purpose of program planning, Algorithm, Flowchart, Pseudo code, Control structures (sequence, selection, Iteration), Testing and debugging. Procedure Oriented Programming- Object Oriented Programming- A simple C++ program- Structure of C++ program- Tokens- Data types- variables- Symbolic constants-Reference by variables-Operators in C++- Operator precedence- Control structures- Arrays.

Module II

Classes and Objects :Function in C++ - The main function, Function prototyping- Call by value-Call by reference- Return by reference. Basic concepts of object-oriented programming- Benefits of OOP- Applications of OOP. Specifying a class- Defining member functions-Private member functions- Arrays within a class - Memory allocation for objects-Static data members -Static member functions -Arrays of objects -Friendly functions.

Module III

Constructors- Default constructor-Parameterized constructor-Copy constructor- Multiple constructors-Constructors with default arguments- Dynamic constructor-Destructors- Operator overloading- Unary and Binary operator overloading- Overloading using friends- Rules for overloading- Type conversion.

Module IV

Inheritance- Defining derived classes-Visibility modes-Single, Multilevel, Multiple, Hierarchical and Hybrid inheritance- Virtual base classes- Abstract classes- Constructors in derived classes.

Module V

Pointers- Pointers to objects- this pointer-Pointers to derived classes- Virtual functions- Pure virtual functions-Opening and closing a file- File opening modes- File pointers and their manipulations- Sequential input and output operations.

References

1. Object oriented Programming with ANSI & Turbo C++,Ashok N. Kamthane,First Edition, 2011, Pearson India.

2. Computer Fundamentals,P K Sinha&PritiSinha, Reprint 2018, BPB Publications.

3. Object Oriented Programming with C++,E. Balagurusamy , Fifth edition, Tata McGraw Education Hill, 2011.

4. Programming in C,Ashok Kamthane Third Edition, 2015, Pearson Education.

5. Object Oriented Programming in Turbo C++,Robert Lafore,1991, First Edition, Galgotia Publications.

6.Programming with C++,D Ravichandran, Second edition, 2002, Tata McGraw- Hill.

EL1CMT06FUNDAMENTALS OF DIGITAL SYSTEMS

Theory: 4 hrs. per week

Credits: 4

Unit I

Number Systems, Operations and Codes, Decimal Numbers, Binary Numbers, Decimal to Binary Conversion, Binary Arithmetic,1's and 2's complement of binary numbers, Signed numbers, Arithmetic operations with signed numbers,

Hexadecimal numbers, Binary to hexadecimal conversion, Hexadecimal to binary conversion, Hexadecimal to decimal conversion, Decimal to Hexadecimal conversion, Hexadecimal addition and subtraction, Octal numbers, Octal to decimal conversion, Decimal to Octal conversion, Octal to binary conversion, Binary to Octal conversion, Binary coded decimal, 8421 BCD code, BCD addition, Digital codes- gray code, binary to gray code conversion, Alphanumeric codes, parity codes.

Unit II

Logic Gates, Logic Levels and Waveforms, Logic Levels and Digital waveforms, Logic Gates: AND, OR, NOT, XOR, XNOR, NAND (Definition, Symbols, Truth Tables and Operation). Universal Property of NAND and NOR gates. Logic gate operations with pulse waveforms.

Unit III

Boolean Algebra and Logic Simplifications. Boolean operations and expressions, Laws and rules of Boolean algebra, De-morgans theorems, Boolean analysis of logic circuits, simplification using Boolean algebra, standard forms of Boolean expression, Boolean expressions and truth tables. The Karnaugh Map, Karnaugh SOP minimization, Karnaugh POS minimization, Five variable Karnaugh maps.

Unit IV

Combinational Logic and its functions, Basic combinational Logic circuits, Implementing combinational logic, combinational logic using NAND and NOR gates, Basic overview of logic functions, Basic adders, parallel binary adders, comparators, decoders, encoders, code converters, multiplexers, demultiplexers, parity generators/ checkers.

Unit V

Sequential Circuits, Latches, RS flip flop using NAND/ NOR gates, Clocked RS, D, JK and T flip flops, Edge triggered flip flops, Master slave flip flops, Asynchronous counter operation, Synchronous counter operations, Up/ Down Synchronous counter, Design of synchronous counters. Basic shift register functions. Serial in-Parallel out shift registers, Parallel in -Serial out shift registers, Serial in- Serial out shift registers, Parallel in Parallel out shift registers.

References

1. Floyd and Jain- Digital Fundamentals, Eighth Edition, Pearson Education.

2 .A P Malvino and D P Leach - Digital Principles and Applications, Fourth edition, Tata McGraw Hill Publishers, co Ltd.

CF1CRP01 SOFTWARE LAB I

Practical: 4 hrs. Per week

Credits: 2

Programming using C & C++(1 to 3 must be performed in both C and C++)

1. Programs to familiarize input and output.

2. Programs Based on Decision statements, break, goto, continue, switch and Loop controls statements.

3. Programs based on functions, Call by value, Call by reference, Recursion.

4. Programs Based on One dimensional and two dimensional arrays.

5. Programs based on array of objects, friend functions, passing objects as arguments to function, function overloading.

6. Programs based on operator overloading (binary, unary) using member functions and friend functions.

7. Programs based on constructors, different types of constructors.

8.Programs based on inheritance, different types of inheritance.

9. Programs based on pointers

Scheme of Evaluation for ExternalExam (80 Marks)

Division of Marks (Practical -3 hours External Exam)
1**. First program (simple)**   -25 marks
a. Flowchart/ Algorithm -5 marks
b. Logic –10 marks
c. Successful compilation–5 marks
d. Result –5 marks

2**. Second program should be based on advanced concepts   - 35marks**
a. Flowchart and class diagram -10 marks
b. Logic –15 marks
c. Successful compilation–5 marks
d. Result –5 marks

3. Viva Voce   -10 marks
4. Lab Record (minimum of 25 Programs)   -10 marks
Total   - 80Marks

EN2CC03ISSUES THAT MATTER

Theory: 5 hrs per Week

Credits: 4

Module 1

1. The Unsurrendered People - Kenzaburo Oe

2. The Old Prison – Judith Wright

3. War– Luigi Pirandello

Module 2

4. Persuasions on the Power of the Word - Salman Rushdie Peril - Toni Morrison

5. The Burning of the Books- Bertolt Brecht

6. The Censors - Luisa Valenzuela

Module 3

7. "The Poisoned Bread" – Bandhumadhav.*AWestwardTrip-ZitkalaSa*

9. "The Pot Maker" – TemsulaAo

Module 4

10. Does it Matter – Richard Leaky

11. On Killing A Tree - Gieve Patel

12. Hagar: A Story of a Woman and Water (Gift in Green [chapter 2]) – Sarah Joseph

Module5

13. Understanding Refugeeism: An Introduction to Tibetan Refugees in India

14 Refugee Blues – W. H. Auden

15. The Child Goes to the Camp(from Palestine's Children)–GhassanKanafani

CoreText:ISSUESTHATMATTER

MM2CMT03DISCRETE MATHEMATICS 2

Theory: 4 hrs per Week

Credits: 4

Module I: Graphs

Graphs and Graph Models, Graph Terminology and Special types of Graphs, Representing Graphs and Graph Isomorphism, Connectivity, Euler and Hamilton Paths.

Text 1 Chapter 8 (Sections 8.1, 8.2, 8.3, 8.4 and 8.5 only)

Module II: Trees

Introduction to Trees, Application of Trees, Tree Traversal, and Spanning Trees.

Text 1 Chapter 9 (Sections 9.1, 9.2, 9.3 and 9.4 only)

Module III: Boolean Algebra

Boolean Function, Representing Boolean Functions and Logic Gates

Text 1 Chapter 10 (Sections 10.1, 10.2 and 10.3 only)

Module IV: Matrices

Definitions and examples of Symmetric, Skew-symmetric, Conjugate, Hermitian, Skewhermitian matrices. Rank of Matrix , Determination of rank by Row Canonical form and Normal form , Linear Equations, Solution of non homogenous equations using Augmented matrix and by Cramers Rule , Homogenous Equations, Characteristic Equation, Characteristic roots and Characteristic vectors of matix , Cayley Hamilton theorem and applications.

Text 2. Relevant Sections of Chapters 2, 5 , 10 , 19 and 23 (Proofs of all Theorems in Module IV are Excluded)

References

1. Clifford Stien, Robert L Drysdale, KennethBogart ; Discrete Mathematics for Computer Scientists; Pearson Education; Dorling Kindersley India Pvt. Ltd

2. Kenneth A Ross; Charles R.B. Wright ; Discrete Mathematics; Pearson Education; Dorling Kindersley India Pvt.Ltd

3. Ralph P. Grimaldi, B.V.Ramana; Discrete And Combinatorial Mathematics ; Pearson Education; Dorling Kindersley India Pvt. Ltd

4. Richard Johnsonbaugh; Discrete Mathematics; Pearson Education; Dorling Kindersley India Pvt.Ltd

5. Winfried Karl Grassman, Jean-Paul Tremblay; Logic And Discrete Mathematics A Computer Science Perspective ; Pearson Education; Dorling Kindersley India Pvt. Ltd

CF2CRT03INTRODUCTION TO CYBER FORENSICS& CYBER LAWS

Theory: 4 hrs per Week

Credits: 4

Module I

Introduction to Cyber forensics: Information Security Investigations, Corporate Cyber Forensics, Scientific method in forensic analysis, investigating large scale Data breach cases. Analyzing malicious software. Types of Computer Forensics Technology, Types of Military Computer Forensic Technology, Types of Law Enforcement: Computer Forensic Technology, Types of Business Computer Forensic Technology, Specialized Forensics Techniques, Hidden Data and How to Find It, Spyware and Adware, Encryption Methods and Vulnerabilities, Protecting Data from Being Compromised Internet Tracing Methods, Security and Wireless Technologies, Avoiding Pitfalls with Firewalls Biometric Security Systems

Module II

Types of Computer Forensics Systems: Internet Security Systems, Intrusion Detection Systems, Firewall Security Systems, Storage Area Network Security Systems, Network Disaster Recovery Systems, Public Key Infrastructure Systems, Wireless Network Security Systems, Satellite Encryption Security Systems, Instant Messaging (IM) Security Systems, Net Privacy Systems, Identity Management Security Systems, Identity Theft, Biometric Security Systems ,Router Forensics. Cyber forensics tools and case studies. Ethical Hacking: Essential Terminology, Windows Hacking, Malware, Scanning, Cracking.

Module III

Evidence Collection and Data Seizure: Why Collect Evidence, Collection Options Obstacles, Types of Evidence, The Rules of Evidence, Volatile Evidence, General Procedure, Collection and Archiving, Methods of Collection, Controlling Contamination: The Chain of Custody, Reconstructing the Attack, The digital crime scene, Investigating Cybercrime, Investigating Web attacks, Investigating network Traffic ,Identification of Data: Timekeeping, Forensic Identification and Analysis of Technical Surveillance Devices, Reconstructing Past Events.

Module IV
Basic of law, Understanding cyber space, Defining cyber law, Scope and jurisprudence , Concept of jurisprudence, Overview of Indian legal system, Introduction to IT Act 2000, Amendment in IT Act.

Module V

Cyber Crimes – Types of cyber crimes –against individuals institution, and states-various offenses and punishments, digital signature-concepts of public key and private key, certification authorities and their role, creation and authentication of digital signature. E-contracting –salient features of E-contracts, formation of E-contracts and types, E-governance, E-governance models, E-commerce- salient features and advantages.

References
1. Computer Forensics: Computer Crime Scene Investigation, 2nd Edition,John R. Vacca, Charles River Media, 2005
2. Cyber Forensics - Concepts and Approaches, Ravi Kumar & B Jain,2006, icfai university press
3. Understanding Cryptography: A Textbook for Students and Practitioners,ChristofPaar, Jan Pelzl, 2010, Second Edition, Springer's.
4. Live Hacking: The Ultimate Guide to Hacking Techniques & Countermeasures for Ethical Hackers & IT Security Experts, Ali Jahangiri,First edition, 2009
5. Computer Forensics: Investigating Network Intrusions and Cyber Crime (Ec-Council Press Series: Computer Forensics), 2010
6. "Internet Complete Reference, Harley Hahn, second Edition, 1996, Osborne/McGraw-Hill
7. Internet and Web design, , Ramesh Bangia Firewall Media, (An imprint of Lakshmi Publications Pvt. Ltd.). Second Edition 2006.
8. Cyber Law Crimes, Barkhs and U. Rama Mohan, Third Edition ,2017,Asia Law House
9. Cyber Laws Simplified,ViveekSood, Fourth reprint 2008,McGraw Hill.

CF2CRT04 DATA STRUCTURES USING C++

Theory: 4 hrs per Week

Credits: 4

Module I

Introduction to Data Structures , Basic Terminology, Data Structure Operations; Algorithm: Definition, Algorithm Analysis, Complexity, Asymptotic Notation, Recursion. Array: Introduction, Linear Arrays, Representation of Linear Arrays in Memory, operations; Multidimensional Arrays.

Module II

Stack: Introduction, Array Representation and Basic Operations; Implementation of Stacks. Application of Stacks, Evaluating Arithmetic Expression using Stacks, Infix to Postfix Notation, Evaluating a Postfix Notation.

Module III

Queue: Introduction, Implementation of Queue, Priority Queue, Dequeue, Linked List: Introduction, Representation of Linked List, operations in Linked List, Doubly and Circular Linked List.

Module IV

Trees - Introduction, Binary Trees, Representation, Traversing and its Algorithms, AVL tree.

Module V

Sorting: Bubble sort, Insertion sort, Selection sort, Heap sort, Quick sort, Merge sort; Comparison of sorting algorithms.Searching: Linear Search, Binary Search; Comparison of searching algorithms.

References

1. Schaum's Outline Series: Theory and Problems of Data Structures-Seymour Lipschutz, 1986, McGraw- Hill.

2. Data Structures and Algorithms in C++, Goodrich Michael T, Second edition, 2016,Wiley.

3. Data structures and Algorithm Analysis in C++, Mark allenWeiss, Third edition, 2007, Pearson Education India.

4. Data Structures, Seymour Lipschutz, Revised First edition, 2014, McGraw Hill Education.

EL2CMT07DATA COMMUNICATION

Theory: 4 hrs per Week

Credits: 4

Module I

Data and Signals

Analog and Digital Data, Analog and Digital Siginals, Periodic and Nonperiodic, Periodic Analog signals, Time and Frequency Domains, Composite Signals, Bandwidth, Digital Signals, Bit Rate, Digital Signal as a Composite Analog Signal, Transmission of Digital and Analog Signals, Transmission Impairment, Attenuation, Distortion, Noise, Data rate limits, Noiseless channel: Nyquist bit rate, Noisy Channel: Shannon Capacity, Simplified Communication &Data Communication models. Data Flow-Simplex, Half Duplex, Full Duplex.

Module II

Transmission Media Guided media, Twisted-pair cable – UTP, STP, Connectors Coaxial Cable, Connectors Fiber-Optic Cable Propagation Modes, Unguided Media - Wireless Transmission – Terrestrial Microwave, Satellite Microwave, Radio Waves. Infrared.

Module III

Digital Transmission Analog to Digital Conversion : Block Diagram of Digital Communication System. Parallel and serial ports Pulse Code Modulation(PCM), Sampling, Sampling Rate, Quantization, Delta modulation, Adaptive Delta Modulation, Transmission modes, Parallel Transmission, Serial Transmission, Asynchronous Transmission, Synchronous Transmission.

Module IV

Analog Transmission Digital to Analog Conversation, Modulation of Digital Data, Bit Rate, Baud Rate, Carrier signal, ASK, FSK, PSK, QAM. Analog to Analog modulation, Amplitude Modulation, Frequency Modulation, and Phase Modulation. Bandwidth Utilization : Multiplexing and Spectrum Spreading : Multiplexing, FDM, WDM, TDM, Synchronous TDM, Digital Siginal Services, Statistical TDM, Spread Spectrum, FHSS, DSSS.

Module V

SwitchingCircuit-Switched Networks, Three Phases, Packet Switching, Datagram Networks, Virtual-Circuitnetworks, Three Phases, Connection Oriented and Connectionless Services.Telephone Network :Major Components, Local Loops, Trunks, Switching Offices, Dial-Up service, Digital Subscriber Line, Cable Networks, Traditional Cable Networks, HFC Network, Cable TV for data transfer.

References

1. BehrouzA.Forouzan - Data Communications and Networking, Fifth Edition, TATA McGraw Hill Education.

2. William Stallings- Data and Computer communications,Eighth Edition, Pearson.

3. WillaimL.Sechwebar- Data Communications, First Edition, Tata McGraw Hill Publishing Co Ltd .

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CF2CRP02 SOFTWARE LAB 2

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Practical: 4 hrs. Per week

Credits: 2

Data structures using C++

1. Stack Implementation

2. Queue Implementation

3. Linked list

4. Sorting

5. Searching

Scheme of Evaluation for External Exam(80 marks)

Logic	-	10 marks
Algorithm	-	10 marks
Program	-	20 marks
Successful compilation	-	10 marks
Result	-	10 marks
Record (Minimum 15 programs)	-	10 marks
Viva	-	10 marks
Total	**-**	**80 marks**

CF3CRT05OPERATING SYSTEMS AND SYSTEM SOFTWARE

Theory: 4hrs per Week

Credits: 4

Module I

Definition- Functions- OS as Resource Manager, Types – Structure- Concept of Batch Processing, Multi-programming, Multi-user systems and Real-time systems, POST Bootstrapping – Kernel

Module II

Process management: process concept, process scheduling, operations on processes, cooperating processes, interprocess communication, communication in client server systems, threads, overview, multithreading models, CPU scheduling, scheduling criteria, CPU scheduling algorithms, process synchronization, critical-section problem semaphores, deadlocks, prevention, avoidance and detection.

Module III

Storage Management: memory management, contiguous memory allocation, paging, segmentation, segmentation with paging, virtual memory, demand paging, page replacement.

I/O hardware ,I/O Software , Disks – Disk Scheduling . File organization ,File system implementation , allocation methods, Security , Protection mechanism

Module IV

General concepts - system software and application software, Assemblers- Design of assembler, Macros and Macroprocessor, Macro definitions& Instructions, Features of macro facility, Nested macros calls.

Module V

Loading, Linking & Relocating- Loading& Linking Schemes- Relocatablity of Programs, Concepts of Binders, Linking Loaders, Overlays, Dynamic Binders, Design of an absolute loader. Compilers – Different phases of compilers

References

1. Operating System Concepts – Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, 8th Revised edition edition, 2008, Wiley.

2. System programming &Operating Systems D.M. Dhammdhere, Second revised edition, reprint 2009. Tata McGraw Hill

3. Operating System- Manick& Donovan, reprint 2008, McGrawHill

4. Operating system –H M Deitel, 2007, Pearson Education

5. System Programming - John J Donovan , 2017, Tata McGraw Hill

CF3CRT06COMPUTER NETWORKS AND NETWORK SECURITY

Theory: 4 hrs per Week

Credits: 4

Module I

Introduction: - Types of Computer Networks, Reference Models - ISO-OSI Reference Model, TCP/IP Reference Model.

Protocol Hierarchies Network layer: Routing Algorithm , ARP,RARP-Transport Layer: Elements of transport protocols, UDP, Segment Structure, TCP ,Service model, TCP Protocol, Application Layer: HTTP, DNS.

Module II

Computer Security Concepts, the OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms, A Model for Network Security. Access Control Models, Chinese Wall, Clark-Wilson, Bell-LaPadula, Non Interference and Role Base Model.

Module III

Symmetric Encryption Principles, Symmetric Block Encryption Algorithms. Public-Key Cryptography Principles, Public-Key Cryptography Algorithms, Digital Signatures. Key Distribution and User Authentication: Symmetric Key Distribution Using Symmetric Encryption, Kerberos, Key Distribution Using Asymmetric Encryption,X.509 Certificates, Public-Key Infrastructure.

Module IV

Transport-Level Security: Web Security Considerations, Secure Socket Layer and Transport Layer Security, Transport Layer Security, HTTPS, Secure Shell (SSH). IP Security: IP Security Overview, IP Security Policy, Encapsulating Security Payload, Combining Security Associations, Internet Key Exchange.

Module V

Electronic Mail Security: Pretty Good Privacy, S/MIME. Intruders: Intruders, Intrusion Detection, Password Management. Firewalls: The Need for Firewalls, Firewall Characteristics, Types of Firewalls, Firewall Basing, Firewall Location and Configurations.

References

1. Network security essentials, William Stallings, fourth edition, 2011 Pearson Education

2.Computer Networks,Andrew S. Tanenbaum, fifth Edition, 2013, Pearson Education India.

3. Data communications and networking, Behrouz A. Forouzan, 2017,McGraw Hill Education.

CF3CRT07 BIOMETRIC SECURITY

Theory: 4 hrs per Week

Credits: 4

Module I

Biometric fundamentals and standards: Definition, Biometrics versus traditional techniques, Characteristics, Key biometric processes: Verification - Identification - Biometric matching, Performance measures in biometric systems, assessingthe privacy risks of biometrics - Designing privacy sympathetic biometric systems, Different biometric standards, and Application properties.

Module II

Physiological Biometric Technologies: Fingerprints ,Technical description, characteristics , Competing technologies ,strengths, weaknesses ,deployment ,Facial scan , Technical description ,characteristics ,weaknesses-deployment ,Iris scan ,Technical description , characteristics, strengths ,weaknesses ,deployment

Module III

Retina vascular pattern, Technical description, characteristics, strengths, weaknesses, Deployment, Hand scan, Technical description, characteristics, strengths, weaknesses deployment, DNA biometrics. Behavioral Biometric Technologies: Handprint Biometrics, DNA Biometrics.

Module IV

Signature and handwriting technology, Technicaldescription, classification, keyboard / keystroke dynamics, Voice, data acquisition, featureextraction, characteristics, strengths, weaknesses, deployment.

Module V

Multi biometrics and multi factor biometrics, two-factor authentication with passwords, tickets and tokens, executive decision, implementation plan.

References

1. "Handbook of Biometrics,Anil K Jain, Patrick Flynn and Arun A Ross,2010, Springer, USA.

2.Biometric Technologies and Verification Systems,John R Vacca,2009.Elsevier, USA

3.Biometrics -Identity verification in a network, Samir Nanavathi, Michel Thieme, and Raj Nanavathi, 1st Edition,2002.Wiley Eastern.

4. Implementing Biometric Security,John Chirillo and Scott Blaul, 1st Edition, 2005, Wiley Eastern Publication..

5.Biometrics for Network Security, John Berger, 1st Edition,2004, Prentice Hall.

CF3CRT08MICROPROCESSORS

Theory: 4 hrs per Week

Credits: 4

Module I

Microprocessor architecture and its operations , microprocessor initiated operations and 8085 bus organization, internal data operations, 8085 registers, externally initiated operations. Memory ,memory map, memory and instructions, peripheral mapped I/O. 8085 microprocessor and its architecture.

Module II

8086 Internal architecture. Basic 8086 microcomputer system :system overview, 8086 bus, Read machine cycle, Write machine cycle. Assembly language programming ,program development steps, 8086 instructions ,data transfer instructions, arithmetic instructions, bit manipulation instructions, string instructions, program execution, Constructing the machine codes for 8086 instructions. Implementing standard program in 8086 - unconditional jump instructions, condition flags, conditional jump instructions, If-then, If-then else, and multiple if-then-else , while-do , repeat-until , loop instructions, instruction timing and delay loops.

Module III

Strings, Procedures and Macros , 8086 string instructions, writing and using procedures, CALL and RET instructions, stack, using PUSH and POP to save register contents, passing parameters, reentrant and recursive procedures, writing and using macros.

Module IV

8086 interrupts , program examples, interrupt Types, 8254 software ,programmable TIMER/ COUNTER , basic 8253 and 8254 operations, 8255A, 8259A Priority interrupt controller. Direct Memory Access data transfer – circuit connections and operations of the Intel 8257 DMA controller, DMA transfer timing diagram.

Module V

Intel 80286 microprocessor: architecture, signals and system connections, Real address mode operation, protected mode operation. Intel 80386 32-bit microprocessor :architecture, pins and signals. Introduction to 80486 microprocessor. Introduction to RISC machines.

References

1. Microprocessors and Interfacing , Programming and Hardware, Douglas V- Hall, Second revised edition, 1992, Tata McGraw-Hill. .

2. Microprocessor 8086 programming &interfacing ,A.nagoorKani. RBA publications.

4. The Intel microprocessors : 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, and Pentium Pro processor : architecture, programming, and interfacing / Barry B. Brey. Brey, Barry B, Fouth edition,1997, Prentice Hall.

CF3CRT09LINUX AND JAVA PROGRAMMING
Module I

Overview of Linux: Architecture of Linux, features, advantages, Booting process, kernel, Shell Types, Shell variables, Linux file system, simple commands- echo, date, cal, etc. Commands for files and directories- mkdir, cd, pwd, ls, rmdir, mv, cp, rm, more, less. Creating and viewing file using cat. File permissions chmod- filters—head, tail, cut, paste, sort, uniq, grep, pipe,tr, tee-Communication &Scheduling commands- mail, wall, write, talk, at, cron, crontab.

Module II

System Administration: Creating and deleting users-mounting file systems - mount, umount-changing passwords- passwd. Network administration – netstat, ping, ifconfig, traceroute-remote login-telnet, ssh, file transfer-ftp. Process related commands- ps, kill, nice, time- archiving- tar,

gzip, Installation of packages using rpm command- Understanding various servers- DHCP, DNS, Apache, squid.

Module III

Brief History of Java, Feature of Java, JDK, Data Types, Operators, Control Structures in JAVA, Arrays, Defining a Class, Fields declaration, Method declaration, Creating object, Accessing class members, method overloading, visibility control, Constructors, constructor overloading, super keyword, static members, Inheritance, Overriding Methods, Dynamic Method Dispatch, final(variables, methods and classes), Abstract Methods, Interfaces, Packages.

Module IV

Exception Handling- Try- Catch Statement, Catching more than one Exception, The Finally Clause.

Multi-threading- Creation of multithreaded program- Thread class- Runnable interface, thread life cycle. File class, Java I/O Packages- FileStream classes, DataStream classes.

Module V

Applet Fundamentals -applet tag, applet life cycle, passing parameters to applets. Working with graphics - Line, Rectangle, Oval, Arc, Color setting. Loading and Viewing Images, Loading and Playing Sound,

AWT and Event Handling- Delegation Event Model -Event Classes- Sources of Events- Event Listeners. Swing- architecture, components of swing- JLabel, JButton, JCheckBox, JRadioButton, JList, JComboBox, JTextField, JText Area, JPanel, JFrame, Layout Managers(Flow Layout, Grid Layout)

References

1. Red Hat Linux Bible, Cristopher Negus,2005, Wiley Dreamtech India.
2. UNIX Shell Programming, YeswantKanethkar, 2003, 1st edition, BPB Publications.
3. A Practical Guide to Linux Commands, Editors, and Shell Programming, Mark G. Sobell,Third edition, 2012, Prentice Hall.
4.The Java Programming Language, Ken Arnold, James Gosling,Fourth Edition, 2005, Addison-Wesley
5. Java Programming Advanced Topics,Joe Wiggles worth, Paula Lumby, Second edition,2000, Course technology.
6. Java How to Program, Deitel&Deitel, tenth edition, 2015, Pearson Education
7. Programming with Java ,E. Balagurusamy, Third Edition, 2007, McGraw Hill Companies.
8. Programming in java2,K. Somasundaram, First Edition, 2005, Jaico Publishing House

CF3CRP03SOFTWARE LAB 3 AND SECURITY LAB 1

Practical: 5hrs per Week

Credits: 2

Software Lab 3 A) - LINUX

1.Linux Installation, Introduction to Linux Booting , login-simple commands, date, cal, echo-commands for files and directories(2 hrs).

2.   Bash- wild card characters - command substitutions, Shell variables , subshells export ,filters- pr, head,tail ,cut,paste,sort, uniq, grep,tr,join,sed,awk , grep-pipe-tee,redirection(<,>,>>,2>)   -editors vi and emacs-Communication and scheduling commands mail ,talk,write,wall,at,cron process related commands- ps, kill, nohup, nice, time archiving tar, gzip, exit status   (10 hrs)

3.   System administration- booting ,,creating users and groups , network administration -net stat, ping , traceroute, ifconfig telnet and ftp, disk related commands, checking disk free spaces, su command (6 hrs)

B) Java Programming using Linux.

Java Programs: using class and read inputs from keyboard, Method Overloading- Method Overriding- inheritance- Interface- package- Exception Handling- File operations- Applet, and swing based Programs- JDBC connection

Scheme of Evaluation for External Eam(40 Marks)

First program - questions from Modules 1 to 2   - 10 marks
Second program should be based on advanced concepts
(questions from modules 3 to 5)   - 15 marks
Viva Voce   - 5 marks
Lab Record (minimum of 20 Programs)   - 10 marks

Security Lab 1

1. Introduction to Computer Forensics: computer crimes, evidence, extraction, preservation, etc.

2. Overview of hardware and operating systems: structure of storage media/devices; windows/Macintosh/ Linux -- registry, boot process, file systems, file metadata.

3. Data recovery: identifying hidden data, Encryption/Decryption, Steganography, recovering deleted files.

4. Digital evidence controls: uncovering attacks that evade detection by Event Viewer, Task Manager, and other Windows GUI tools, data acquisition, disk imaging, recovering swap files, temporary &cache files

5. Computer Forensic tools

Scheme of Evaluation for External Exam (40 Marks)

Record   - 10 marks

Procedure   -10 marks

Usage of tools   - 10 marks

Viva- Voce   - 10 marks

SEMESTER 4

MM4CMT03OPERATIONS RESEARCH

Theory: 4 hrs per Week

Credits: 4

Unit I: Basics of O.R.

The nature and uses of O.R- math concepts and approaches of O.R- models in O.R.

Unit 2: Linear programming problems

Mathematical formulation of a L.P.P., General linear programming problems, solution of a L.P.P,graphical method for solving a L.P.P.

Simplex Method: Stack and surplus variables- reduction of any feasible solution to a basic feasible solution. Unbounded solution. Optimality conditions- artificial variable techniques- Big M method.

Unit 3: Transportation & assignment Problems

Transportation model- solution by simplex method- North West corner rule, lowest cost entry method, vogel method, MODI method, degeneracy, assignment problems.

Unit 4: Game Theory

Two persons zero sum games, pure and mixed strategy with saddle point, solution of pure strategy games, solution of mixed strategy problems by arithmetic method. Principle of dominance.

Reference Books

1.Belly E Gillet – Introduction to Operations Research (A Computer Oriented Arithmetic Approach) (Tata Mc. GrawHill)

2. V.K Kapoor – OperationsResearch

3. KantiSwarup , P.K Gupta and Man Mohan – Operations Research, Sultan Chand &Sons

4. K.V Mital and C. Mohan – Optimization Methods in Operations Research and SystemAnalysis

5. J. K Sharma – Operations Research Theory and Applications , Macmillan

6. B. N. Mishra, B. K. Mishra – OptimizationLinear Programming Ane Books

CF4CRT10 DATABASEMANAGEMENT SYSTEMSAND SECURITY

Theory: 4 hrs per Week

Credits: 3

Module I

Introduction: Characteristics of the Database approach,Problems with file system data management, Data models, Schemas and instances, Database System Architecture, Data Abstraction, Data Independence, Data Definitions and Data Manipulation Languages.

Data models, Entity Relationship (ER), Mapping ER Model to Relational Mode,Weak and strong entity, Enhanced Entity Relationship (EER) and object modeling. specialization and generalization, Network. Relational and Object Oriented Data Models, Integrity Constraints and Data Manipulation Operations.

Module II

Physical Data organization, Hashed files, Indexed files, B- Trees, sequential Organization files. The relational Data model concepts, Relational model constraints ,Relational algebra, Tuple relational calculus, Domain relational calculus, SQL.

Database design, Functional dependencies, Basic definitions, Trivial and non trivial dependencies, Closure of a set of dependencies, closure of a set of attributes ,Irreducible set of dependencies, Non loss decomposition and functional dependencies First, Second and Third Normal forms, Boyce –Codd Normal forms.

Module III

Introduction- Introduction to Databases Security Problems in Databases .Database Integrity and Security Concepts, Domain constraints, Referential Integrity .Introduction to database security concepts, Methods for database security, Discretionary access control method, Mandatory access control and role base access control for multilevel security.Use of views in security enforcement.Overview of encryption technique for security.Statistical db security.

Module IV

Crash Recovery, Failure classification, Recovery concepts, Log base recovery techniques (Deferred and Immediate update), Checkpoints, Recovery with concurrent transactions (Rollback, checkpoints, commit), Database backup and recovery from catastrophic failure. Shadow paging.

Security Models -2 Bell and LaPadula's Model Biba's Model, Dion's Model , The Lattice Model for the Flow Control.

Module V

Security Mechanisms: User Identification/Authentication Memory Protection, Resource Protection, Control Flow Mechanisms Isolation Security .Secure DBMS Design Security

A Model for the Protection of Object Oriented Systems,SORION Model for the Protection of Object-Oriented Databases

References

1. Database system concepts,Silberschatz, H.F Korth , and S Sudarsan,, Fouth Edition, 2002 Tata McGraw Hill.

2. Database Security and Auditing, Hassan A. Afyouni, India Edition,2009 cengageLearning.

3. Database Security, SilvanaCastano, Second edition 1994, Pearson Education.

4. Fundmentals of Database Systems, Elmasri and Navathe, 3/e, 2003 ,Pearson Education,

5. Database systems- Design Implementation and Management, Peter Rob, Carlos Coronel, 10 edition, 2012, Course Technology

6. An Introduction To Database Systems,C.J Date, seventh edition, 2003, Pearson Education.

7. An Introduction to Database Systems,Bipin C. Desai,2001, Galgotia Publications.

CF4CRT11SOFTWARE ENGINEERING

Theory: 4 hrs per Week

Credits: 4

Module I

Introduction to Software Engineering, Definition, Program Vs Software, and Software process, Software Characteristics, Brief introduction about product and process, Software process and product matrices.

Module II

Software life cycle models, Definition, Waterfall model, Increment process models, Evolutionary process models, Selection of a life cycle model.

Module III

Software Requirement Analysis and Specification Requirements Engineering type of requirements, Feasibility Studies, Requirement Elicitation, Various steps for requirement analysis, Requirement documentation, Requirement validation. Project planning-Size estimation, cost estimation, the constructive cost model (COCOMO)

Module IV

Design concept and principles:architectural designs, user interface design

Module V

Software Testing What is testing?, Test, Test case and Test Suit, Verification and Validation, Alpha, beta and acceptance testing, functional testing, Levels of testing ,types of s/w test ,black box testing ,Unit testing, integration testing, validation testing, testing boundary conditions, structural testing , regression testing, system testing and debugging.

References

1. Software Engineering ,Roger S . Pressman, Sixth edition, 2004, TataMcgraw - Hill International Edition.

2. Software Engineering Programs Documentation Operating procedures, K.K. Aggarwal&Yogesh Singh,2003, New Age International Publishers

3. Software engineering,Ian Sommerville, Sixth edition,2001,Pearson education Asia.

CF4CRT12APPLIED CRYPTOGRAPHY

Theory: 4 hrs per Week

Credits: 4

Module I

Foundation, Terminology, Substitution Cipher and Transposition Cipher, Simple XOROne Time Pads, Computer Algorithms, Large Numbers, Cryptographic Protocols, Communication using Symmetric Cryptography, One Way Functions-One Way Hash Function Communications using Public Key Cryptography, Digital Signatures-Digital Signature with Encryption, Random and Pseudo Random Sequence Generation.

Module II

Basic Protocols-Key Exchange, Authentication, Authentication and Key Exchange, Formal Analysis of Authentication and Key Exchange Protocols-Multiple Key Public Key Cryptography, Secret Splitting-Secret Sharing. Intermediate Protocols, Timestamp Services-Sublimal Channel, Undeniable Digital Signature- Proxy Signature, Group Signature

Module III

Advanced Protocols, Zero knowledge proofs, Zero knowledge proofs of identity, Blind Signature, Identity based Public key cryptography-Digital Certified Mail. Esoteric Protocol ,Secure Elections, Secure Multiparty Computation, Anonymous Multiparty Computation-Anonymous Message Broadcast, Digital Cash

Module IV

Cryptographic Techniques, Key length, Key Management, Public Key Cryptography Versus Symmetric Cryptography, Encrypting communication Channel, Encrypting Data for storage-Hardware vs software Encryption. Cryptographic Algorithm, Information Theory, Data Encryption Standard (DES), IDEA, Blowfish.

Module V

One way Hash Function- N Hash- MD4- MD5-MD2- Secure Hash Algorithm(SHA)- Public Key algorithms, Knapsack Algorithm, RSA- Public Key Digital Signature Algorithms- Digital Signature Algorithm(DSA)- DSA Variants- Gost Digital Signature Algorithm, Key Exchange Algorithm- Diffie Hellman – Station to Station Protocol, Encrypted Key Exchange

References

1. Bruce Schneier, "Applied Cryptography: Protocols, Algorithms, and Source Code in C" John Wiley & Sons, Inc, 2nd Edition, 1996.

2. Cryptography and Network Security: Principles and Practice, William Stallings, sixth edition, 2013, Pearson.

CF4CRP04 SOFTWARE LAB 4

DBMS LAB

Practical: 5 hrs per week

Credit: 2

1. DDL, DML, DCL, Key concepts

2. Functions in Sql(Aggregate, Sort, date)

3. Basic plSql program using conditional statements, loop statements.

4. plSql program using function, procedure, trigger.

Scheme of Evaluation for External Exam (80 marks)

- Set 1, 2   - **25 marks**

- Set 3, 4   - **35 marks**
        Logic- 10 marks
        Program- 15 marks
        Result- 10 marks
- Record (minimum 8 plsql programs)   - **10 marks**
- Viva- Voce   - **10 marks**

CF4CRP05 SECURITY LAB 2

Practical: 4 hrs per Week

Credits: 2

1. Windows network commands.

2. Linux network commands.

3. Network analyzing tools.

4. Packet capturing tools.

5. Vulnerability testing tools.

Scheme of Evaluation for ExternalExam(80 marks)

- **Set 1**
  Commands   - **15 marks**
Result   - **5 marks**
- **Set 2**

      Procedure   - **20 marks**
      Tools usage   -**15 marks**
      Result   -**5 marks**
- **Record**   **-20 marks**
      Total   **- 80 Marks**

SEMESTER 5

CF5CRT13 PROGRAMMING IN PYTHON

Theory: 4 hrs per Week

Credits: 3

Module I

Introduction to python: Features, Execution, Viewing the byte code, flavors, PVM, Memory management, garbage collection, comparison between C , python and java.

Data types: Comments, Docstrings, datatypes, variables, built in datatypes, bool, sequences, Sets, literals, Determining the data types of variable, characters, user defined data types, Constance, identifiers and reserved words, naming convention in python.

Module II

Operators in python: operator, arithmetic, Assignment, unary minus, relational, logical, Boolean, bitwise, membership, identity, using precedence and associativity, mathematical functions.

Input and output: Output statements, input statements, command line arguments.

Module III

Control statements: If, a word on indentation, if else, if elif else, while, for, inifinite loop, nested loops, else loop, break statement, continue, pass, assert, return.

Arrays: Advantages of array, creating, importing, indexing, slicing and processing an arrays, types, working with using numpy, creating arrays using(), linespace, logspace, using arnge() function, zeros() and ones() functions, mathematical operations, attributes, working with multidimensional arrays.

Module IV

Strings and characters: Creating string, length, indexing, slicing, repeting, concatenation, checking membership, comparing, removing spaces, finding substrings, counting substrings, replacing string, splitting and joining, changing case, checking starting and ending and formatting the strings.

Functions : Difference between a function and a method, defining and calling a function , returning results, returning multiple values from a function, pass by object reference, formal and actual arguments, positional, keyword, default, variable length arguments, local and global variables, global keyword, passing a group of elements to a function, recursive functions.

Module V

Introduction to OOPS: Problems in procedure oriented approach, specialty of python language, features of oops. Classes and objects: Creating a class, the self variable, constructor, type of variables, name spaces, types of methods, passing members of one class to another class, inner classes.

Inheritance and polymorphism: Constructers in inheritance, overriding, super class, constructors and methods, the super() method, types of inheritance, method resolution order, polymorphism, duck typing philosophy of python, operator overloading, method overloading, method over riding.

References

1. Core python programming, Dr.RnageswaraRao, dreamtech press second edition,

2019.

2. Python Cookbook: Recipes for Mastering Python 3, David Beazley,Brian K. Jones, 3rd Edition, 2013, O'Reilly Media.

3. Violent Python: A Cookbook for Hackers, Forensic Analysts, Penetration Testers and Security Engineers, TJ O'Connor, 2012, Syngress.

CF5CRT14WEB PROGRAMMING USING .NET

Theory: 4 hrs per week

Credits: 4

Module I

Introduction to .NET framework : Introduction, Architecture of .NET framework, Components of .NET framework : CLR, CTS, MSIL, Meta data and Assemblies, .NET Framework Class Library, Benefits of .NET Framework; WF, WCF, WPF.

Module II

Overview of ASP.NET framework, Understanding ASP.NET Controls, Applications, Web servers, installation of IIS, Web forms, web form controls - server controls, client controls, web, forms & HTML, Adding controls to a web form, Buttons, Text Box, Labels, Checkbox, Radio Buttons, List Box, etc, Running a web Application, creating a multiform web project.

Module III

Form Validation: Client side validation, server Side validation, Validation Controls: Required Field Comparison Range. Calendar, control, Ad rotator Control, Internet Explorer Control, State management- View state, Session state, Application state.

Module IV

Architecture of ADO.NET, Connected and Disconnected Database, Create Connection using ADO.NET Object Model, Connection Class, Command Class.

Data Adapter Class, Dataset Class. Display data on, data bound Controls and Data Grid, Database Accessing on web applications: Data Binding concept with, web, creating data grid, Binding standard web server controls, Display data on web form using Data bound controls.

Module V

Writing datasets to XML, Reading datasets with XML, Web services: Introduction, Remote method call using XML, SOAP, web service description language, building & consuming a web, service, Web Application deployment

References

1.   ASP.NET Unleashed, C# programming – Wrox publication

2.   Beginning ASP.NET 4 in C# ,Matthew Macdonald ,2010, Apress

3.   ASP.NET 4 Unleashed ,Stephen Walther , 2010, Sams.

CF5CRT15PRESERVING& RECOVERING DIGITAL EVIDENCE

Theory: 4 hrs per week

Credits: 4

Module I

Digital Investigation: Digital evidence and computer crime ,history and terminals of computer crime investigation ,technology and law ,the investigate process ,investigate reconstruction ,modus operandi, motive and technology ,digital evidence in the court room.

Module II

Computer basics for digital investigators: applying forensic science to computers, forensic examination of windows systems ,forensic examination of unix systems ,forensic examination of macintosh systems, forensic examination of handheld devices.

Module III

Networks: Networks basics for digital investigators, applying forensic science to networks ,digital evidence on physical and datalink layers ,digital evidence on network and transport layers ,digital evidence on the internet.

Module IV

Investigating Computer Crime: Investigating computer intrusions ,investigatingcyberstalking ,digital evidence as alibi.

Module V

Guidelines: Handling the digital crime scene – digital evidence examination guidelines.

References

1. Digital Evidence and Computer Crime Forensic science, Computers and Internet, Eoghan Casey,Second Edition, 2011 ,Elsevier Academic Press.

2. A Electronic Discovery and Digital Evidence in a Nut Shell-Daniel J Capra,Shira A scheindlin,-Third Edition, 2009 The Sedona Conerence-Academic Press.

3.The Best Damn Cybercrime and Digital Forensics Book Perio,Jack Wiles, Anthony Reyes , Jesse Varsalone,2007 Syngress Publishing.

4. Computer Evidence and Computer Crime: Forensic Science, Computers, and the Internet.Casey, Eoghan, 2000 , Cambridge University Press

5. Computer Forensics Computer Crime Scene Investigation,Vacca, John R. ,2002,Charles River Media.

CF5CRT16 ENVIRONMENTAL STUDIES AND HUMAN RIGHTS

Theory: 4 hrs Per week

Credits: 4

Module I

Natural Resources - Renewable and non-renewable resources, Natural resources and associated problems.Forest resources.Water resources.Mineral resources.Food resources.Energy resources. Land resources, Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles. Ecosystems - Concept of an ecosystem. Structure and function of an ecosystem.Producers, consumers and decomposers.Energy flow in the ecosystem.Ecological succession.Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem: - Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

Module II

Biodiversity and its conservation - Introduction – Definition : genetic, species and ecosystem diversity. Biogeographical classification of India. Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity at global, National and local levels.Inida as a mega-diversity nation Hot-sports of biodiversity. Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity.

Module III

Environmental Pollution- Definition ,Cause, effects and control measures of :- Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards, Solid waste Management : Causes, effects and control measures of urban and industrial wastes.Role of an individual in prevention of pollution. Diastermanagement : floods, earthquake, cyclone and landslides.Social Issues and the Environment- From Unsustainable to Sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management, Resettlement and rahabilitation of people; its problems and concerns. Environmental ethics : Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust.Wasteland reclamation. Consumerism and waste products.Environment Protection Act.Air (Prevention and Control of Pollution) Act.Water (Prevention and control of Pollution) Act.Wildlife Protection Act .Forest Conservation Act. Issues involved in enforcement of environmental legislation. Public awareness.Role of Information Technology in Environment and human health.

Module IV

What Is Green Computing,The Straight Scoop on Power,Assessing What You've Got,Giving Your Computer a Green Makeover,Buying a Green Computer,Choosing Earth-Friendly Peripherals,Recycling Your Computer,Greening Mobile Devices,Print Less, Breathe More.

Module V

An Introduction to Human Rights, Meaning, concept and development –History of Human Rights-Different Generations of Human Rights- Universality of Human Rights- Basic International Human Rights Documents - UDHR,ICCPR,ICESCR.-Value dimensions of Human Rights
Human Rights co-ordination within UN system- Role of UN secretariat- The Economic and Social Council- The Commission Human Rights-The Security Council and Human rights- The Committee on the Elimination of Racial Discrimination- The Committee on the Elimination of Discrimination Against Women- the Committee on Economic, Social and Cultural Rights- The Human Rights Committee- Critical Appraisal of UN Human Rights Regime. Human Rights in Indian Constitution – Fundamental Rights- The Constitutional Context of Human Rights- directive Principles of State Policy and Human Rights- Human Rights of Women-children – minorities- Prisoners- Science Technology and Human Rights- National Human Rights Commission- State Human Rights Commission- Human Rights Awareness in Education.

References

1) Textbook for Environmental Studies For Undergraduate Courses of all Branches of Higher Education, ErachBharucha, for University Grants Commission.
2) Green Home Computing for dummies,Woody Leonhard and Katherine Murray,Wiley Publishing,2009.
3) Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
4) BharuchaErach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad – 380 013, India, Email:mapin@icenet.net (R)
5) Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
6) Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)
7) Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumabai, 1196p
8) De A.K., Environmental Chemistry, Wiley Eastern Ltd.
9) Down to Earth, Centre for Science and Environment (R)
10) Gleick, H.P. 1993. Water in crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p
11) Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R)
12) Heywood, V.H &Waston, R.T. 1995. Global Biodiversity Assessment. Cambridge Univ. Press 1140p.
13) Jadhav, H &Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284 p.
14) Mckinney, M.L. & School, R.M. 1996. Environmental Science systems & Solutions, Web enhanced edition. 639p.

15) Mhaskar A.K., Matter Hazardous, Techno-Science Publication (TB)
16) Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB)
17) Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA, 574p
18) Rao M N. &Datta, A.K. 1987. Waste Water treatment. Oxford & IBH Publ. Co. Pvt. Ltd. 345p.
19) Sharma B.K., 2001. Environmental Chemistry. Geol Publ. House, Meerut
20) Survey of the Environment, The Hindu (M)
21) Townsend C., Harper J, and Michael Begon, Essentials of Ecology, Blackwell Science (TB)
22) Basic documents in humanrights- Ian Brownlie
23) Universal human rights in theory and practice- Jack Donelly
24) Future of human rights- UpendraBaxi
25) Understanding human rights an overview- OP Dhimam
26) Reforming human rights- D.P. Khanna
27) Human rights in India Historical and political perspectives- Chiranjivi J Nirmal
28) Human rights in postcolonial India edited by Om PrakashDwivedi and V.G Julie Rajan

CF5CRP06 MINI PROJECT USING PYTHON

Practical: 5 hrs per week

Credit: 2

Set 1. Basic programs demonstrating datatypes, strings, arrays, control statements etc.

Set 2. Demonstration of functions.

Set 3. Demonstration of OOPS concepts.

Scheme of Evaluation for External Exam (80 marks)

- **For Python lab**

Record (Minimum 15 programs)   - 5 marks
     Logic   - 10 mark
     Successful compilation   - 10 mark
Result   - 5 mark

- **For Mini Project**

     Demonstration and Presentation   - 25 marks
     Viva Voce   - 15 marks
Project Report   - 10 marks
     Total   **- 80 marks**

CF6CRT17ETHICAL HACKING AND DIGITAL FORENSICS

Theory: 5Hrs per week

Credits: 4

Module I

Hacking windows,Network hacking, Web hacking ,Password hacking. A study on various attacks, Input validation attacks, SQL injection attacks, Buffer overflow attacks, Privacy attacks.

Module II

TCP / IP:Checksums,IP Spoofing port scanning, DNS Spoofing. Dos attacks: SYN attacks, Smurf attacks, UDP flooding, DDOS Models. Firewalls: Packet filter firewalls, Packet Inspection firewalls :Application Proxy Firewalls. Batch File Programming.

Module III

Fundamentals of Computer Fraud,Threat concepts, Framework for predicting inside attacks, Managing the threat, Strategic Planning Process. Architecture strategies for computer fraud prevention .

Module IV

Protection of Web sites, Intrusion detection system, NIDS, HIDS, Penetrating testing process, Web Services, Reducing transaction risks.

Module V

Key Fraud Indicator selection process customized taxonomies , Key fraud signature selection process, Accounting Forensics ,Computer Forensics , Journaling and it requirements, Standardized logging criteria , Journal risk and control matrix ,Neural networks, Misuse detection and Novelty detection.

References

1. Insider Computer Fraud,Kenneth C.Brancik,2008, Auerbach Publications Taylor & Francis Group,

2. Ethical Hacking,AnkitFadia, Second edition, 2006, Macmillan India Ltd.

Theory: 5 Hrs per week

Credits: 4

Module I

Wireless Fundamentals: Wireless Hardware,Wireless Network Protocols, Wireless Programming WEP Security. Wireless Cellular Technologies,concepts,Wireless reality,Security essentials,Information classification standards, Wireless Threats: Cracking WEP ,Hacking Techniques,Wireless Attacks, Airborne Viruses.

Module II

Standards and Policy Solutions ,Network Solutions ,Software Solutions ,Physical Hardware Security, Wireless Security ,Securing WLAN ,Virtual Private Networks ,Intrusion Detection System ,Wireless Public Key infrastructure. Tools,Auditing tools,Pocket PC hacking, wireless hack walkthrough.

Module III

Security Principles,Authentication, Access control and Authorization, Non-repudiation, privacy and Confidentiality, Integrity and Auditing, Security analysis process. Privacy in Wireless World, Legislation and Policy, Identify targets and roles analysis, Attacks and vulnerabilities ,Analyze mitigations and protection.

Module IV

WLAN Configuration, IEEE 802.11,Physical layer, media access frame format ,systematic exploitation of 802.11b WLAN ,WEP ,WEP Decryption script ,overview of WEP attack , Implementation , Analyses of WEP attacks.

Module V

Global Mobile Satellite Systems; case studies of the IRIDIUM and GLOBALSTAR systems. Wireless Enterprise Networks: Introduction to Virtual Networks, Blue tooth technology, Blue tooth Protocols. Server-side programming in Java, Pervasive web application architecture, Device independent example application

References

1. Wireless Security Essentials: Defending Mobile from Data Piracy, Russel Dean Vines ,First Edition, 2002, John Wiley & Sons,.

2. Maximum Wireless Security, Cyrus, Peikari and Seth Fogie,2002, SAMS Publishing.

3. Wireless and Mobile Networks Architectures,Yi-Bing Lin and Imrich Chlamtac,2001, John Wiley & Sons.

4. Mobile and Personal Communication systems and services, Raj Pandya, 2001, Prentice Hall of India..

5. Wireless Security and Privacy- Best Practices and Design Techniques, Tara M. Swaminathan and Charles R. Eldon, 2002, Addison Wesley.

CF6SMP07SEMINAR

Practical: 2 Hrs per week

Credits: 2

Each student has to choose a latest topic of current day interest in the areas of Computer security / Cyber Forensics and present a seminar using appropriate presentation media. A seminar presentation report in bound form in the pattern of a complete technical report (with contents page, well-structured presentation, references etc.) should be submitted. There will not be any external evaluation for Seminar Presentation.

CF6PRP08PROJECT

Practical: 8 Hrs Per week

Credits: 5

Individual project

The project topic shall be chosen from areas of current day interest using latest packages / languages running on appropriate platforms (Except the tools used in software development-I), so that the student can be trained to meet the requirements of the Industry. A project report should be submitted in hard bound complete in all aspects. For internal evaluation, the progress of the student shall be systematically assessed through various stages of evaluation at periodic intervals.

Project demonstration and Presentation	**40 marks**
Viva related to project	**20 marks**
Project report with proper content and binding	**20 marks**

Total Marks	80marks

<center>**CF6VVP01 VIVA-VOCE**</center>

Marks: 100

Credits: 1

<center>**ELECTIVES**</center>

<center>**CF6CBT01 SECURITY THREATS & VULNERABILITIES**</center>

Theory: 5 hrs per week

Credits: 4

Module I

Threats and Vulnerabilities to Information and Computing Infrastructures: Internal Security Threats, Physical Security Threats, E-Mail Threats and Vulnerabilities, E-Commerce Vulnerabilities, Hacking Techniques in Wired Networks , Hacking Techniques in Wireless Networks

Module II

Wireless Threats and Attacks: Wireless Threats and Attacks, Cracking WEP, Denial of Service Attacks, Network Attacks, Fault Attacks, Side-Channel Attacks.

Module III

Prevention: Cryptographic Privacy Protection Techniques, Cryptographic Hardware Security Modules, Client-Side Security, Server-Side Security ,Protecting Web Sites, Database Security, Access Control: Principles and Solutions, Password Authentication ,Computer and Network Authentication, Antivirus Technology, Biometric Basics and Biometric Authentication.

Module IV

Detection and Recovery: Intrusion Detection Systems Basics, Host-Based Intrusion Detection Systems , Network-Based Intrusion Detection Systems, Use of Agent Technology for Intrusion Detection, Contingency Planning Management, Computer Security Incident Response Teams (CSIRTs) , Implementing a Security Awareness Program, Risk Assessment for Risk Management, Security Insurance and Best Practices. Auditing Information Systems Security, Evidence Collection and Analysis Tools, Information Leakage: Detection and Countermeasures.

Module V

Management and Policy Considerations: Digital Rights Management, Web Hosting, Multilevel Security, Multilevel Security Models, Guidelines for a Comprehensive Security System.

References

1. Information Security, Volume 3, Threats, Vulnerabilities, Prevention, Detection, and Management,HosseinBidgoli,2006, Wiley.

2.Loss Prevention and Crime Prevention ,Lawrence J Fennelly, fourth edition, 2004, Elsevier.

3.Information Security Management Handbook,Harold F. Tipton, Sixth Edition,2010, Auerbachpubliations.

CF6CBT02 INFORMATION SECURITY, MANAGEMENT AND STANDARDS

Theory: 5 hrs per week

Credits: 4

Module I

Security Risk Assessment and Management: Introduction to Security Risk Management. Reactive and proactive approaches to risk management. Risk assessment, quantitative and qualitative approaches and asset classification - Security Assurance Approaches: Introduction to OCTAVE and approaches.

Module II

Security Management of IT Systems: Network security management. Firewalls, IDS and IPS configuration management. Web and wireless security management. General server configuration guidelines and maintenance. Information Security Management, Information classification. Access control models, role-based and lattice models. Mandatory and discretionary access controls. Linux and Windows case studies.Technical controls, for authentication and confidentiality.Password management and key management for users. Case study: Kerberos.

Module III

Key Management in Organizations: Public-key Infrastructure. PKI Applications, secure email case study(S/ MIME or PGP). Issues in public-key certificate issue and lifecycle management - Management of IT Security Infrastructure; Computer security log management, malware handling and vulnerability management programs. Specifying and enforcing security policies.

Module IV

Auditing and Business continuity Planning: Introduction to information security audit and principles of audit. Business continuity planning and disaster recovery. Case study: 9/11 tragedy. Backup and recovery techniques for applications and storage.

Module V

Computer forensics: techniques and tools. Audit Tools: NESSUS and NMAP. Information Security Standards and Compliance: Overview of ISO 17799 Standard. Legal and Ethical issues.

References

1.IT Security and Risk Management,Slay, J. and Koronios, 2006, Wiley.

2. Incident Response and Computer Forensics. Chris Prosise and Kevin Mandia,2003 McGraw-Hill

3. Information Systems Security-Security Management, Metrics, Frameworks and

Best Practices,Nina Godbole, 2009, Wiley

4. Information Security Policies, Procedures, and Standards: Guidelines for Effective Information Security Management 1st edition, 2001, Auerbach.

CF6CBT03 MULTIMEDIA SECURITY

Theory: 5 hrs per week

Credits: 4

Module I

Introduction, Applications and Properties- Applications of Watermarking, Applications of Steganography, Properties of Watermarking Systems, Evaluating Watermarking Systems, Properties of Steganographic and Steganalysis Systems, Evaluating and Testing Steganographic Systems.

Module II

Models of Watermarking-Communications, Communication-Based Models of Watermarking, Geometric Models of Watermarking, Modeling Watermark Detection by Correlation. Basic Message Coding-Mapping Messages into Message Vectors, Error Correction Coding, Detecting Multisymbol Watermarks.

Module III

Watermarking with Side Information-Informed Embedding, Watermarking Using Side Information. Authentication Watermarkings for Binary Images, Secure Multimedia Content Distribution Based on Watermarking Technology.

Module IV

Digital Video Watermarking and the Collusion Attack, Visibility Control and Quality Assessment of Watermarking and Data Hiding Algorithms, Steganalysis: Trends and Challenges.

Module V

Digital camera Source identification through jepg quantization, Traitor Tracing for Multimedia Forensics, JPEG2000 encryption.

References

1. Digital Watermarking and Steganography,Second Edition, Ingemar J. Cox,Matthew L. Miller, Jeffrey A. Bloom, Jessica Fridrich, Ton Kalker, 2008 , Elsevier Inc.

2. Multimedia Forensics and Security, Chang-Tsun Li, University of Warwick, UK, 2009 by IGI Global

CF6CBT04DIGITAL IMAGE PROCESSING

Theory: 5 hrs per week

Credits: 4

Module I

Introduction, Steps in image processing, Image acquisition, representation, sampling and quantization, relationship between pixels. color models ,basics of color image processing.

Module II

Image enhancement in spatial domain, some basic gray level transformations ,histogram processing , enhancement using arithmetic , logic operations , basics of spatial filtering and smoothing.

Module III

Image enhancement in Frequency domain ,Introduction to Fourier transform: 1- D, 2 –D DFT and its inverse transform, smoothing and sharpening filters.

Module IV

Image restoration: Model of degradation and restoration process ,noise models, restoration in the presence of noise, periodic noise reduction. Image segmentation: Thresholding and region based segmentation.

Module V

Image compression: Fundamentals , models , information theory , error free compression ,Lossy compression: predictive and transform coding.JPEG and MPEG standard.

References

1, Digital Image processing,R.C. Gonzalez, R.E.Woods 2nd Edition,2002, Pearson Education.

2. Fundamentals of Digital image Processing,Anil K. Jain,2nd Edition, 1994, Prentice Hall of India.

3. Digital Image Processing, Pratt. W.K., 3rd Edition, John Wiley & Sons.

4. Digital Picture Processing, vol .I & II, Rosenfled A. &Kak, A.C,1992,Academic Press.

OPEN COURSES

Open course 1

CF5OPT01COMPUTER SECURITY

Module I

What Is Computer Security- Values of Assets, The Vulnerability–Threat–Control Paradigm. Threats- Confidentiality, Integrity, Availability, Types of Threats, Types of Attackers. Harm-Risk and Common Sense, Method–Opportunity–Motive.Vulnerabilities, Controls. Authentication-Identification Versus Authentication, Authentication Based on Phrases and Facts: Something You Know, Authentication Based on Biometrics: Something You Are, Authentication Based on Tokens: Something You Have, Access Control- Access Policies, Implementing Access Control, Procedure-Oriented Access Control, Role-Based Access Control.

Module II

Malicious Code, Malware—Viruses, Trojan Horses, and Worms, Technical Details: Malicious Code.Countermeasures for Users.

Module III

Browser Attacks- Browser Attack Types. Web Attacks Targeting Users- False or Misleading Content, Malicious Web Content. Email Attacks-Fake Email, Fake Email Messages as Spam, Fake (Inaccurate) Email Header Data, Phishing, Protecting Against Email Attacks.

Module IV

Security in Operating Systems- Operating System Structure, Security Features of Ordinary Operating Systems, Protected Objects. Security in the Design of Operating Systems-Simplicity of Design, Layered Design, Kernelized Design, Reference Monitor.

Module V

Network Concepts- Network Transmission Media, Protocol Layers, Addressing and Routing. Threats to Network Communications, Interception, Modification, Fabrication, Interruption, Port Scanning.

References

1. Security in Computing, Charles P. Pfleeger, Shari Lawrence Pfleeger, Jonathan Margulies, , fifth edition , 2015 Pearson Education.
2. William Stallings, Operating Systems: Internals and Design Principles, 7th Ed., Prentice-Hall, 2011.

Open Course 2

CF5OPT02COMPUTER FORENSICS

Module I

Foundations of Digital Forensics, Digital Evidence, Increasing Awareness of Digital Evidence, Digital Forensics: Past, Present, and Future, Principles of Digital Forensics, Challenging Aspects of Digital Evidence, Following the Cyber trail. Language of Computer Crime Investigation, The Role of Computers in Crime.

Module II

Conducting Digital Investigations-Digital Investigation Process Models, Scaffolding for Digital Investigations, Applying the Scientific Method in Digital Investigations, Investigative Scenario: Security Breach. Handling a Digital Crime Scene- Published Guidelines for Handling Digital Crime Scenes, Fundamental Principles, Authorization, Preparing to Handle Digital Crime Scenes, Surveying the Digital Crime Scene, Preserving the Digital Crime Scene.

Module III

Investigative Reconstruction with Digital Evidence- Equivocal Forensic Analysis, Victimology, Crime Scene Characteristics, Threshold Assessments. Axes to Pathological Criminals and Other Unintended Consequences, Modus Operandi, Technology and Modus Operandi, Motive and Technology, Current Technologies.

Module IV

Digital Evidence as Alibi- Investigating an Alibi, Time as Alibi, Location as Alibi. Applying Forensic Science to Computers- Preparation, Survey, Documentation, Preservation, Examination and Analysis, Reconstruction, Reporting.

Module V

Applying Forensic Science to Networks- reparation and Authorization, Identification, Documentation, Collection, and Preservation, Filtering and Data Reduction, Class/Individual Characteristics and Evaluation of Source, Evidence Recovery, Investigative Reconstruction, Reporting Results.

References

1. Digital Evidence and Computer Crime, Eoghan Casey, Third Edition, 2011,Elsevier Inc.
2. Computer Forensics: Computer Crime Scene Investigation, 2nd Edition, John R. Vacca, Charles River Media, 2005