

Mahakaushal University, Jabalpur (M.P.)



Scheme & Syllabus
For
B.Sc (CYBER SECURITY)
with Research/honors Bachelor of
Computer Applications
2022-23

Duration of Course: 4 Years
Examination Mode: Semester
Examination System: CBCS

Mahakaushal University
Village-Aithakheda, Mukunwara
Road, Post-Tilwara Jabalpur (M.P.) 482003

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BCYS0101T: Programming in C

UNIT I(12Lectures)

Introduction to C: Introduction to the C programming language, its history, evolution, and importance in modern programming. Overview of C as a procedural and structured language. Structure of a C program including header files, main function, and program statements. Compilation, linking, and execution process of a C program. Constants, variables, and data types (int, float, double, char, void) with examples. Operators in C: arithmetic, relational, logical, assignment, increment/decrement, conditional, and bitwise operators. Operator precedence, associativity, and type conversion rules. Introduction to input/output using `printf` and `scanf` including format specifiers, escape sequences, and control strings.

UNIT II(10Lectures)

Control Structures: Decision-making statements in C: `if`, `if-else`, nested `if`, `switch-case` with multiple examples and use cases. Looping constructs: `for`, `while`, `do-while` including nested loops and applications in repetitive tasks. Jump statements: `break`, `continue`, `goto`, and their practical usage. Conditional (ternary) operator `?:` and short-hand decision making. Emphasis on logical thinking and program flow control. Examples including number comparisons, conditional calculations, and iterative problems.

UNIT III(12Lectures)

Functions and Recursion: Defining, declaring, and calling functions in C. Importance of modular programming and reusability. Function parameters, passing techniques: call by value and call by reference. Recursive functions: factorial, Fibonacci series, and practical recursion problems. Scope and lifetime of variables: local, global, static, and external variables. Storage classes: `auto`, `register`, `static`, and `extern` with examples. Inline functions and their usage in optimizing performance. Function prototypes, return values, and void functions.

UNIT IV(14Lectures)

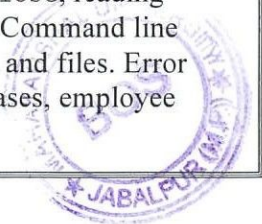
Arrays, Strings, and Pointers: One-dimensional and two-dimensional arrays: declaration, initialization, traversal, searching, and sorting. Multi-dimensional arrays and their applications in matrices. String handling: string declaration, manipulation, and functions like `strcpy`, `strlen`, `strcmp`, `strcat`, `strrev`, and `strupr/strlwr`. Introduction to pointers: declaration, initialization, pointer arithmetic, pointer to array, pointer to function, and pointers with strings. Dynamic memory allocation using `malloc`, `calloc`, `realloc`, and `free`. Examples of passing arrays and pointers to functions, pointer-based string manipulation, and memory-efficient programs.

UNIT V(12Lectures)

Structures, Unions, and File Handling: Introduction to user-defined data types using structures, nested structures, and arrays of structures. Unions and enumerations, their memory management and usage in real-time applications. File handling in C: opening and closing files using `fopen` and `fclose`, reading and writing using `fread`, `fwrite`, `fprintf`, `fscanf`, and handling text and binary files. Command line arguments for input to programs. Sorting and searching records using arrays, structures, and files. Error handling in file operations. Applications of structures and file handling in student databases, employee records, and inventory systems.

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Reference Books

1. E. Balagurusamy – *Programming in ANSI C*, McGraw Hill
2. Brian W. Kernighan & Dennis M. Ritchie – *The C Programming Language*, PHI
3. Yashavant Kanetkar – *Let Us C*, BPB Publications
4. H. Schildt – *C: The Complete Reference*, McGraw Hill
5. K. N. King – *C Programming: A Modern Approach*, W. W. Norton & Company
6. Reema Thareja – *Programming in C*, Oxford University Press
7. R. Subburaj – *Programming in C*, Vikas Publishing House
8. Ashok Kamthane – *Programming in C and Data Structures*, Pearson
9. Tony Gaddis – *Starting Out with C*, Pearson
10. Alfred V. Aho & Jeffrey D. Ullman – *Data Structures and Algorithms in C*, Pearson

C Programming Lab

1. **Hello World & Basic I/O** – Display messages, input/output of numbers, characters, and strings.
2. **Arithmetic Operations** – Perform addition, subtraction, multiplication, division, and modulus operations.
3. **Largest/Smallest of Numbers** – Find the largest and smallest among three or more numbers using if-else and switch-case.
4. **Prime Number Check** – Determine whether a given number is prime or not.
5. **Fibonacci Series** – Generate Fibonacci series up to n terms using loops and recursion.
6. **Factorial Calculation** – Compute factorial of a number using loops and recursion.
7. **Swapping Numbers** – Swap two numbers using functions (call by value and call by reference).
8. **GCD & LCM Calculation** – Find Greatest Common Divisor and Least Common Multiple using functions.
9. **Arrays – Sum, Average & Max/Min** – Calculate sum, average, maximum, and minimum of array elements.
10. **Matrix Operations** – Perform addition, subtraction, and multiplication of two-dimensional arrays (matrices).
11. **String Handling** – Reverse a string, check palindrome, concatenate strings, and compare strings using built-in functions.
12. **Dynamic Memory Allocation** – Create, use, and free dynamic arrays using malloc, calloc, realloc, and free.
13. **Pointers & Pointer Arithmetic** – Demonstrate pointer declaration, arithmetic, and passing arrays to functions using pointers.
14. **Structures & Unions** – Create student or employee records using structures, nested structures, and unions; display and manipulate data.
15. **File Handling** – Read and write data to text and binary files, search and sort records, and implement simple menu-driven database using files.

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BCYS0102T:Data Base Management Systems

Unit-I

(10 Lectures)

Databases and Database Users: Introduction, An example, Characteristics of the Database Approach, Actors on the Scene, Workers behind the Scene, Advantages of Using DBMS Approach, A Brief History of Database Applications, When Not to Use a DBMS. Database System Concepts and Architecture: Data Models, Schemas, and Instances, Three-schema Architecture and Data Independence, Database Languages and Interfaces, The Database System Environment, Centralized and Client-Server Architectures, Classification of Database Management Systems.

Unit-II(20 Lectures)

Data Modeling Using Entity-Relationship Model: Using High-Level Conceptual Data Models for Database Design, An Example Database Application, Entity Types, Entity Sets, Attributes and Keys, Relationship Types, Relationship Sets, Roles and Structural Constraints, Weak Entity

Types, Refining the ER Design Company Database Diagrams, Naming Conventions and Design. Issues, File organization and storage, secondary storage devices, type of single level ordered index, multi-level indexes, indexes on multiple keys, other types of indexes.

Unit-III(8 Lectures)

Relational Model and Relational Algebra: Relational Model Concepts, Relational Model Constraints and Relational Database Schemas, Update Operations, Transactions and Dealing with Constraint Violations, Unary Relational Operations: SELECT and PROJECT, Relational Algebra Operations from SET Theory, Binary Relational Operations: JOIN and DIVISION, Additional Relational Operations, Examples of Queries in Relational Algebra.

Unit-IV(8 Lectures)

Relational Database Design: Anomalies in a database, functional dependency, normal forms, lossless join and dependency, BCNF, normalization through synthesis, higher order normal

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forms. SQL- SQL Data Definition and Data Types, Specifying Constraints in SQL, Schema Change Statements in SQL, Basic Queries in SQL, More Complex SQL Queries, Insert, Delete and Update Statements in SQL, Specifying Constraints as Assertion and Trigger, Views (Virtual Tables) in SQL, Embedded SQL, Dynamic SQL.

Unit-

V(14 Lectures) Introduction to transaction processing, transaction and system concepts, desirable properties of transactions, transaction support in SQL. Concurrency control techniques: two-phase locking techniques, concurrency, control based on timestamp ordering. Recovery techniques: recovery concepts, recovery in multi-database systems, database backup and recovery from catastrophic failures.

Reference Books:

- Elmasri and Navathe: Fundamentals of Database Systems, 7th Edition, Addison- Wesley, 2016.
- Silberschatz, Korth and Sudharshan Database System Concepts, 7th Edition, Tata McGraw Hill, 2019
- C.J.Date, A.Kannan, S.Swamynatham: An Introduction to Database Systems, 8th Edition, Pearson education, 2009

Database Management Systems: Raghu Ramakrishnan and Johannes Gehrke, 3rd Edition, McGraw Hill, 20.

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BCYS0102P:DataBaseManagementSystemsLab

List of Programs:

Program 1: Draw E-R diagram and convert entities and relationships to relation table for a given scenario. Two assignments shall be carried out i.e. consider two different scenarios (eg. bank, college)

Consider the Company database with following Schema

EMPLOYEE (FNAME, MINIT, LNAME, SSN, BDATE, ADDRESS, SEX, SALARY, SUPERSSN, DNO)

DEPARTMENT (DNAME, DNUMBER, MGRSSN, MGRSTARTDATE)

DEPT_LOCATIONS (DNUMBER, DLOCATION)

PROJECT (PNAME, PNUMBER, PLOCATION, DNUM) WORKS_ON (ESSN, PNO, HOURS)

DEPENDENT (ESSN, DEPENDENT_NAME, SEX, BDATE, RELATIONSHIP)

Program 2: Perform the following:

Viewing all databases, Creating a Database, Viewing all Tables in a Database, Creating Tables (With and Without Constraints), Inserting/Updating/Deleting Records in a Table, Saving (Commit) and Undoing (rollback)

Program 3: Perform the following:

Altering a Table, Dropping/Truncating/Renaming Tables, Backing up / Restoring a Database.

Program 4: For a given set of relations, create tables and perform the following Simple Queries, Simple Queries with Aggregate functions, Queries with Aggregate functions (group by and having clause).

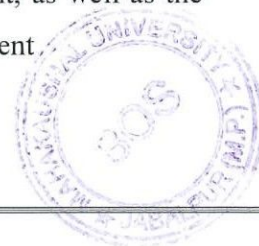
Program 5: Execute the following queries

a. How the resulting salaries if every employee working on the 'Research' Department is given a 10% raise.

b. Find the sum of the salaries of all employees of the 'Accounts' department, as well as the maximum salary, the minimum salary, and the average salary in this department.

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Program 6: Execute the following queries.

- a. Retrieve the name of each employee controlled by Department number 5 (use EXISTS operator).
- b. Retrieve the name of each dept and number of employees working in each Department which has at least 2 employees

Program 7: Execute the following queries

- a. For each project, retrieve the project number, the project name, and the number of employee who work on that project. (use GROUP BY)
- b. Retrieve the name of employees who born in the year 1990's

Program 8: For each Department that has more than five employees, retrieve the department number and number of employees who are making salary more than 40000.

Program 9: For each project on which more than two employees work, retrieve the project number, project name and the number of employees who work on that project.

Program 10: For a given set of relation tables perform the following: Creating Views (with and without check option), Dropping views, Selecting from a view.

Program 11: Create the following tables with properly specifying Primary keys, Foreign keys and solve the following queries. BRANCH (Branchid, Branchname, HOD) STUDENT (USN, Name, Address, Branchid, sem) BOOK (Bookid, Bookname, Authorid, Publisher, Branchid) AUTHOR (Authorid, Authorname, Country, age) BORROW (USN, Bookid, Borrowed_Date)

1) Perform the following:

- a. Viewing all databases, Creating a Database, Viewing all Tables in a Database, Creating Tables (With and Without Constraints), Inserting/Updating/Deleting

Records in a Table, Saving (Commit) and Undoing (rollback) Execute the following Queries:

- 2) a. List the details of Students who are all studying in 2nd sem BCA.
- b. List the students who are not borrowed any books.
- 3) a. Display the USN, Student name, Branch_name, Book_name, Author_name, Books_Borrowed_Date of 2nd sem BCA Students who borrowed books.
- c. Display the number of books written by each Author.
- 4) a. Display the student details who borrowed more than two books.
- b. Display the student details who borrowed books of more than one Author.
- 5) a. Display the Book names in descending order of their names.
- b. List the details of students who borrowed the books which are all published by the same publisher.

Consider the following schema:

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STUDENT(USN,name, date_of_birth,branch,mark1,mark2,mark3,total,GPA)

6)Performthefollowing:

a.CreatingTables(WithandWithoutConstraints),Inserting/Updating/DeletingRecords in a Table, Saving (Commit) and Undoing (rollback)

7)Executethefollowingqueries:

a.FindtheGPAScoreofallthestudents.

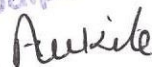
b.Findthestudentswhobornonaparticularyearofbirthfromthedata_of_birth column.

8)a.Listthestudentswhoarestudyinginaparticularchanof study.

b.FindthemaximumGPAScoreofthestudentbranch-wise.


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BCYS0201T :OBJECT ORIENTED PROGRAMMING WITH C++**UNIT-I****(12Lectures)**

Introduction to object oriented programming, user defined types, structures, unions, polymorphism, encapsulation. Getting started with C++ syntax, data-type, variables, strings, functions, default values in functions, recursion, namespaces, operators, flow control, arrays and pointers.

UNIT- II**(14Lectures)**

Abstraction mechanism: Classes, private, public, constructors, destructors, member data, member functions, inline function, friend functions, static members, and references.
Inheritance: Class hierarchy, derived classes, single inheritance, multiple, multilevel, hybrid inheritance, role of virtual base class, constructor and destructor execution, base initialization using derived class constructors.

UNIT- III**(12Lectures)**

Polymorphism: Binding, Static binding, Dynamic binding, Static polymorphism: Function Overloading, Ambiguity in function overloading, Dynamic polymorphism: Base class pointer, object slicing, late binding, method overriding with virtual functions, pure virtual functions, abstract classes.

UNIT- IV**(10Lectures)**

Operator Overloading: This pointer, applications of this pointer, Operator function, member and non member operator function, operator overloading, I/O operators. Exception handling: Try, throw, and catch, exceptions and derived classes, function exception declaration, unexpected exceptions, exception when handling exceptions, resource capture and release.

UNIT- V**(12Lectures)**

Dynamic memory management, new and delete operators, object copying, copy constructor, assignment operator, virtual destructor.

Template: template classes, template functions.

Standard Template Library: Fundamental idea about string, iterators, hashes, iostreams and other types. Namespaces: user defined namespaces, namespaces provided by library. Object Oriented Design, design and programming, role of classes.

TextBooks:

1. Object Oriented Programming with C++by E. Balagurusamy, McGraw-Hill Education (India)
2. ANSI and Turbo C++byAshoke N. Kamthane, Pearson Education

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Reference Books:

- | | |
|--|----------------------------------|
| 3. Big C++ | - Wiley India |
| 4. C++:
McGraw-Hill Education (India) | The Complete Reference- Schildt, |
| 5. C++ and Object Oriented Programming – Jana, PHI Learning. | |
| 6. Object Oriented Programming with C++ | - Rajiv Sahay, Oxford |
| 7. Mastering C++
Education (India) | - Venugopal, McGraw-Hill |

LIST OF PRACTICALS OF C++

1. Write a Program That Just Outputs 'Hello World'
2. Write a Program to Find Maximum and Minimum of Given 3 Numbers.
3. Write a Program That Output Value as Number and as Character.
4. Implementation of the Function That Calculates the Cross Sum of an Integer.(123 as 1+2+3).
5. Determine Number of Characters in a String.
6. Raising a Number N to a Power P is the Same as Multiplying N By Itself P Times. Write a Function Called Power () That Takes a Double Value for N and an INT Value for P and Returns the Result as Double Value. use a Default Argument of 2 for P So That If This Argument is Omitted the Number Will Be Squared. Write a Main () Function That Gets Values from the User to Test This Function.
7. Write a C++ Program to Sort an Array of Integer in Ascending Order Using a Function Called Exchange() Which Accepts Two Integer Arguments By Reference.
8. Write a C++ Program to Implement Function Overloading in Order to Compute.
9. Write a C++ Program to Implement Power(MN) Where
I) M is Double and N is Int II) M and N are Int.
10. Write a Program That Uses a Structure Called Point to Model a Point. Define Three Points and Have the User Input Values to Two of Them. Then Set the Third Point Equal to the Sum of the Other Two and Display the Value of the New Point. Interaction with the Program Might Look Like This:
Enter Coordinates for P1: 3 4
Enter Coordinates for P2: 5 7 Coordinates of P1 + P2 are: 8 11
11. Create the Equivalent of a Four Function Calculator. the Program Should Request the User to Enter a Number an Operator and Another Number. It Should Then Carry Out the Specified Arithmetical Operation: Adding Subtracting Multiplying Or Dividing the Two Numbers. (It Should use a Switch Statement to Select the Operation). Finally It Should Display the Result. When It Finishes the Calculation the Program Should Ask If the User Wants to Do Another Calculation. the Response Can Be Y Or N. Some Sample Interaction with the Program Might Look Like This.

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Enter First Number Operator Second Number: 10/ 3 Answer = 3.333333

Do Another (Y/ N)? Y

Enter First Number Operator Second Number 12 + 100 Answer = 112

Do Another (Y/ N)? N

12.Create a 'Distance' Class with :

- ☐ Feet and Inches as Data Members
- ☐ Member Function to Input Distance
- ☐ Member Function to Output Distance
- ☐ Member Function to Add Two Distance Objects
- ☐ Write a Main Function to Create Objects of Distance Class. Input Two Distances and Output the Sum.

13.Create a Class Called 'Time' That Has

- ☐ Three Integer Data Members for Hours Minutes and Seconds
- ☐ Constructor to Initialize the Object to Zero
- ☐ Member Function to Add Two Time Objects
- ☐ Member Function to Display Time in Hh:Mm:Ss Format
- ☐ Write a Main Function to Create Two Time Objects Add Them and Display the Result in Hh:Mm:Ss Format.

14.Create a Class Called 'Employee' That Has

- ☐ Empcode and Empname as Data Members
- ☐ Member Function Getdata() to Input Data
- ☐ Member Function Display() to Output Data
- ☐ Write a Main Function to Create Emp an Array of Employee Objects. Accept and
- ☐ Display the Details of At Least 6 Employees.

15.Create a Class Rational Which Represents a Numerical Value by Two Double Values- Numerator& Denominator. Include the Following Public Member Functions: Constructor with No Arguments (Default). Constructor with Two Arguments.

- ☐ Void Reduce() That Reduces the Rational Number By Eliminating the Highest Common Factor Between the Numerator and Denominator.
- ☐ Overload + Operator to Add Two Rational Number.
- ☐ Overload >> Operator to Enable Input ThroughCin.
- ☐ Overload << Operator to Enable Output ThroughCout.
- ☐ Write a Main () to Test All the Functions in the Class.

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16. Create a Class 'Complex' to Hold a Complex Number. Write a Friend Function to add Two Complex Numbers. Write a Main Function to Add Two Complex Objects.

17. Create a 'Matrix' Class of Size M X N. Overload the '+' Operator to Add Twomatrix Objects. Write a Main Function to Implement It.

18. Create a 'String' Class Which Overloads '=' Operator to Compare Two Stringobjects.

19. Create a Base Class Called 'Shape' Having

☐ Two Data Members of Type Double.

☐ Member Function Get-Data() to Initialize Base Class Data Members.

☐ Pure Virtual Member Function Display-Area() to Compute and Display the Area of the Geometrical Object.

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BCY0S202T: DISCRETE MATHEMATICS**Unit I(10Lectures)**

Logic: Propositional equivalence, predicates and quantifiers, Methods of proofs, proof strategy, sequences and summation, mathematical induction, recursive definitions and structural induction, program correctness.

Unit-2 (10Lectures)

Counting: The basics of counting, the pigeonhole principle, permutations and combinations, recurrence relations, solving recurrence relations, generating functions, inclusion-exclusion principle, application of inclusion-exclusion.

Unit -3(16Lectures)

Relations: Relations and their properties, n-array relations and their applications, representing relations, closure of relations, equivalence of relations, partial orderings.

Graph theory: Introduction to graphs, graph terminology, representing graphs and graph isomorphism, connectivity, Euler and Hamilton paths, planar graphs, graph coloring, introduction to trees, application of trees.

Unit -4(12Lectures)

Group theory: Groups, subgroups, generators and evaluation of powers, cosets and Lagrange's theorem, permutation groups and Burnside's theorem, isomorphism, automorphisms, homomorphism and normal subgroups, rings, integral domains and fields.

Unit -5(12Lectures)

Lattice theory: Lattices and algebras systems, principles of duality, basic properties of algebraic systems defined by lattices, distributive and complimented lattices, Boolean lattices and Boolean algebras, uniqueness of finite Boolean expressions, propositional calculus. Coding theory: Coding of binary information and error detection, decoding and error correction.

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Text Books:

- 1) K.H. Rosen: Discrete Mathematics and its application, 5th edition, Tata McGraw Hill. Chapter 1(1.1-1.5), Chapter 3(3.1-3.4, 3.6), Chapter 4(4.1-4.3, 4.5), Chapter 6(6.1, 6.2, 6.4-6.6) Chapter 7(7.1-7.6), Chapter 8(8.1-8.5, 8.7, 8.8)
- 2) C.L. Liu: Elements of Discrete Mathematics, 2nd edition, TMH 2000. Chapter 11(11.1-11.10 except 11.7), Chapter 12(12.1-12.8)
- 2.3. B. Kalman: Discrete Mathematical Structure, 3rd edition, Chapter 1(11.1, 11.2)

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BCYS0301T :Object Oriented Concepts using JAVA

Unit-I(8Lectures)

Fundamentals of Object-Oriented Programming: Introduction, Object Oriented Paradigm, BasicConceptsofOOP,BenefitsandApplicationsofOOP.IntroductiontoJava:JavaFeatures, Java Environment, Simple Java Program, Java Program Structure, Java Tokens, Java Statements, Java Virtual Machine.

Unit-II (14Lectures)

Java Programming Basics: Constants, Variables, Data Types, Declaration of variables, Giving values to the variable, Scope of variables, Symbolic constants, Type casting.

OperatorsandExpressions:ArithmeticOperators,RelationalOperators, Logical Operators, Assignment Operator, Increment and Decrement Operators, Conditional Operator, Special Operators, Mathematical functions.

Using I/O: Byte streams and character streams, predefined streams, reading console input, reading characters, strings, writing console output.

Decision Making & Branching: Simple if statement, if..else statement, nesting of if..else statement, the else..if ladder, the Switch statement.

Unit-III

(12Lectures)

Decisionmaking&Looping-Thewhilestatement,thedostatement,theforstatement.Jumpsin loops, Labelled loops.Class & Objects - Class Fundamentals, Declaring Objects, Assigning Object Reference Variables, Introducing Methods, Constructors, The 'this' keyword, Overloading Methods, Using Objects as Parameters, Returning Objects, Recursion, Understanding 'static', Introducing 'final ', Using Command-LineArguments,Varargs :Variable-LengthArguments Arrays and Strings: One dimensional arrays, Creating an arrays, Two dimensional arrays , Strings, Vectors, Wrapper classes.

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Unit-IV (12Lectures)

Inheritance-InheritanceBasics,Using'super,CreatingMultilevelhierarchy,Methodverriding, Using Abstract Classes, Using final with Inheritance.

Packages & Interfaces - Packages, Access protection in packages, Importing Packages, Interfaces.Exception Handling - Exception Handling Fundamentals –Exception Types, Uncaught

Exceptions,Usingtryandcatch,Multiplecatchclauses,Nestedtrystatements,throw,throws, finally, Javas builtin Exceptions.

Unit-V(14Lectures)

Multithreaded Programming- Introduction, Creating threads, Extending the thread class, stopping & blocking thread, Life cycle of a thread, Using thread methods, Implementing the runnable interface.

Event and GUI programming: The Applet Class, Types of Applets, Applet Basics, Applet Architecture,AnApplet Skeleton, SimpleApplet Display Methods, Requesting Repaint, The HTMLAPPLET tag. Event Handling - The delegation event model, Event Classes –Action Event, KeyEvent & MouseEvent Classes, Event Listener Interfaces –ActionListener, KeyListener & MouseListener interfaces. Using the Delegation Event Model. Window Fundamentals, Working with Frame Windows, Creating a Frame Window in an Applet. Creating a Windowed Program, Displaying information within a window.

Introducingswing–twokeyswingfeatures,componentsandcontainers,theswingpackages,a simple swing application, event handling. Exploring Swing- JLabel, JTextField, JButton, Check boxes, Radio buttons ,Jlist , JComboBox.

ReferenceBooks:

- EBalagurusamy, Programming with Java –APrimer, Fourth Edition, Tata McGraw Hill Education Private Limited.
- HerbertSchildt,Java:TheCompleteReference,SeventhEdition,McGrawHill Publication.

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- Herbert Schildt, Java 2 - The Complete Reference, Fifth Edition, McGraw Hill publication.
- Cay S. Horstmann, Core Java Volume I - Fundamentals, Prentice Hall.
- Somashekara, M. T., Guru, D. S., Manjunatha, K. S., Object Oriented Programming with Java, 3rd Edition, PHI.

BCYS301P: JAVALab

List of Programs:

1. Program to accept student name and marks in three subjects. Find the total marks, average and grade (depending on the average marks).
2. A menu driven program to input two integers & an operator to perform basic arithmetic operations (+, -, *, and /) using switch case structure.
3. Program, which reads two numbers having same number of digits. The program outputs the sum of product of corresponding digits. (Hint Input 327 and 539 output $3 \times 5 + 2 \times 3 + 7 \times 9 = 84$)
4. Program to input Start and End limits and print all Fibonacci numbers between the ranges. (Use for loop)
5. Define a class named Pay with data members String name, double salary, double da, double hra, double pf, double grossSal, double netSal and methods: Pay(String n, double s) - Parameterized constructor to initialize the data members, void calculate() - to calculate the following salary components, and void display() - to display the employee name, salary and all salary components.
 Dearness Allowance = 15% of salary House Rent Allowance = 10% of salary Provident Fund = 12% of salary Gross Salary = Salary + Dearness Allowance + House Rent Allowance Net Salary = Gross Salary - Provident Fund
 Write a main method to create object of the class and call the methods to compute and display the salary details.
6. Program to create a class DISTANCE with the data members feet and inches. Use a constructor to read the data and a member function Sum () to add two distances by using objects as method arguments and show the result. (Input and output of inches should be less than 12.)

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7. Program to check whether the given array is Mirror Inverse or not.
8. Program to create a class "Matrix" that would contain integer values having varied numbers of columns for each row. Print row-wise sum.
9. Program to extract portion of character string and print extracted string. Assume that 'n' characters extracted starting from mth character position.
10. Program to add, remove and display elements of a Vector.

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BCYS0302T: INTRODUCTION TO CYBER SECURITY

UNIT I: Basics of Cyber Security

Introduction to Cyber Security - Importance and challenges in Cyber Security - Cyberspace - Cyber threats - Cyber warfare - CIA Triad - Cyber Terrorism - Cyber Security of Critical Infrastructure - Cyber security - Organizational Implications.

UNIT II: Vulnerability in Cyber Space and Security

Types of Hackers - Hackers and Crackers - Cyber-Attacks and Vulnerabilities - Malware threats - Sniffing - Gaining Access - Hiding Files - Covering Tracks - Worms - Trojans - Viruses - Backdoors. Vulnerabilities - Overview, Vulnerabilities in Software, System administration, Threat Actors, Attacks, Open Access to Organizational Data, Weak Authentication, Unprotected Broadband communications. Cyber Security Safeguards - Overview, Access control, Audit, Authentication, Biometrics, Cryptography, Deception, Denial of Service Filters, Ethical Hacking, Firewalls, Intrusion Detection Systems, Response, Scanning, Security policy, Threat Management.

UNIT III: Ethical Hacking and Social Engineering

Ethical Hacking Concepts and Scopes - Threats and Attack Vectors - Information Assurance - Threat Modeling - Enterprise Information Security Architecture - Vulnerability Assessment and Penetration Testing - Types of Social Engineering - Insider Attack - Preventing Insider Threats - Social Engineering Targets and Defence Strategies.

UNIT IV: Cyber Forensics and Auditing

Introduction to Cyber Forensics - Computer Equipment and associated storage media - Role of forensics Investigator - Forensics Investigation Process - Collecting Network based Evidence - Writing Computer Forensics Reports - Auditing - Plan an audit against a set of audit criteria - Information Security Management System Management. Introduction to ISO 27001:2013.

UNIT V: Architecture of Cyberspace

Defining Cyberspace and Overview of Computer and Web-technology, Architecture of cyberspace, Complex Network Architectures, Internet, World wide web, Advent of internet, Internet infrastructure for data transfer and governance, Internet society, Regulation of cyberspace, Concept of cyber security, Issues and challenges of cyber security.

RECOMMENDED READINGS:-

Donaldson, S., Siegel, S., Williams, C.K., and Aslam, A. (2015). —Enterprise Cyber security -How to Build a Successful Cyber defense Program against Advanced Threats, Apress, 1st Edition. Franke, Don Cyber Security Basics: Protect your organization ... (Paperback) Nina Godbole, Sumit Belapure, (2011). —Cyber Security, Willey. Roger Grimes, —Hacking the Hacker, Wiley, 1st Edition, 2017. Yuri Diogenes and Erdal Ozkaya (2018). Cyber security— Attack and Defense Strategies: 2nd Edition Paperback. L: Lecture T: Tutorial P: Practical C: Credits

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Course Objectives:

The main objectives of this course are

- Identify Key concept and Terminology of Cyber Security.
- Examine the concept of privacy and its legal protections.
- Explain the primary concepts involving encryption.
- Describe the social implications of cyber security.
- Understand the risks and benefits of social networks.

CYBER SECURITY LAB:-

1. Password Management: Teach about creating strong, unique passwords and using password managers to store them securely.
2. Phishing Awareness: Educate on recognizing phishing emails, texts, and calls and how to avoid falling victim to them.
3. Basic Network Security: Cover topics like securing Wi-Fi networks, enabling firewalls, and updating router firmware.
4. Malware Protection: Explain different types of malware (viruses, ransomware, etc.) and how to defend against them with antivirus software and regular updates.
5. Data Encryption: Introduce concepts of encryption and how it protects data both in transit and at rest, including tools like BitLocker and FileVault.
6. Social Engineering Awareness: Discuss tactics used by attackers to manipulate people into divulging sensitive information and how to recognize and resist them.
7. Secure Web Browsing: Teach about HTTPS, safe browsing habits, and avoiding risky websites and downloads.
8. Two-Factor Authentication (2FA): Explain the importance of using 2FA to add an extra layer of security to online accounts.
9. Mobile Device Security: Cover best practices for securing smartphones and tablets, including enabling device locks, installing updates, and being cautious with app permissions.
10. Incident Response: Educate on what to do in case of a security breach, including reporting procedures, containment measures, and recovery steps.

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BCYS0401T: Cyber Defense Strategies

UNIT I:Introduction to Cyber Defense:-Overview of cybersecurity threats and challenges, Understanding the cybersecurity landscape, Principles of cyber defense.

UNITII:Risk Management and Assessment:-Risk assessment methodologies, Identifying and prioritizing cybersecurity risks, Risk mitigation strategies.

UNITIII:Network Security:-Fundamentals of network security architecture, Intrusion detection and prevention systems,Secure network design principles.

UNITIV:Incident Response and Management:-Incident response planning and preparation, Incident detection, analysis, and containment, Post-incident recovery and lessons learned.

UNITV:Cyber Defense Technologies:-Cryptography and encryption techniques, Security tools and technologies (firewalls, antivirus, etc.), Emerging trends in cyber defense.

Reference Book:

"Cybersecurity Essentials" by Charles J. Brooks and Christopher Grow, "Risk Management Framework: A Lab-Based Approach to Securing Information Systems" by James Broad , "Network Security Essentials: Applications and Standards" by William Stallings, "Incident Response & Computer Forensics" by Jason T. Luttgens, Matthew Pepe, and Kevin Mandia , "Applied Cyber Security and the Smart Grid" by Eric D. Knapp and Raj Samani.

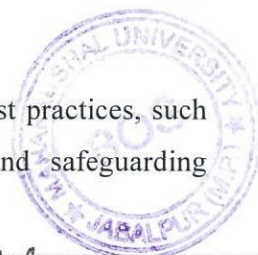
List of Programs:-

1. Vulnerability Assessment and Penetration Testing: Teach students how to identify vulnerabilities in systems and networks and simulate attacks to test their security posture.
2. Security Hardening: Cover techniques for securing systems and networks by configuring them to minimize vulnerabilities and reduce the attack surface.
3. Incident Response Planning and Execution: Guide students through the process of developing incident response plans and executing them effectively to minimize the impact of security incidents.
4. Security Awareness Training: Educate users about cybersecurity best practices, such as recognizing phishing attempts, creating strong passwords, and safeguarding sensitive information.

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5. Security Monitoring and Threat Detection: Introduce students to tools and techniques
6. for monitoring network traffic, logs, and system activity to detect and respond to security threats in real-time.
7. Data Loss Prevention: Discuss strategies and tools for preventing the unauthorized disclosure of sensitive data, including encryption, access controls, and data classification.
8. Identity and Access Management: Teach students how to manage user identities, enforce access controls, and implement multi-factor authentication to protect against unauthorized access.
9. Secure Software Development: Cover principles and best practices for writing secure code, performing secure code reviews, and integrating security into the software development lifecycle.
10. Cloud Security: Explore security considerations and best practices for deploying and managing applications and data in cloud environments, including securing cloud infrastructure and services.
11. Security Incident Simulation Exercises: Conduct hands-on exercises where students simulate real-world security incidents, such as ransomware attacks or data breaches, to practice their response skills in a controlled environment.

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BCYS0402T: Cyber Laws and IPR

Unit-I Introduction

Overview of Computer and Web Technology, Need for Cyber Law, Cyber Jurisprudence at International and Indian Level, Jurisdictional Aspects in Cyber Law Issues of jurisdiction in cyberspace, Types of jurisdiction, Minimum Contacts Theory, Sliding Scale Theory, Effects Test and International targeting, Jurisdiction under IT Act, 2000. [CO1]

Unit-II Cyber Crimes & Legal Framework

Cyber Crimes against Individuals, Institution and State, Hacking, Digital Forgery, Cyber Stalking/Harassment, Ethics and Etiquettes of Cyber World, Cyber Pornography, Identity Theft & Fraud, Cyber Terrorism, Cyber Defamation, Right to Privacy and Data Protection on Internet, Concept of privacy, Threat to privacy on internet, Self-regulation approach to privacy. [CO2]

UNIT III Overview of Intellectual Property

Introduction and the need for intellectual property right (IPR), IPR in India – Genesis and Development IPR in abroad, Data Protection, Open Source Software, Macro economic impact of the patent system, Patent and kind of inventions protected by a patent, Patent document How to protect your inventions?, Granting of patent, Rights of a patent. [CO3]

Unit-IV Copyright

What is copyright? Latest editions of Designs, what is covered by copyright? How long does copyright last? Why protect copyright?

UNIT V: Related Rights and Trademarks

What are related rights? Distinction between related rights and copyright? What is a trademark? Rights of trademark? What kind of signs can be used as trademarks? Types of trademark, function does a trademark perform, How is a trademark protected? How is a trademark registered? [CO4][CO5]

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TextBooks

1. AnirudhRastogi.CyberLaw, LexisNexis.
2. VakulSharma.InformationTechnologyLawandPracticeCyberLawsandLawsRelati
ngtoE-Commerce, Universal Law Publishing.
3. PankajSharma.InformationSecurityandCyberLaws, Kataria, S.K., & Sons.
4. NavneetNagpal.IntellectualPropertyRight, Ebooks2goInc.
5. Dr.S.K.singh.IntellectualPropertyRights, CentralLawAgency.

List ofPrograms:

Experiment 1: Data Privacy and Cybersecurity

Objective: To analyze the effectiveness of data privacy laws and cybersecurity measures in protecting sensitive information.

Procedure:

- 1.Select a dataset containing sensitive information (could be simulated or real data with proper consent and anonymization).
- 2.Implement different data privacy measures such as encryption, access controls, and data masking.
- 3.Assess the vulnerability of the data to cyber threats like hacking or data breaches.
- 4.Evaluate the effectiveness of implemented measures in safeguarding the data.
- 5.Discuss the legal implications and compliance requirements under relevant cyber laws (e.g., GDPR, CCPA).

Experiment 2: Digital Copyright Infringement

Objective: To explore issues related to digital copyright infringement and the enforcement of intellectual property rights online.

Procedure:

- 1.Choose a set of copyrighted digital content (e.g., images, music, videos).
- 2.Intentionally distribute the content through various online channels without proper authorization.

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3. Monitor and document instances of copyright infringement.
4. Analyze the methods used for detecting and addressing copyright violations (e.g., DMCA takedown notices, digital watermarking).
5. Discuss the legal frameworks and challenges in prosecuting copyright infringement cases in different jurisdictions.

Experiment 3: Patent and Trademark Registration Process

Objective: To understand the process of patent and trademark registration and its importance in protecting intellectual property.

Procedure:

1. Select a product or invention for patent registration and a brand name/logo for trademark registration.
2. Research the requirements and procedures for filing patent and trademark applications.
3. Prepare and submit patent and trademark applications for the selected intellectual properties.
4. Track the progress of applications through the registration process.
5. Discuss the significance of patents and trademarks in preventing infringement and promoting innovation and brand recognition.

Experiment 4: Cybercrime Investigation and Legal Proceedings

Objective: To simulate a cybercrime scenario and understand the investigative and legal processes involved.

Procedure:

1. Create a simulated cybercrime scenario (e.g., hacking, phishing, identity theft).
2. Formulate a response plan for investigating the cybercrime, including digital forensics and evidence collection.
3. Role-play as investigators, legal experts, and law enforcement agencies involved in the case.

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4. Conduct a mock trial to simulate legal proceedings, including presenting evidence and arguments.

5. Analyze the challenges and limitations faced in prosecuting cybercrime cases under existing cyber laws.

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BCYS0501T:Python Programming

Unit-I

(10Lectures)

Python Basics, Objects-Python Objects, Standard Types, Other Built-in Types, Internal Types, Standard Type Operators, Standard Type Built-in Functions, Categorizing the Standard Types, Unsupported Types Numbers - Introduction to Numbers, Integers, Floating Point Real Numbers, Complex Numbers, Operators, Built-in Functions, Related Modules Sequences - Strings, Lists, and Tuples, Mapping and Set Types.

Unit-II(16Lectures)

FILES: File Objects, File Built-in Function [open()], File Built-in Methods, File Built-in Attributes, Standard Files, Command-line Arguments, File System, File Execution, Persistent Storage Modules, Related Modules Exceptions: Exceptions in Python, Detecting and Handling Exceptions, Context Management, *Exceptions as Strings, Raising Exceptions, Assertions, Standard Exceptions, *Creating Exceptions, Why Exceptions (Now)?, Why Exceptions at All?, Exceptions and the sys Module, Related Modules Modules: Modules and Files, Namespaces, Importing Modules, Importing Module Attributes, Module Built-in Functions, Packages, Other Features of Modules.

Unit-III(12Lectures)

Regular Expressions: Introduction, Special Symbols and Characters, Res and Python Multithreaded Programming: Introduction, Threads and Processes, Python, Threads, and the Global Interpreter Lock, Thread Module, Threading Module, Related Modules.

Unit-IV(12Lectures)

GUI Programming: Introduction, Tkinter and Python Programming, Brief Tour of Other GUIs, Related Modules and Other GUIs WEB Programming: Introduction, Web Surfing with Python, Creating Simple Web Clients, Advanced Web Clients, CGI-Helping Servers Process Client Data, Building CGI Application Advanced CGI, Web (HTTP) Servers.

Unit-V(10Lectures)

Database Programming: Introduction, Python Database Application Programmer's Interface (DB-API), Object Relational Managers (ORMs), Related Modules.

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Reference Books:

- CorePythonProgramming, WesleyJ.Chun, SecondEdition, Pearson.
- ThinkPython, AllenDowney, GreenTeaPress
- IntroductiontoPython, KennethA.Lambert, Cengage
- PythonProgramming:AModernApproach, VamsiKurama, Pearson
- LearningPython, MarkLutz, O'Really.

BCYS501P:PythonProgrammingLab

List of Programs:

1. Writeaprogramtodemonstratedifferentnumberdatatypesin Python.
2. WriteaprogramtoperformdifferentArithmeticOperationsonnumbersin Python.
3. Writeaprogramto create, concatenate and print a string and access sub-string from a given string.
4. Write a python script to print the current date in the following format "Sun May 29 02:26:23 IST 2017"
5. 26:23 IST 2017"
6. Writeaprogramto create, append, and remove lists in python.
7. Writeaprogramtodemonstrate working with tuples in python.
8. Writeaprogramtodemonstrate working with dictionaries in python.
9. Write a python program to find largest of three numbers.
10. Write a Python program to convert temperature to and from Celsius, Fahrenheit. [Formula : $c/5 = f-32/9$]
11. Write a Python program to construct the following pattern, using a nested for loop.

```
*
* *
* * *
* * * *
* * * * *
* * * * *
* * * *
* * *
* *
*
```

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12. Write a Python script that prints prime numbers less than 20.
13. Write a Python program to find factorial of a number using Recursion.
14. Write a program that accepts the lengths of three sides of a triangle as inputs. The program output should indicate whether or not the triangle is a right triangle (Recall from the Pythagorean Theorem that in a right triangle, the square of one side equals the sum of the squares of the other two sides)
15. Write a Python program to define a module to find Fibonacci Numbers and import the module to another program.
16. Write a Python program to define a module and import a specific function in that module to another program.
17. Write a script named copyfile.py. This script should prompt the user for the names of two text files. The contents of the first file should be input and written to the second file.
18. Write a program that inputs a text file. The program should print all of the unique words in the file in alphabetical order.
19. File in alphabetical order.
20. der.
21. Write a Python class to convert an integer to a Roman numeral.
22. Write a Python class to implement $\text{pow}(x, n)$.
23. Write a Python class to reverse a string word by word.

Reference Books:

- Core Python Programming, Wesley J. Chun, Second Edition, Pearson.
- Think Python, Allen Downey, Green Tea Press
- Introduction to Python, Kenneth A. Lambert, Cengage
- Python Programming: A Modern Approach, Vamsi Kurama, Pearson
- Learning Python, Mark Lutz, O'Really.

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BCYS0601: Network Security

Unit-I

Network Security Terminology: Identification, Confidentiality, Authentication, Authorization, Access Control, Integrity, Non-Repudiation, Freshness, and Availability, Network Threats and Types of attacks, Introduction to malwares.

Unit-II

Cryptography Symmetric Cipher Model, Classical Cryptographic Algorithms: Monoalphabetic Substitution such as Caesar Cipher, Cryptanalysis of Monoalphabetic ciphers; Transposition Cipher. Stream and Block Cipher: principles, Data Encryption Standard (DES).

Concept of Asymmetric Cryptography, Rivest-Shamir-Adleman (RSA) Key Generation, Encryption and Decryption Algorithm.

Unit-III

Key Management Protocols: Solving Symmetric Key Distribution Problem, Diffie-Hellman Algorithm, Key Exchange with Public Key Cryptography or Asymmetric Cryptography, Digital Envelope, Public Key Certificate Structure, Certificate Authority

Unit-IV

Hash Algorithms & Digital Signature Hash concept, Hash Function Requirements, Popular Message Digest and Hash Algorithms: Overview of SHA1, SHA2, MD4, MD5, Digital Signature.

Unit-V

Authentication Protocols Basic authentication protocols, concept of Key distribution centre (KDC), Needham-Schroeder Authentication Protocol. SSL and TLS, Overview of IP Security, Introduction to Firewalls and IDS.

Text Books:

1. Principles of Cryptography, 4th Edition by William Stallings, Pearson Education.
2. Security in Computing, 2nd Edition by Charles P. Pfleeger, Prentice Hall International.
3. Cryptography & Network Security, 2nd Edition by Atul Kahate, TMH.
4. Applied Cryptography: Protocols, Algorithms, and Source Code in C, 2nd Edition by Bruce Schneier, John Wiley and Sons.
5. Firewalls and Internet Security, 2nd Edition by Bill Cheswick and Steve Bellovin, Addison Wesley.
6. Security Technologies for the world wide web, 2nd Edition by Rolf Oppliger, Artech House, Inc.

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BCYS0502P:NetworkSecurityLaboratory:-

1. setting up the system for testing purpose: Learning basic commands.
2. software requirements. Security Attacks: ARP Attacks (ARP Cache poisoning , ARP man in the middle Attack).
3. IP Attacks (IP fragmentation attack, IP Teardrop Attack).
4. ICMP Attacks(Ping of Death, Smurf Attack. TCP RST Attack), UDP Attack.
5. TCP Attacks(SYN Flooding Attack, TCP RST Attack),UDP Attack.
6. Understand the tools and techniques. IEXPRESS 2.0, KARAT, Damm Web Application Web Application Vulnerabilities (DWAV), WebGoat , prorate Trojan, Key Logger, STeganographer etc.
7. Nmap port scanning: TCP port Scanning (TCP Connect() scanning, TCP SYN Scan, TCP FIN Scan, XMAS Scan, TCP NULL Scan).
8. UDP Port Scanning, performing stealth Scan of a Selected computer.

ReferenceBooks:

1. Schneier Bruce: Applied Cryptography : protocols, Algorithms and source code in c ,Wiley India, 2nd Edition, Reprint -2013.

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BCYS0701: Fundamentals of Cyber Security

Unit-I

Introduction to CyberSpace: History of Internet, Cyber Crime, Information Security, Computer Ethics and Security Policies, Choosing the Best Browser according to the requirement and email security, Guidelines to choose web browsers, Securing web browser, Antivirus, Email.

Guidelines for secure password and wi-fi security: Guidelines for setting up a Secure password, Two-steps Password management, Wi-Fi Security. Guidelines for social media and basic Windows security: Guidelines for social media.

Unit-II

Smartphone security guidelines: Introduction to mobile phones, Smartphone Security, Android Security, IOS Security. Cyber Security Initiatives in India: Counter Cyber Security Initiatives in India, Cyber Security Exercise, Cyber Security Incident Handling.

Unit-III

Online Banking, Credit Card and UPI Security: Overview of Online Banking Security, Mobile Banking Security, Security of Debit and Credit Card, UPI Security.

Unit-IV

Cyber Security Threat Landscape and Techniques: Cyber Security Threat Landscape, Emerging Cyber Security threats, Cyber Security Techniques, Firewall.

Unit-V

IT Security Act and Misc. Topics: IT Act, Hackers-Attacker- Countermeasures, Web Application Security, Digital Infrastructure Security, Defensive Programming.

Text Books:

1. Introduction to Cyber Security available at <http://uou.ac.in/foundation-course>
2. Fundamentals of Information Security <http://uou.ac.in/progdetail?pid=CEGCS-17>
3. Cyber Security Techniques <http://uou.ac.in/progdetail?pid=CEGCS-17>
4. Cyber Attacks and Counter Measures: User Perspective
<http://uou.ac.in/progdetail?pid=CEGCS-17>
5. Information System
<http://uou.ac.in/progdetail?pid=CEGCS-17>

Reference Books:

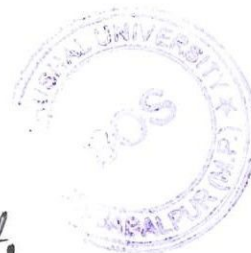
Introduction to Cyber Security: Jatindra Pandey.

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BCYS0701P: Fundamentals of Cyber Security**Experiments:**

1. Write a program in C/Java to perform encryption and decryption using the following algorithms
 - a) Ceaser Cipher
 - b) Substitution Cipher
2. Demonstrate creation of Digital signatures using GNUPG.
3. Demonstrate the concept of firewalls.
4. Install Wireshark and different filters for network monitoring.
5. Install the key logger to understand their working.

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BCYS0702T: Digital Forensics

Unit-I

Digital Forensics Science: Forensic science, computer forensics, and digital forensics. **Computer Crime:** Criminalistics as it relates to the investigative process, analysis of cyber-criminalistics area, holistic approach to cyber-forensics.

UNIT2

Cyber Crime Scene Analysis: Discussion on court orders etc., methods to search and seize electronic evidence, retrieved and unretrieved communications, Discuss the importance of understanding what court documents would be required for a criminal investigation.

UNIT3

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

UNIT4

Computer Forensics: Prepare a case, Begin an investigation, Understand computer forensics workstations and software, Conduct an investigation, Complete a case, Critique a case, **Network Forensics:** open-source security tools for network forensic analysis, requirements for preservation of network data.

UNIT5

Mobile Forensics: mobile forensics techniques, mobile forensics tools. **Legal Aspect of Digital Forensics:** IT Act 2000, amendment of IT Act 2008. Recent trends in mobile forensic technique and methods to search and seize electronic evidence.

Text Books:

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

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Digital Forensics LAB:-

1. File System Analysis: Teach students how to analyze file systems to extract information about files, directories, and file attributes, which can provide valuable evidence in investigations.
2. Memory Forensics: Cover techniques for analyzing volatile memory (RAM) to identify running processes, open network connections, and artifacts of malicious activity, even after a system has been shut down.
3. Network Forensics: Explore methods for capturing and analyzing network traffic to reconstruct events, identify communication patterns, and uncover evidence of network-based attacks.
4. Mobile Device Forensics: Discuss tools and techniques for acquiring and analyzing data from mobile devices, including smartphones and tablets, to recover messages, call logs, and other digital artifacts.
5. Email Forensics: Teach students how to analyze email headers, message content, and attachments to trace the origins of emails, identify spoofing or phishing attempts, and gather evidence of malicious activity.
6. Malware Analysis: Introduce students to methods for dissecting and analyzing malicious software to understand its functionality, behavior, and impact on systems and networks.
7. Forensic Data Recovery: Cover techniques for recovering deleted or hidden data from storage devices, such as hard drives and flash drives, using specialized tools and forensic imaging methods.
8. Timeline Analysis: Teach students how to create timelines of digital events using timestamps from system logs, file metadata, and other sources to reconstruct the sequence of activities during an incident.
9. Database Forensics: Explore methods for analyzing database systems to identify unauthorized access, data manipulation, or other suspicious activities that may indicate a security breach.
10. Cloud Forensics: Discuss challenges and techniques for investigating digital evidence stored in cloud environments, including accessing and preserving data hosted by third-party providers.


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BCYS0801-T: Web technology

UNIT I SCRIPTING

(10 Lectures)

Web page Designing using HTML, Scripting basics- Client side and server side scripting. JavaScript Object, names, literals, operators and expressions- statements and features- events- windows- documents- frames- datatypes- built-in functions- Browser object model- Verifying forms.- HTML5- CSS3- HTML5 canvas- Website creation using tools.

UNIT II JAVA (10 Lectures)

Introduction to object oriented programming- Features of Java- Datatypes, variables and arrays
- Operators- Control statements- Classes and Methods- Inheritance. Packages and Interfaces
- Exception Handling- Multithreaded Programming- Input/Output- Files- Utility Classes- String Handling.

UNIT III JDBC

(10 Lectures)

JDBC Overview – JDBC implementation – Connection class – Statements - Catching Database Results, handling database Queries. Networking- InetAddress class – URL class- TCP sockets
- UDP sockets, Java Beans – RMI.

UNIT IV APPLET (10 Lectures)

Java applets- Life cycle of an applet – Adding images to an applet – Adding sound to an applet. Passing parameters to an applet. Event Handling. Introducing AWT: Working with Windows Graphics and Text. Using AWT Controls, Layout Managers and Menus. Servlet – life cycle of a servlet. The Servlet API, Handling HTTP Request and Response, using Cookies, Session Tracking. Introduction to JSP.

UNIT V XML AND WEB SERVICES (10 Lectures)

Xml – Introduction- Form Navigation- XML Documents- XSL – XSLT- Web services- UDDI- WSDL- Java web services – Web resources.

TEXT BOOKS:

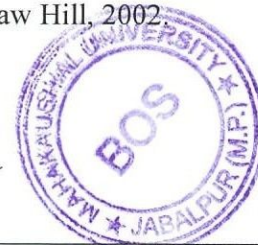
1. Harvey Deitel, Abbey Deitel, Internet and World Wide Web: How To Program 5 Edition.
2. Herbert Schildt, Java - The Complete Reference, 7th Edition. Tata McGraw- Hill Edition.
3. Michael Morrison XML Unleashed Tech media SAMS.

REFERENCE BOOKS:

1. John Pollock, Javascript - A Beginners Guide, 3rd Edition — Tata McGraw-Hill Edition.
2. Keyur Shah, Gateway to Java Programmer Sun Certification, Tata McGraw Hill, 2002.

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BCYS0801P: Web technology**LIST OF EXPERIMENTS:**

1. Develop and demonstrate a XHTML file that includes Javascript script for the following problems:

- a) Input: A number n obtained using prompt Output: The first n Fibonacci numbers
- b) Input: A number n obtained using prompt Output: A table of numbers from 1 to n and their squares using alert

2. a) Develop and demonstrate, using Javascript script, a XHTML document that collects the USN (the valid format is: A digit from 1 to 4 followed by two upper-case characters followed by two digits followed by two upper-case characters followed by three digits; no embedded spaces allowed) of the user. Event handler must be included for the form element that collects this information to validate the input. Messages in the alert windows must be produced when errors are detected. b) Modify the above program to get the current semester also (restricted to be a number from 1 to 8)

3. a) Develop and demonstrate, using Javascript script, a XHTML document that contains three short paragraphs of text, stacked on top of each other, with only enough of each showing so that the mouse cursor can be placed over some part of them. When the cursor is placed over the exposed part of any paragraph, it should rise to the top to become completely visible.

b) Modify the above document so that when a paragraph is moved from the top stacking position, it returns to its original position rather than to the bottom.

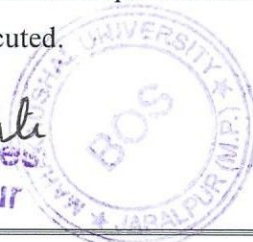
4. a) Design an XML document to store information about a student in an engineering college affiliated to VTU. The information must include 100 USN, Name, Name of the College, Branch,

Year of Joining, and e-mail id. Make up sample data for 3 students. Create a CSS style sheet and use it to display the document. b) Create an XSLT style sheet for one student element of the above document and use it to create display of that element.

5. a) Write a Perl program to display various Server Information like Server Name, Server Software, Server protocol, CGI Revision etc. b) Write a Perl program to accept UNIX command from a HTML form and to display the output of the command executed.

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6.a) Write a Perl program to accept the User Name and display a greeting message randomly chosen from a list of 4 greeting messages.

.b) Write a Perl program to keep track of the number of visitors visiting the web page and to display this count of visitors, with proper headings.

7. Write a Perl program to display a digital clock which displays the current time of the server.

TOTAL REFERENCE BOOKS:

1. Kai Hwang, Geoffrey C. Fox, Jack G. Dongarra, "Distributed and Cloud Computing,
2. Harvey Deitel, Abbey Deitel, Internet and World Wide Web: How To Program 5 Edition.

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BCYS0802T: Data Collection and Cleaning

UNIT I: Introduction to Data Collection and Cleaning, Overview of data collection processes, Importance of data cleaning in the data analysis pipeline, Common challenges and issues in data collection and cleaning.

UNIT II: Data Collection Methods, Types of data sources (e.g., surveys, interviews, web scraping), Sampling techniques and their implications, Ethical considerations in data collection.

UNIT III: Data Cleaning Techniques, Identifying and handling missing data, Outlier detection and treatment methods, Data transformation and normalization techniques.

UNIT IV: Data Quality Assessment, Metrics for assessing data quality, Data validation and verification techniques, Establishing data quality standards.

UNIT V: Advanced Topics in Data Cleaning, Automated data cleaning tools and algorithms, Handling unstructured data, Case studies and real-world examples.

Reference Book:

"Practical Data Cleaning" by Tal Galili "Data Science for Business" by Foster Provost and Tom Fawcett

"Sampling: Design and Analysis" by Sharon L. Lohr, "Web Scraping with Python" by Ryan Mitchell

"Advanced Data Management" by Roland Bouman and Alberto LluchLafuente

"Clean Data: A Handbook of Data Cleaning Techniques in R" by Edwin de Jonge and Mark van der Loo

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BCYS0101D-T: Digital marketing analysis

UNIT1:DIGITALMEDIAANDANAL(10Lectures)

Digital media types – Owned and earned social metrics – Paid searches and Organic Searches - Aligning Digital and Traditional Analytics – Identifying social media listening tools – Understanding social media engagement software – Social media engagement tools.

UNIT2:TOOLS FORDIGITALANALYTICS(16Lectures)

Social Media Listening Tools - Evolution, Social analytics life cycle, Social media monitoring software: Sysomos, Radian6, Visible Technologies, Zoho social and others. Search Analytics Tools – Basics of search, Search analytics use cases, Search data, Google trends, YouTube trends, Google Adwords keyword, Yahoo clues, Collecting insights through search data. Audience Analysis Tools – Audience Analysis Use Cases, Audience analysis tool types – Audience analysis Techniques, Event Triggers. Content Analysis Tools – Content Audits- Optimizing Content Distribution, Analysing Content Consumption. Engagement Analysis Tools – Social Media Engagement Software (SMES), using SMES, study of different SMES in the market.

UNIT 3: DIGITAL INFLUENCE AND LISTENING(14Lectures)

Reality of Digital Influence - Media List - Klout, PeerIndex - Online Versus Offline Influence - Using the Influencer List - Developing Social Media Listening Program - Using Listening Data for Program Planning - Implementing Listening Program - Conversation Audit - Online Influencers - Conducting Social brand benchmarking - Use of Online data for crisis anticipation - Identifying known issues - Crisis day monitoring and ongoing reporting - Corrections after crisis - Improving customer service – Social customer service conflict - Social customer service models.

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UNIT 4: RESEARCH PLAN AND SEARCH ANALYSIS(10Lectures)

Launching new product – Product life cycle – Introduction Phase – Growth Phase – Maturity Phase.

Formulating research plan – Developing source list – Research methods – Constructing reports –

Delivering reports – Report use cases – Building central repository of information – Search analytics for digital strategy – Search analytics for content strategy and planning – Search analytics for paid advertising.

UNIT 5: ROI, MOBILE ANALYTICS AND BUSINESS INTELLIGENCE(10Lectures)

Return on Investment (ROI) – Return on Engagement, Influence, Experience – Tracking ROI

Understanding measurement fundamentals – Measurement reporting cadence - Mobile Analytics –

Mobile market landscape – Mobile marketing measurement – Marketing activities – Audience/visitor metric – Mobile app performance - Social CRM – Social CRM initiative – Social CRM Initiative – Future of Digital Data – Business Intelligence.

TEXT BOOKS:

1.ChuckHemann and Ken Burbary, “Digital Marketing Analytics: Making Sense of Consumer Data in a Digital World”, Que Publishing, 2nd edition, 2018.

REFERENCE BOOKS:

1.SimonKingsnorth, “Digital Marketing Strategy: An Integrated ApproachMarketing”,KoganPagePublisher,Firstedition,ISBN-13:978-0749474706,2016.

2.DaveChaffey,FionaEllis-Chadwick,“DigitalMarketing–Strategy, Implementationand Practice”,PearsonEducation,Sixthedition,ISBN-13:978-1292077611,2016.

EBOOKS

1.EricEnge, Andy Crestodina, Larry Kim, Steve Rayson and Chad White, “How the Pros TurnMarketing Analytics Into Effective Marketing Strategies”, Alexa, An Amazon Company.<https://blog.alexa.com/wp-content/uploads/2016/12/How-to-Pros-Turn-Marketing-Analytics-into-Effective-Marketing-Strategies-ebook.pdf>

MOOC

1.<https://www.coursera.org/learn/marketing-analytic>



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BCYS0102D-T: FORMS OF CYBER CRIME

UNIT I: Cyber Crimes-Overview

Introduction–History and Development–Definition, Nature and Extent of Cyber Crimes in India and other countries- Classification of Cyber Crimes–Trends in Cyber Crimes across the world.

UNIT II: Forms of Cyber Crimes and Cyber Frauds

Hacking, cracking, DoS– viruses, worms, bombs, logical bombs, time bombs, email bombing, data diddling, salami attacks, phishing, steganography, cyberstalking, spoofing, pornography, defamation, computer vandalism, cyberterrorism, cyberwarfare, crimes in social media, malwares, adware, scareware, ransomware, social engineering, credit card frauds & financial frauds, telecom frauds, Cloud based crimes– understanding fraudulent behaviour, fraud triangle, fraud detection techniques, Intellectual Property Rights and Violation of Intellectual Property rights, E-commerce Frauds and other forms.

UNIT III: Modus Operandi of various Cybercrimes and Frauds

Definition of various types of cyber frauds – Modus Operandi - Fraud triangle – fraud detection techniques including data mining and statistical references-countermeasures.

UNIT IV: Profile of Cybercriminals

Cyber Crime Psychology–Theories dealing with cybercriminals.

UNIT V: Impact of Cybercrimes

Impact on individual, property and to the corporates / companies, to government and thenation.

RECOMMENDED READINGS

Albert J. Marcellaa and Robert S. Greenfiled (Ed) (2002) Cyber Forensics, A Field Manual for collecting, examining and preserving evidence of computer crimes, Auerbach publications.

Derek Atkins et. al., (1997). Internet Security: Professional Reference, Techmedia, Daryaganj, New Delhi
IT Act 2000.

Seymour Goodman and Abraham Sofer (ed.) (2002) The Transnational dimension of cybercrime, Hoover Institution Press Washington.

L: Lecture T: Tutorial P: Practical C: Credits

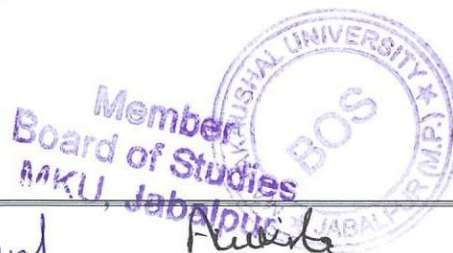
Course Objectives:

The main objectives of this course are

- This course will expose the introductory concepts of cybercrimes
- The impact of cybercrimes and its countermeasures
- The contemporary challenges in cyberspace.
- List the preventive and precautionary measures.

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BCYS0103D-T MOBILE AND WEB APPLICATION SECURITY

UNIT I: Introduction to Mobile Security

Introduction to Mobile Security— Building Blocks— Basic security and cryptographic techniques. Security of GSM Networks— Security of UMTS Networks- LTE Security- Wi-Fi and Bluetooth Security- SIM/UICC Security

UNIT II: Mobile Security Implementation

Mobile Malware and App Security- Android Security Model— IOS Security Model- Security Model of the Windows Phone— SMS/MMS, Mobile Geo location and Mobile Web Security- Security of Mobile VoIP Communications— Emerging Trends in Mobile Security

UNIT III: Security Fundamentals

Introduction to WWW security- Input Validation- Attack surface Reduction- Classifying and prioritizing threats- Hacking Methodology. Security Policies relating to mobile devices- Operation guidelines for implementing mobile devices and security policies

UNIT IV: Web Application Security Principles

Authentication- Authorization- Browser Security Principles- Common Web Application Security Threats: Injection attacks, broken authentication, Cross site Scripting- Cross site Request Forgery, insecure direct object references, security misconfigurations, missing function level access control.

UNIT: Case Studies

Mobile Application Protection Suite- Internet and Service (MAPS): Find & Fix Security issues— Evaluate smart phone security issues- Web Applications Security and Vulnerability Analysis Financial Web Applications Security Audit— Securing Web Applications.

RECOMMENDED READINGS:

Bryan Sullivan, Vincent Liu, — Web Application Security- A Beginner's Guide, McGraw Hill, 1st edition, 2011.

Himanshu Dviwedi, Chris Clark and David Thiel, — Mobile Application Security, 1st Edition, 2010.

Michael Cross, — Developer's Guide to Web Application Security, Syngress Publications, 1st edition, 2007.

Nouredine Boudriga, — Security of Mobile Communications, 2009.



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BCYS0104D-T: CRYPTOGRAPHY

UNIT I: Introduction to Cryptography

Introduction to Cryptography, Security Threats, Vulnerability, Active and Passive attacks, Security services and mechanism, Conventional Encryption Model- Classical Cryptography: Dimension of Cryptography, Classical Cryptographic Techniques.

UNIT II: Block Ciphers and Public Key Cryptography

Data Encryption Standard-Block cipher principles-block cipher modes of operation -CBCM (Cipher-Block Chaining Message Authentication Code) vulnerabilities and mitigation measures-CFB (Cipher Feedback) vulnerabilities and mitigation measures- OFB (Output Feedback) vulnerabilities and mitigation measures- Advanced Encryption Standard (AES). Public key cryptography: Principles of public key cryptosystems-The RSA algorithm- Key management- Diffie- Hellman Key Exchange-Elliptic curve cryptosystem.

UNIT III: Hash Functions and Digital Signature

Authentication requirement-Authentication function-MAC-Hash function-Security of hash function and MAC-MD4 & MD5. Message Digest Algorithm-SHA-HMAC-CMAC-Digital signature and authentication protocols - DSS - Elgamal - Schnorr signature.

UNIT IV: Security Practice and System Security

Authentication applications - Kerberos - X.509 Authentication services - Internet Firewalls for Trusted System: Roles of Firewalls-Firewall related terminology- Types of Firewalls-Firewall designs-SET for E-Commerce Transactions.

UNIT V: E-Mail Security and Case Studies

E-mail Security: Security Services for E-mail-attacks possible through E-mail-Establishing keys privacy-Authentication of the source-Message Integrity-Non-repudiation-Good Privacy-S/MIME-Internet Key Exchange Case Studies on Cryptography and security: Secure Multiparty Calculation, Virtual Elections, Single sign On, Secure Inter-branch Payment Transactions, Crosssite Scripting Vulnerability.

RECOMMENDED READINGS

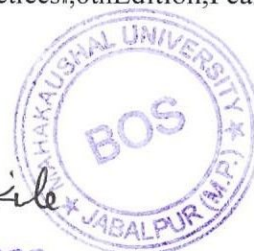
- Atul Kahate, -Cryptography and Network Security I, McGraw Hill, 3rd Edition, 2011.
 Bart Preneel, Christof Paar, Jan Pelzl, -Understanding Cryptography I, Springer-Verlag Berlin Heidelberg, 2010.
 Behrouz A. Forouzan, Debdeep Mukhopadhyay, -Cryptography and Network Security I, Tata McGraw Hill Second Edition, 2010.
 Douglas R. Stinson, -Cryptography: Theory and Practice I, CRC press, 3rd Edition, 2005.
 Wenbo Mao, -Modern Cryptography: Theory and Practice I, Prentice Hall PTR, 1st Edition, 2003.
 William Stallings, -Cryptography and Network Security: Principles and Practices I, 6th Edition, Pearson Education Ltd, 2016

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BCYS0105D-T: ADVANCED NETWORKING AND COMMUNICATION PROTOCOLS

UNIT I: Session Layers

Introduction to the Session Layer and its functions, including establishing, managing, and terminating sessions between applications. Overview of the Session Layer protocols, NetBIOS, RPC, and ZIP, and their features and uses. Overview of the Session Layer services, dialog control, token management, and synchronization. Introduction to the

UNIT II: Presentation and Application Layers

Presentation Layer and its functions, including data representation, data encryption, and data compression. Overview of the Presentation Layer protocols, including JPEG, MPEG, and ASCII, and their features and uses. Overview of the Presentation Layer services, including data conversion, data compression, and data encryption. Introduction to application layer Protocol: Domain Name System (DNS), WWW-Architecture, HTTP Transaction.

UNIT III: Protocols in Network

Introduction to IPv4 Addressing and Subnetting- Subnet Masks and Network Prefix-Address Classes (A, B, C, D, E) - Private IP Addresses and NAT - Variable Length Subnet Mask (VLSM) and CIDR Notation - Subnet Design and Address Allocation - Subnetting and Routing - Broadcast and Multicast Addresses - IPv6 Addressing and Subnetting. Network protocol: HTTP, FTP, PPP, SMTP, TCP/IP, POP3, HTTPS, TELNET, VoIP.

UNIT IV: Protocols and Services

Communication protocols- Address Resolution Protocol (ARP)- Reverse Address Resolution Protocol (RARP)- Internet Control Message Protocol (ICMP)- Internet Protocol (IP)- Transmission Control Protocol (TCP)- User Datagram Protocol (UDP)- American Standard Code for Information Interchange (ASCII)- Hypertext Transfer Protocol (HTTP)- File Transfer Protocol (FTP)- Simple Mail Transfer Protocol (SMTP)- Telnet- Trivial File Transfer Protocol (TFTP)- Post Office Protocol version 3 (POP3) - Internet Message Access Protocol (IMAP)- Simple Network Management Protocol (SNMP)- Domain Name System (DNS)- DNS Flags- Dynamic Host Configuration Protocol (DHCP).

Virtual LANs- Access links and Trunk links- Switchport modes- Vlan Trunking- Server, Client and Transparent modes- VTP Domain- Configuration Revision numbers- Inter Vlan Communications- Broadcast domain- Collision Domain

UNIT V: Principles of Web Services

WWW, HyperText Markup Language (HTML), Extensible Markup Language (XML), domain names. Web services- URL, website, web browser, web servers, web hosting.

RECOMMENDED READINGS:-

Donaldson, S., Siegel, S., Williams, C.K., Aslam, A., —Enterprise Cyber security-How to Build a Successful Cyber defense Program against Advanced Threats, Apress, 1st Edition, 2015.
Behrouz Forouzan, Data Communications and Networking, Fifth Edition, ISBN 978-0-07-337622-6 McGraw Hill.
Andrew S. Tanenbaum, Computer Networks, Fifth Edition, ISBN-13: 978-0-13-212695-3, Pearson
Nina Godbole, Sumit Belapure, —Cyber Security, Wiley, 2011.

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BCYS0106D-T: Cyber forensic analytics

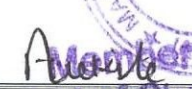
UNIT1: CYBER CRIME:-CyberSpace–CyberCrime–CriminalBehaviour–JurisdictionalConcerns–JurisprudentialInconsistency – eCash Security – Prepaid Cards – Stored Values Cards – Mobile Payments – InternetPaymentServices–Cyberstalking–Cyberextortion–Cyberterrorism–Cyberwarfare–Cyberweapons–ATMfrauds–Phreaking–InternetGambling.

UNIT2: CYBERFORENSICS:Digital device–Harddisk–Diskcharacteristics–Diskimaging–DataCarving–Techniques–commercialpiracy–softlifting–Steganography–Networkcomponents–Portscans–Wireshark–pcap.analysis - Trojans and Backdoors – Botnets - DoS – DDoS Attacks - Honey Pots – Malware – Virus and Worms.

UNIT 3: CYBER INVESTIGATION:-Concepts of Investigation - cyber investigation, Network Investigation - Investigating audit logs - Investigating Web attacks - Investigating Computer Intrusions - Profiling – Cyber Criminal profiling – Stylometric Techniques – Warranted searches – Warrantless searches – Undercover Techniques

UNIT 4: EVIDENCE MANAGEMENT:-Evidence – Digital Evidence - Types – physical evidence – Real evidence – Circumstantial evidence – network evidence - Evidence collection – Evidence Analysis - Contextual Information –Evidence Management – pre search activities – On Scene activities – Report Preparations.

UNIT 5: CYBER LAWS AND AUTHORITIES:-Information Technology Act 2000 – Digital signature - Electronic Governance - Secure electronic records - Regulation of certifying authorities – CERNTin - Electronic signature certificates – Penalties compensation - Future Trends and Emerging Concerns.



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TEXT BOOKS:

1. Marjie T. Britz, "Computer Forensics and Cyber Crime", Pearson, 2013.
2. Garima Tiwari, "Understanding Laws– Cyber Laws And Cyber Crimes", Lexis Nexis, 2014.

REFERENCE BOOKS:

1. Chuck Easttom, Jeff Taylor, "Computer Crime, Investigation, and the Law", Course Technology, 2018.
2. Eoghan Casey, "Digital Evidence and Computer Crime: Forensic Science, Computers, and the Internet", Eoghan Casey, 2018.

E-BOOK

- 1 <http://index-of.es/Miscellaneous/LIVRES/Syngress.Cyber.May.2014.ISBN.0128007435.pdf>
2. <http://index-of.es/Miscellaneous/LIVRES/Syngress.Cyber.May.2014.ISBN.0128007435.pdf>

MOOC

1. <https://www.coursera.org/lecture/cyber-conflicts/introduction-to-cybercrime-and-fundamentalissues-xndSq>.

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BCYS0107D-T: FUNDAMENTALS OF CRIMINOLOGY AND CYBER CRIMINOLOGY**Unit I: Principles and Concepts of Crime**

Crime, Tort, Misdemeanor, - Conventional crimes vs Cyber Crimes. Crimes in India: Statistics, Crime Clock, Crim rate, National Crime records Bureau¹, State Crime records Bureau, and District crime records bureau; Crime patterns and Trends in India² (latest trends should be introduced).

Unit II: Criminology and Cyber Criminology

Criminology, Crime-Definitions³; historical perspectives; nature, origin and scope. Schools of Criminology. Crime Typology Introduction to crimes against persons and crimes against property⁴; Adult and Juvenile-Habitual offenders, Professional offenders, and violent offenders. Cyber Space, Cyber Crime, Cyber Criminology, Information Security, Penetration Testing, Incident Response, GRC, etc.

Unit III: Cyber Crime-Sociological and Criminological Perspectives

Causes of Cyber Crimes-Criminological Theories and Cyber Crime-Routine Activity Theory, Social Learning Theory, Differential Association Theory, Differential Opportunity Theory, Media and Crime and latest theories and other related theories.

Unit IV: Criminal Justice System

Structure of Criminal Justice System in India⁵; Roles of legislature, police, judiciary and prisons system in Criminal Justice; Cooperation and coordination among the various sub

¹ Practical Exposure

² Seminar

³ Discussion

⁴ Assignment

⁵ Jigsaw learning

systems of criminal justice system⁶. Cognizable and non-cognizable offences, bailable and non-bailable offences – arrest, search, seizure – Interrogation of suspects and witnesses – charge sheet – Cyber crime cells – structure & investigation of cyber crime cases.

Unit V: Contemporary Forms of Crimes and Cyber crimes

White Collar Crimes, Economic Offences, Organized Crimes, Cyber crimes, Terrorism, Cyber Warf are, Cyber Bullying & Stalking, Online Sextortion, Sexting, and other contemporary forms of crimes.

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RECOMMENDED READINGS:-

- Ahmed Siddique, (1993), *Criminology, Problems and Perspectives*, III Edn. Eastern Book House, Lucknow.
- Allen, Friday, Roebuck and Sagarin, (1981), *Crime and Punishment: An introduction to Criminology*. The Free Press, New York.
- Brenda S. Griffin and Charles T. Griffin, (1978), *Juvenile Delinquency in perspective*, Harper and Row, New York
- Brendan Maguire & Polly F. Radosh, (1999), *Introduction to Criminology*, Wadsworth Publishing Company, Boston, U.S.A.
- Chockalingam, K. (1997), '*Kuttraviyal*' (Criminology) in Tamil, Parvathi Publications, Chennai.
- Crime in India (Latest edition). National Crime Record Bureau, Ministry of Home Affairs, New Delhi.
- Edwin H. Sutherland and Donald R. Cressey (1974), *Principles of Criminology*, Lippincott, Philadelphia.
- George Vold and Thomas J. Bernard, (1986), *Theoretical Criminology*, Oxford University Press, New York
- Harries, K., (1999) *Mapping Crime—principle and practice*, Crime Mapping Research Center, National Institute of Justice, U.S. Department of Justice, Washington, DC
- Harry Elmer Barnes and Negley K. Teeters, (1966), *New Horizons in Criminology*, Prentice Hall, New Delhi.
- John E. Conklin, J.E., (1981), *Criminology*, Macmillan, London.
- Paranjepe, N.V., (2002). *Criminology and Penology*, Central Law Publications, Allahabad.

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BCYS0108D-T:- CYBER RISKMANAGEMENT

UNITI:IntroductiontoCyberRiskManagement,ThreatsandVulnerabilitiesAssessment

Overview of Risk Management - Cyber Risk Management Framework - Risk Analysis and Evaluation - Types of Risks - Risk Assessment Methods - Risk Management Standards - Risk Management Process - Cyber Risk Management Cycle. Threats and Vulnerabilities- Common Threat Actors-Attack Methods-Vulnerability Scanning and Penetration Testing- Security Controls-Risk Mitigation and Remediation.

UNITII:FrameworksforDigitalForensics

Introduction to digital forensics—Introduction to Frameworks for Digital Forensics-NIST SP 800-86-ISO 27041:2015-Computer Forensic Tool Testing (CFTT)—
—Electronic Evidence Analysis Methodology" (EEAM) by UNODC.

UNITIII:BusinessImpactAnalysisandContinuityPlanning

Business Impact Analysis - Disaster Recovery Planning - Business Continuity Planning - Crisis Management-Incident Response Planning-Communication Planning- Business Continuity Standards.

Legal Frameworks for Cyber Security-Data Protection and Privacy Laws- Regulations and Compliance Requirements- International Cyber Security Law and Cyber Diplomacy- Cyber Insurance.

UNITIV:LegalandComplianceConsiderations

Legal Frameworks for Cyber Security-Data Protection and Privacy Laws- Regulations and Compliance Requirements- International Cyber Security Law and Cyber Diplomacy- Cyber Insurance.

UNITV:RiskMonitoringandRiskCommunication

Risk Monitoring-Continuous Monitoring and Auditing-Risk Metrics-Risk Reporting
- Risk Communication-Information Sharing and Collaboration- Cyber Security Awareness and Training.

RECOMMENDED READINGS:-

- "Enterprise Cybersecurity: How to Build a Successful Cyberdefense Program Against Advanced Threats" by Scott Donaldson, Stanley Siegel, Chris K. Williams, Abdul Aslam
- "Cyber Risk Management: Prioritize Threats, Identify Vulnerabilities and Apply Controls" by Hanno Heintzenberg

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- "The Manager's Guide to Cybersecurity Law: Essentials for Today's Business" by Tari Schreider
- "Cybersecurity for Executives: A Practical Guide" by Gregory J. Touhill and C. Joseph Touhill
- "Introduction to Risk Management and Insurance" by Mark S. Dorfman and David L. Northrup

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BCYS0101SB-T: Internet of Things

Unit-I

(10Lectures)

Introduction – Definition and Characteristics of IoT, Physical Design of IoT; Things in IOT, Logical Design of IoT; IoT Functional Blocks, IoT Communication APIs, IoT Enabling Technologies; WSN, Cloud Computing, Big Data Analysis, Communication Protocols, Embedded Systems.

Unit-II (10Lectures)

(14Lectures) IoT Hardware, Devices and Platforms – Basics of Arduino Hardware, The Arduino IDE, Basic Arduino Programming, Basics of Raspberry pi; Introduction to Raspberry pi, Programming with Raspberry pi, C DAC IoT devices: Ubimote, WiFimote, BLE Mote, WINGZ gateway, Introduction to IoT Platforms, IoT Sensors and actuators.

Unit-III(14Lectures)

IoT Protocols – IoT Data link Protocols, Network Layer Routing Protocols, Network Layer Encapsulation Protocols, Session Layer Protocols, IoT Security Protocols, Service Discovery Protocols, Infrastructure Protocols.

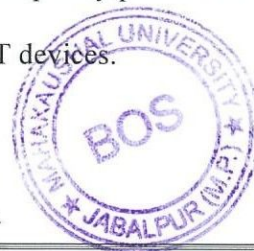
Unit-IV(12Lectures)

IoT Programming – Arduino Programming: Serial Communications – Getting Input from Sensors, Visual, Physical and Audio Outputs,

Remotely Controlling External Devices, Wireless Communication, Programming with Raspberry pi: Basics of python Programming, Python Packages of IoT, IoT Programming with CADC IoT devices.

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Unit-V(10Lectures)

Domain Specific IoT – Home automation, smart cities, Smart Environment, IoT in Energy, Logistics, Agriculture, industry and Health & Lifestyle sensors, Case Studies: A Case Study of Internet of Things Using Wireless Sensor Networks and Smart Phones, Security Analysis of Internet-of-Things: A Case Study of August Smart Lock, Open IoT Platform

Reference Books:

- Vijay Madiseti and Arshdeep Bahga, —Internet of Things (A Hands-on Approach) I, 1st Edition, VPT, 2014.
- Margolis, Michael. —Arduino Cookbook: Recipes to begin, Expand and Enhance Your Projects I. O'Reilly Media Inc. 2011.
- Monk, Simon. Raspberry Pi Cookbook: Software and hardware problems and Solutions. O'Reilly Media, Inc. 2016.
- https://onlinecourses.swayam2.ac.in/aic20_sp06/preview
- https://onlinecourses.swayam2.ac.in/arp19_ap79/preview

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BCYS0102SB-T: Ethical Hacking

Unit-I(14Lectures)

Introduction to Hacking – Importance of Security – Elements of Security – Phases of an Attack – Types of Hacker Attacks – Hacktivism – Vulnerability Research – Introduction to Footprinting – Information Gathering Methodology – Footprinting Tools – WHOIS Tools – DNS Information Tools – Locating the Network Range – Meta Search Engines.

Unit-II(10Lectures)

Introduction to Scanning – Objectives – Scanning Methodology – Tools Introduction to Enumeration – Enumeration Techniques – Enumeration Procedure – Tools.

Unit-III(14Lectures)

Introduction – Cracking Passwords – Password Cracking Websites – Password Guessing – Password Cracking Tools – Password Cracking Countermeasures – Escalating Privileges – Executing Applications – Keyloggers and Spyware.

Unit-IV

(12Lectures)

Programming Fundamentals – C language – HTML – Perl – Windows OS Vulnerabilities – Tools for Identifying Vulnerabilities – Countermeasures – Linux OS Vulnerabilities – Tools for Identifying Vulnerabilities – Countermeasures.

Unit-V(10Lectures)

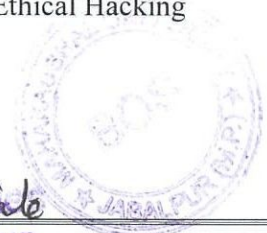
Introduction – Security Assessments – Types of Penetration Testing – Phases of Penetration Testing – Tools – Choosing Different Types of Pen-Test Tools – Penetration Testing Tools.

Reference Books:

- ECCouncil, —Ethical Hacking and Countermeasures: Attack Phases I, Cengage Learning, 2010.
- Jon Erickson, —Hacking, 2nd Edition: The Art of Exploitation I, No Starch Press Inc., 2008.
- Michael T. Simpson, Kent Backman, James E. Corley, —Hands-On Ethical Hacking and Network Defense I, Cengage Learning, 2013.

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- Patrick Engebretson, —The Basics of Hacking and Penetration Testing—Ethical Hacking and Penetration Testing Made Easy!, Second Edition, Elsevier, 2013.
- Rafay Boloch, —Ethical Hacking and Penetration Testing Guide!, CRC Press, 2014
- https://onlinecourses.swayam2.ac.in/aic20_sp06/preview

https://onlinecourses.swayam2.ac.in/arp19_ap79/preview

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BCYS0103SB-T: CRIMINAL LAWS AND CYBERCRIMES

UNIT I: Crime and Criminality

Definitions – Vices, Sin, Tort and Crime – History of criminal law – Constitution, IPC and IEA- Nature and Scope- Doctrine of Actus Reus and Mens Rea, Elements of crime⁷. Evolution of Law.

UNIT II: Legal provisions in Indian Penal Code

Crimes against property – Theft – Robbery – Dacoity. Crimes against persons: Defamation, Extortion, Bullying, Crimes against public tranquillity: Riot, Unlawful assembly.

UNIT III: Criminal Procedure Code (CrPC)

Organizational setup of courts in India. Complaint – inquiry – investigation – police report – public prosecutor – defence counsel – Arrest. Bail, Search. Seizure. Summons – Warrant – Information regarding cognizable and non-cognizable offence. Trials: Summary, Summon, and warrant trials

UNIT IV: Indian Evidence Act

Indian Evidence Act – History in India. Evidence – Meaning, principles, and concept of relevancy and admissibility. Confessions and Dying Declaration. Presumption of fact and law, Burden of proof.

UNIT V: Information Technology Act, 2000 (amended 2008)

Relevance of IT Act – Section 63, 64, 65, 66 (all relevant sections and subsections).

RECOMMENDED READINGS:-

- Guar K.D., (1995) Criminal Law, Oxford University Press
IT Act, 2000 – Bare Act with recent amendments
Kelkar, R. V., (2003) Lectures on Criminal Procedure Eastern book Co., Lucknow.
Krishnamurthy S., (1987), Impact of Social Legislations, on the Criminal Law in India, RR Publishers, Bangalore.
Pillai, A.P. S., (1996) Criminal Law, N.M.
Tripathi, Ratan Lal and Dhirajlal (1995) Code of Criminal Procedure
Sarathy Veppa P., (1994) Elements of Law of Evidence, Eastern book Co., Lucknow.
Singh, A., (1995) Law of Evidence, Allahabad Law agency.

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BCYS0104SB-T CYBERLAWS AND INTELLECTUAL PROPERTY RIGHTS

UNIT I: Introduction

Reorganization of Electronic Records - UNICITRAL Model Law, Legal Aspects of Electronic Records / Digital Signatures - UNICITRAL Model Law, UNICITRAL Model Law relating to the retention of Data Messages, Attributes of Data Messages, Acknowledgement of Data Messages, Time and Place receipt of Data Messages – Securing Electronic Record and electronic/Digital Signature in India – Verification of electronic Signature in India.

UNIT II: Cyber Space

The Cyberspace – Protection of Copyrights of Cyber Space – Rights of Software Owners – Infringement of Copyright – remedies for infringement of Copyright on Cyberspace – The liabilities of an Internet Service Provider (ISP) in Cyberspace – Cyberspace and the Protection of Patents in India.

UNIT III: Tribunal

Cyber Appellate tribunal - Its Function and Powers under IT Act – Obscenity and pornography on Cyberspace – Hacking on Cyberspace on Internet – Other Offences – violation of the Right of Privacy on Cyberspace/Internet – Punishment for violation of Privacy, Breach of Confidentiality and Privacy under the IT Act – Terrorism on Cyberspace/ Internet.

UNIT IV: Cyber Crimes Investigation

An Overview of Cyber Crimes – Indian Evidence Act – Examiner of Electronics Act – Amendments Introduced in Indian Evidence Act, 1872 – Relevant Provisions under IT Act as Amended up to 2008 – IT (Certifying Authorities) Rules, 2000 – Ministerial Order on Blocking of Websites – The IT (Use of Electronics Records and Digital Signatures) Rules 2004.

UNIT V: Intellectual Property Rights

Concept of IPR- Patents- Indian Patent Act - Patent databases- patent information system- preparation of patent documents- trademarks- copyrights- industrial designs- geographical indication- protection of trade secrets- management and valuation of intellectual property.

RECOMMENDED READINGS:-

Cyber Law & IT Protection, Eastern Economy Edition, by Harish Chander. Cyber Law: the law of Internet – Jonathan Rosenor, Springer, 1997.

Mark F Grady, Francesco Parisi August 2011. The Law and Economics of Cyber Security

Cyber law: National and International Perspectives by Roy J. Girasa and

2001 Intellectual Property Rights – Law and Practice Institute of Company Secretaries of India 2014

Law Relating to Patents, Trademarks, Copyright, Designs and Geographical Indications by BL Wade
ISBN-13: 978-8175341852 Universal Book Traders; 2nd edition

IT Act, 2000 (Bare Act with amendments)

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BCYS0105SB-T: INFORMATION SECURITY AND AUDIT

UNIT I: Model for Internet Network Security

Conventional Encryption Principles & Algorithms (DES, AES, RC4, Blowfish), Block Cipher Modes of Operation, Location of Encryption Devices, Key Distribution, Public key cryptography principles, public key cryptography algorithms (RSA, Diffie-Hellman, ECC), public Key Distribution.

UNIT II: Approaches of Message Authentication

Secure Hash Functions (SHA-512, MD5) and HMAC, Digital Signatures, Kerberos, X.509 Directory Authentication Service, Email Security: Pretty Good Privacy (PGP) IP Security: Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.

UNIT III: Web Security Requirements

Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET). Firewalls: Firewall Design principles, Trusted Systems, Intrusion Detection Systems.

UNIT IV: Security Audit

Introduction, Basic Terms Related to Audits, Security audits, The Need for Security Audits in Organization, Organizational Roles and Responsibilities for Security Audit, Auditors responsibility in Security Audits, Types of Security Audits.

UNIT V: Case Studies

Approaches to Audits, Technology based Audits Vulnerability Scanning and Penetration Testing, Resistance to Security Audits, Phase in security audit, Security audit Engagement Costs and other aspects, Budgeting for security audits, Selecting external Security Consultants, Key Success factors for security audits.

RECOMMENDED READINGS:-

- A.J. Elbirt, — Understanding and Applying Cryptography and Data Security, CRC Press, Taylor Francis Group, New York, 2015.
- M. Merkow and J. Breithaupt, — Information Security: Principles and Practices, Pearson Education, 2006.
- Mark Stamp, — Information Security, Wiley-INDIA, 2006.
- Rick Lehtinen, Deborah Russell & G.T. Gangemi Sr., — Computer Security Basics, SPDO-REILLY 2006.
- Robert Bragg, Mark Rhodes, — Network Security: The complete reference, TMH, 2017.
- W. Stalling, — Cryptography and Network Security Principles and Practices, 7th Edition, Pearson of India, 2018.
- Wenbo Mao, — Modern Cryptography, Pearson Education 2007.
- Whitman, — Principles of Information Security, CENGAGE Learning Custom Publishing, 4th ed. Edition, 2011.

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Open Elective Compulsory

Course/Generic Elective Compulsory

Course



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OECC0101-T: Fundamental of Computer

UNIT I

Brief History of Development of Computers, Computer System Concept, Computer System

Characteristics, Capabilities and Limitations, Types of Computers-., Personal Computer (PCs) - IBM PCs, Types of PCs- Desktop, Laptop, Notebook, Palmtop, etc. Basic Components of a Computer System- Control Unit, ALU, Input/Output semiconductor Memory. Storage fundamentals - Primary Vs Secondary memory.

UNIT II

Input Devices : Keyboard, Mouse, Joystick, Scanners, Digital Camera, MICR, OCR, OMR, , Light pen, TouchScreen. Output Devices Monitors - Characteristics and types of monitor, Size, Resolution, Refresh Rate, Dot Pitch, Video Standard - VGA, SVGA, XGA etc. Printers - Daisy wheel, Dot Matrix, Inkjet, Laser. Plotter, Sound Card and. Speakers.

UNIT III

Various Storage Devices - Magnetic Disks, Hard Disk Drives, Floppy, Disks, Optical Disks, Computer Software, Need, Types of Software's - System software, Application software System Software - Operating System, compiler, Assemblers, Interpreter .

UNIT IV

Operating Systems – Functions , Types- Batch, Single, Multiprogramming, Multiprocessing Programming languages- Machine, Assembly, High Level, 4GL, Application Software - Word-processing, Spreadsheet, Presentation Graphics, Data Base Management Software, Number System, Number System of computers- Binary, Octal, Hexadecimal, their conversion. Coding System – ASCII, EBCDIC.

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UNIT V

Direction of Transmissions Flow-Simplex, Half Duplex Full Duplex, Types of Network - LAN, WAN, MAN etc. Topologies of LAN- Ring, Bus, Star, Mesh and Tree topologies. Computer Virus: Virus working principals, Types of viruses, Virus detection and Prevention Viruses on network.

TEXT & REFERENCE BOOKS :

COMPUTERS TODAY BY S.K. BASANDRA, GALGOTIA PUBLICATIONS.

FUNDAMENTALS OF INFORMATION TECHNOLOGY BY ALEXIS LEON & MATHEWS LEON,
VIKAS PUBLISHING HOUSE, NEW DELHI.

DOS QUICK REFERENCE BY RAJEEV MATHUR, GALGOTIA PUBLICATIONS.

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