,

HAVERI UNIVERSITY, HAVERI

03 - Year B.Sc. (Computer Science)

Program

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SYLLABUS

Subject: Computer Science

[Effective from 2024-25]

DISCIPLINE SPECIFIC CORE COURSE (DSC) FOR SEM I – IV,

SKILL ENHANCEMENT COURSE (SEC) FOR SEM IV/V/VI AND

ELECTIVE COURSES FOR SEM V AND VI

B.Sc. (Computer Science)
Academic Year 2024-25

Sem.	Type of Course	Theory/ Practical	Course Code	Subject Title	Credits	No. of hour per week Theory / Practical	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
I	DSC-1	Theory	C1CS1T1	Computer Fundamentals and Programming in C	4	4 hrs.	3 hrs.	20	80	100
	DSC-2	Practical	C1CS1P1	C programming Lab	2	4 hrs.	3 hrs.	10	40	50
II	DSC-3	Theory	C2CS1T1	Object Oriented Programming using Java	4	4 hrs.	3 hrs.	20	80	100
	DSC-4	Practical	C2CS1P1	Java Programming Lab	2	4 hrs.	3 hrs.	10	40	50
III	DSC-5	Theory	C3CS1T1	Data Structures	4	4 hrs.	3 hrs.	20	80	100
	DSC-6	Practical	C3CS1P1	Data Structure Lab using Java	2	4 hrs.	3 hrs.	10	40	50

Academic Year 2024-25

Sem.	Type of Course	Theory/ Practical	Course Code	Subject Title	Credits	No. of hour per week Theory / Practical	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
IV	DSC-7	Theory	C4CS1T1	Data Base Management System	4	4 hrs.	3 hrs.	20	80	100
	DSC-8	Practical	C4CS1P1	DBMS Lab (using MySQL)	2	4 hrs.	3 hrs.	10	40	50
V	DSC-9A DSC-10A	Theory	C5CS2T1 C5CS2T2	1. Web Technologies 2. Python Programming	4	4 hrs.	3 hrs.	20	80	100
	DSC-9B DSC-10B	Practical	C5CS2P1 C5CS2P2	1. Web Technology Lab 2. Python Programming Lab	2	4 hrs.	3 hrs.	10	40	50
	EC-1	Theory	C5CS5T1	Computer Concepts and Office Automation	3	3 hrs.	3 hrs.	20	80	100
VI	DSC-11A DSC-11B	Theory	C6CS2T1 C6CS2T2	1. Artificial Intelligence 2. Cryptography and Information Security	4	4 hrs.	3 hrs.	20	80	100
	DSC-12A DSC-12B	Practical	C6CS2P1 C6CS2P2	1. Artificial Intelligence Lab 2. Cryptography and Information Security Lab	2	4 hrs.	3 hrs.	10	40	50
	EC-2	Theory	C6CS5T1	Cyber Security and cyber Laws	3	3 hrs.	3 hrs.	20	80	100
IV/ V / VI	**Skills**	Practical	C4CS6T1	Java Script Programming	2	3 hrs.	3 hrs.	10	40	50

* Student shall either DSC 9A and DSC 10A or DSC 9B and DSC 10B in 5th semester. Similarly, DSC 11A and DSC 12A or DSC 11B and DSC 12B in 6th semester.

** Student shall study Skill of this subject either in IV/ V / VI but not in all the semester.

Karnatk University, Dharwad

B.Sc. (Computer Science)

Programme Specific Outcomes (PSO):

On completion of the 03 years Degree in Computer Science students will be able to:

- Demonstrate, solve and understand the major concepts in all the disciplines of Computer Science.
- Understand practical skills so that they can understand and assess risks and work safely and competently in the laboratory.
- To apply standard methodology to the solutions of problems in Computer Science
- Provide students with the ability to plan and carry out experiments independently and assess the significance of outcomes.
- Develop in students the ability to adapt and apply methodology to the solution of unfamiliar types of problems.
- Employ critical thinking and the scientific knowledge to design, carry out, record and analyse the results of Computer Science.
- To build confidence in the candidate to be able to work on his own in industry and institution of higher education.
- To develop an independent and responsible work ethics.

B.Sc. Semester – I

Subject Title (Theory): Computer Fundamentals and Programming in 'C'

Course code	Type of Course	Theory / Practical	Credits	Instruction hour per week	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
C1CS1T1	DSC-1	Theory	04	04	3hrs	20	80	100

Course Outcome (CO): After completion of course (Theory), students will be able to:

CO 1: Familiarize with fundamental concepts and computer programming.

CO 2: Learn fundamental concepts of programming by developing and executing programs in C.

CO 3: Focuses on the structured program.

CO 4: Various constructs and their syntax.

Total Hrs.: 60

Unit I **15 hrs.**

Computer Fundamentals: History & Evolution of Computers. Characteristics, Types and Generations of Computers. System logical Organization: Von - Neumann concept of computer with block diagram: Components of Computer & their functions. Input Devices, Output Devices, Storage Devices. Processor & Main Memory: Central Processing Unit: ALU & CU. Architecture of Processor & Main Memory, Processor Registers, Main Memory: Organization of Main Memory, Main Memory Capacity. RAM, ROM, PROM, EPROM, EEPROM, Cache Memory.

Computer Software: Types of Software: System Software & Application Software. Translators: Compiler, Interpreter Linker, Loader and Editor. Computer Languages: Machine Level, Assembly Level & High Level, Their Merits & Demerits. Planning a Computer Program: Algorithm, Flowchart and Pseudo code.

Unit II **15 hrs.**

Introduction to C: Over View of C: Introduction. Importance and Features of C. Structure of a C Program. Sample C Programs. Creating and Executing a C Program. Block diagram of execution of C program. Basic Concepts: C Character Set. C tokens: keywords, identifiers, constants and variables. Data types. Declaration & initialization of variables. Symbolic constants. Formatted I/O functions: *printf* and *scanf*: control stings and escape sequences, output specifications with *printf* functions. Unformatted i/o functions to read and display single character and a string: *getchar, putchar, gets* and *puts* functions.

Operators & Expressions: Arithmetic operators, Relational operators, Logical operators, Assignment operators, increment & decrement operators, bitwise operators, conditional operator and special operators. Computational Problems, Operator Precedence and Associatively. Evaluation of arithmetic expressions, Type conversion.

Unit III **15 hrs.**

Control Structures (Branching & Looping): Decision making with *if* statements: *simple if, if_else* statements, *nested if_else* and *else_if ladder. Switch case* Statement. *goto, break* & *continue* statements. Looping Statements: Entry controlled and Exit controlled, *while, do-while* & *for* loops. Nested loops.

Arrays and Strings: One Dimensional arrays: Declaration, Initialization and Memory representation. Two Dimensional arrays: Declaration, Initialization and Memory representation. Declaring & Initializing string variables. String handling functions: *strlen, strcmp, strcpy and strcat.* Character handling functions: *toascii, toupper, tolower, isalpha, isnumeric* etc.

Unit IV **15 hrs.**

User Defined Functions: Need for user defined functions. Format of C user defined functions. Components of user defined functions: return type, name, parameter list, function body, return statement and function call. Categories of User defined functions: with and without parameters and return type.

Structures & Unions: Definition of Structure & Union. Declaring structure variables, Accessing structure members, Structure members initialization, Difference between structure and union.

Text Books:

1. P. K. Sinha & Priti Sinha: Computer Fundamentals (BPB)
2. V. Rajaraman: Computer Fundamentals
3. E. Balguruswamy: Programming in ANSI C (TMH)
4. V. Rajaraman: Programming in C (PHI – EEE)
5. Yashwant Kanitkar: Let us C
6. P.B. Kottur: Programming in C (Sapna Book House)

Reference Books:

1. Moris mano: Computer Organization & Architecture
2. Norton: Computer Applications
3. Kamthane: Programming with ANSI and TURBO C (Pearson Education)
4. S. Byron Gottfried: Programming with C (TMH)
5. Kernighan & Ritche: The C Programming Language. (PHI)

Formative Assessment for Theory	
Assessment Occasion/ type	**Marks**
Internal Assessment Test 1	05
Internal Assessment Test 2	05
Assignment	10
Total	20
Formative Assessment as per guidelines	

Subject Title (Practical): C – Programming Lab

Course code	**Type of Course**	**Theory / Practical**	**Credits**	**Instruction hour per week**	**Duration of Exam**	**Formative Assessment Marks**	**Summative Assessment Marks**	**Total Marks**
C1CS1P1	DSC-2	Practical	02	04	3hrs	10	40	50

Course Outcome (CO): After completion of course (Practical), students will be able to:

CO 1: Understand the basics of programming by executing the simple programming

CO 2: Be able to design & execution of code.

CO 3: Have practical knowledge of arrays, strings & functions

List of Experiments:

1. Find the area of a circle and area of a triangle given three sides.
2. Largest of three numbers.
3. Reversing the digits of an integer.
4. GCD of two integers.
5. Generating prime numbers.
6. Computing nth Fibonacci numbers.
7. Finding Even and Odd numbers.
8. Exchanging the values of two variables.
9. Counting: Print number from 100 to 200 which are divisible by 7 and display their sum and count using for loop.
10. Summation of set of Numbers.
11. Factorial Computation.
12. Generation of Fibonacci sequence.
13. Array Order Reversal.
14. Finding the Maximum Number in a Set.
15. Removal of Duplicates from an Ordered Array.
16. Partitioning an Array.
17. Finding the k^{th} Smallest Element.
18. Read N (minimum 5) students marks and find number of students passed and fail depending on the marks.
19. Count the number of vowels, consonants and special characters in a given sentence.
20. To find the addition and subtraction of two matrices using function

B.Sc. Semester – II

Discipline Specific Course (DSC)

Subject Title (Theory): Object Oriented Programming using JAVA

Course code	Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks

C1CS1T1	DSC-1	Theory	04	04	60hrs	3hrs	20	80	100

Course Outcome (CO): After completion of course (Theory), students will be able to:

CO 1: Explain the object-oriented concepts using JAVA. CO 2: Implement Classes, objects and constructors.

CO 3: Write JAVA programs using OOP concepts like Abstraction, Encapsulation, Inheritance and Polymorphism.

CO 4: Implement multithreading using JAVA.

CO 5: Demonstrate the basic principles of creating Java applications with GUI.

Unit I	Introduction to Java: Basics of Java programming, Data types, Variables, Operators, Control structures including selection, Looping, Java methods, Overloading, Math class, Arrays in java. Objects and Classes: Basics of objects and classes in java, Constructors, Finalizer, Visibility modifiers, Methods and objects, Inbuilt classes like String, Character, String Buffer, File, this reference.	15 hrs.
Unit II	Inheritance and Polymorphism: Inheritance in java, Super and sub class, Overriding, Object class, Polymorphism, Dynamic binding, Generic programming, Casting objects, Instance of operator, Abstract class, Interface in java, Package in java, UTIL package.	15 hrs.
Unit III	Event and GUI programming: Event handling in java, Event types, Mouse and key events, GUI Basics, Panels, Frames, Layout Managers: Flow Layout, Border Layout, Grid Layout, GUI components like Buttons, Check Boxes, Radio Buttons, Labels, Text Fields, Text Areas, Combo Boxes, Lists, Scroll Bars, Sliders, Windows, Menus, Dialog Box, Applet and its life cycle, Introduction to swing, Exceptional handling mechanism.	15 hrs.
Unit IV	I/O programming: Text and Binary I/O, Binary I/O classes, Object I/O, Random Access Files. Multithreading in java: Thread life cycle and methods, Runnable interface, Thread synchronization, Exception handling with try catch-finally, Collections in java, Introduction to JavaBeans and Network Programming	15 hrs.

References:

1. Programming with Java, By E Balagurusamy – A Primer, 4th Edition, McGraw Hill Publication.
2. Core Java Volume I – Fundamentals, By Cay S. Horstmann, Prentice Hall.
3. Object Oriented Programming with Java: Somashekara M.T., Guru, D.S., Manjunatha K.S, 1st Edition, PHI Learning 2017.
4. Java 2 - The Complete Reference, Herbert Schildt, 5th Edition, McGraw Hill Publication, 2017.
5. Java - The Complete Reference, Herbert Schildt, 7th Edition, McGraw Hill Publication, 2017.

B.Sc. Semester – II

Course: Computer Science

Discipline Specific Course (DSC) Course No.3 (Practical): 033CSC012 Title of the Course: JAVA Lab

Subject Title (Practical): Java Programming Lab

Course code	Type of Course	Theory / Practical	Credits	Instruction hour per week	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
C1CS1P1	DSC-2	Practical	02	04	3hrs	10	40	50

Course Outcomes (COs):

At the end of the course, (Practical), students will be able to:

CO: Student would be able to implement OOP's concepts using JAVA.

List of Experiments for 52 hrs/ Semester.

Operators, Decision making and Loops:

1. Write a Java program to read the radius of a circle and to find the area and circumference.
2. Write a program to demonstrate String Operators
3. Write a Java program to find N prime numbers reading N as command line argument.
4. Write a program to find factorial of N numbers reading N as command line argument.
5. Write a program to read N numbers and sort them using one-dimensional arrays.

Classes and Methods:

6. Write a Java program to illustrate Method Overloading.
7. Write a Java program to illustrate Operator Overloading.
8. Write a program to demonstrate Single Inheritance.
9. Write a program to illustrate Constructor Overloading
10. Write a program to illustrate Method Overriding

Packages, Threads and Exception Handling:

11. Write a Java program demonstrating Multithreading.
12. Write a Java program demonstrating Exception Handling.
13. Write a Java program to demonstrate user defined package program.

Java Applet Programming

14. Write an Applet program to display Geometrical Figures using objects.
15. Write an Applet program which illustrate Scroll bar object.
16. Write an Applet program to change the background color randomly.
17. Write an Applet program to change the color of applet using combo box.
18. Write an Applet program to implement Digital Clock using thread.

Event Handling:

19. Write an Applet program to implement Mouse events.
20. Write an Applet program to implement Keyboard events.

Note: A minimum of 20 assignments should be done by each student.

General Instructions

Implement all programs using JAVA.

Scheme of Practical Examination (distribution of marks): 25 marks for the Semester end examination

1. **7 Marks (Writing Program 1 + Execution without error)**
2. **7 Marks (Writing Program 2 + Execution without error)**
3. **Viva 6 marks**
4. **Journal 5 Marks**

Total 25 Marks

Note: Same scheme may be used for IA (Formative Assessment) examination.

B.Sc. Semester – III

Subject Title (Theory): Data Structures

Course code	Type of Course	Theory / Practical	Credits	Instruction hour per week	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
C2CS1T1	DSC-3	Theory	04	04	3hrs	20	80	100

Course Outcome (CO): After completion of course (Theory), students will be able to:

CO 1 : To impart the basic concepts of data structures and algorithms.
CO 2 : To familiar with data structural algorithms such as sorting & searching, stack & queue, linked list and trees.
CO 3 : To be familiar with some graph algorithms such as binary tree representation of tree and operations on trees.
CO 4 : To understand the basic concepts of tree traversal.

CO 5 : How to use basic data structure for program implementation.

Total Hrs.: 60

Unit I: **15 hrs.**

Introduction to Data Structure: Structure Definition, Initialization, Array as structure, Array within structure, Union. Understanding pointers, Declaring and initializing pointers, accessing a variable through its pointer, static and dynamic memory allocation.

Definition of Data Structure, Classification of Data Structure: Primitive and Non-Primitive, Operations on Data Structure, Review of Array.

Unit II: **15 hrs.**

Searching and Sorting: Searching Definition, Searching Techniques: Sequential search, Binary search. Comparison Between sequential and binary searching. Sorting Definition, Sorting Techniques: Bubble sort, Merge sort, Selection sort, Quick sort, Insertion Sort, Heap sort.

Unit III: **15 hrs.**

Stack and Queue: Definition of stack, Array Representation of Stack, Linked List Representation of stack, Operation Performed on Stack, Infix, Prefix, Postfix notations, Conversion of arithmetic expressions, Application of stack. Definition of Queue, Array Representation of Queue, Types of Queue: Simple queue, Circular queue, Double ended queue, Priority queue, Operations on all types of queue.

Unit IV: **15 hrs.**

Linked List: Definition, Representation of linked lists in Memory, Types of linked list: Singly linked list, doubly linked list, and Circular linked list. Operations on linked list: Creation, Insertion, Deletion, Search, Display and Traversing. Advantages and disadvantages of linked list.

Trees: Definitions, Tree terminology, Binary tree, Complete binary tree. Operations on Binary Trees, Representation of binary tree.

Text Books

1. Kamthane: Introduction to Data Structure in C. Pearson education 2005.
2. Fundamentals of Data structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan Anderson-Freed, Universities Press.

References

1. Data Structures using C, A.M. Tanenbaum, Y. Langsam, M.J. Augenstein, Pearson.
2. Data structures and Program Design in C, 2nd edition, R. Kruse, C.L. Tondo and B. Leung, Pearson.
3. Data structures A Programming Approach with C, D.S. Kushwaha and A.K. Misra, PHI.
4. E. Balaguruswamy, Programming in ANSI C, Tata Mc Graw-Hill.

Formative Assessment for Theory	
Assessment Occasion/ type	**Marks**
Internal Assessment Test 1	05
Internal Assessment Test 2	05
Assignment	10
Total	20
Formative Assessment as per guidelines	

Subject Title (Practical): Data Structures Lab Data Structures Using JAVA

Course code	**Type of Course**	**Theory / Practical**	**Credits**	**Instruction hour per week**	**Duration of Exam**	**Formative Assessment Marks**	**Summative Assessment Marks**	**Total Marks**
C2CS1P1	DSC-4	Practical	02	04	3hrs	10	40	50

Course Outcome (CO): After completion of course (Practical), students will be able to:

CO 1 : Be able to design & implement list data structure using
- i. Stack & Queue
- ii. Linked list
- iii. Singly & doubly linked list

CO 2 : Design & implement searching and sorting by applying various operations.

CO 3 : Design & implement basic operation on trees.

List of the Experiments for 52 hrs. / Semesters

1. Write a Program to create, Initialize and access a pointer variable.
2. Write a Program to Calculate the length of the string using a pointer.
3. Write a Program to swap numbers using pointer.
4. Write a program in C to print all permutations of a given string using pointers.
5. Write a Program to store n students information using structure.
6. Write Program to implement Push, Pop and Traverse operation on STACK.
7. Write Program to convert infix notation to postfix notation.
8. Write Program to convert Infix notation to prefix notation.

9. Write a program to convert Prefix notation to postfix notation.
10. Write Program to perform the operation Insert, Delete and Display on Queue.
11. Write Program to implement Circular queue.
12. Write Program to implement Double ended queue.
13. Write Program to implement Priority queue.
14. Write a Program to search an element using Linear search.
15. Write a Program to sort given Array using Insertion sort technique.
16. Write a Program to sort given Array using Bubble sort technique.
17. Write a Program to sort given Array using Quick sort technique.
18. Write a Program to sort given Array using selection sort technique.
19. Write Program to implement Singly Linked List.
20. Write Program to implement Double Linked List.

B.Sc. Semester – IV

Subject Title (Theory): Data Base Management System

Course code	Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
C4CS1T1	DSC-7	Theory	04	04	60hrs	3hrs	20	80	100

Course Outcomes (COs):

At the end of the course, students will be able to:

CO 1: Explain the various database concepts and the need for database systems.

CO 2: Identify and define database objects, enforce integrity constraints on a database using DBMS.

CO 3: Demonstrate a Data model and Schemas in RDBMS.

CO 4: Identify entities and relationships and draw ER diagram for a given real-world problem.

CO 5: Convert an ER diagram to a database schema and deduce it to the desired normal form.

CO 6: Formulate queries in Relational Algebra, Structured Query Language (SQL) for database manipulation.

CO 7: Explain the transaction processing and concurrency control techniques.

DSC4: Database Management Systems (DBMS)

Unit I	**Database Architecture:** Introduction to Database system applications. Characteristics and Purpose of database approach. People associated with Database system. Data models. Database schema. Database architecture. Data independence. Database languages, interfaces, and classification of DBMS.	15 hrs.
Unit II	**E-R Model:** Entity-Relationship modeling: E – R Model Concepts: Entity, Entity types, Entity sets, Attributes, Types of attributes, key attribute, and domain of an attribute. Relationships between the entities. Relationship types, roles and structural constraints, degree and cardinality ratio of a relationship. Weak entity types, E -R diagram.	15 hrs.

Unit III	**Relational Data Model:** Relational model concepts. Characteristics of relations. Relational model constraints: Domain constrains, key constraints, primary & foreign key constraints, integrity constraints and null values. Relational Algebra: Basic Relational Algebra operations. Set theoretical operations on relations. JOIN operations Aggregate Functions and Grouping. Nested Sub Queries-Views. Introduction to PL/SQL & programming of above operations in PL/SQL.	15 hrs.
Unit IV	**Data Normalization:** Anomalies in relational database design. Decomposition. Functional dependencies. Normalization. First normal form, Second normal form, Third normal form. Boyce-Codd normal form. **Query Processing Transaction Management:** Introduction Transaction Processing. Single user & multiuser systems. Transactions: read & write operations. Need of concurrency control: The lost update problem, Dirty read problem. Types of failures. Transaction states. Desirable properties (ACID properties) of Transactions. Concurrency Control Techniques: Locks and Time stamp Ordering. Deadlock & Starvation.	15 hrs.

References:

1. Fundamentals of Database Systems, RamezElamassri, Shankant B. Navathe, 7th Edition, Pearson, 2015
2. An Introduction to Database Systems, Bipin Desai, Galgotia Publications, 2010.
3. Introduction to Database System, C J Date, Pearson, 1999.
4. Database Systems Concepts, Abraham Silberschatz, Henry Korth, S.Sudarshan, 6th Edition, McGraw Hill, 2010.
5. Database Management Systems, Raghu Rama Krishnan and Johannes Gehrke, 3rd Edition, McGraw Hill, 2002

Formative Assessment for Theory	
Assessment Occasion/ type	**Marks**
Internal Assessment Test 1	05
Internal Assessment Test 2	05
Assignment	10
Total	20
Formative Assessment as per guidelines	

Subject Title (Practical): DBMS LAB(Using MySQL)

Course code	Type of Course	Theory / Practical	Credits	Instruction hour per week	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
C4CS1P1	DSC-8	Practical	02	04	3hrs	10	40	50

Course Outcomes (COs): At the end of the course(practical), students will be able to:

CO1.Design a database schema for a given problem domain.

CO2. Employ SQL DDL/DML commands to create, secure, populate, maintain, and query a database.

CO3. Create query using SQL commands as solutions to a broad range of query and data update problems.

CO4: Employ integrity constraints on a database design.

Programs:

1. A) Create the following relation for the student:

Student (regno : string , name : string, class :string, bdate: date, marks1:int, marks1:int, marks2:int, marks3:int)

i. Enter atleast five tuples of the above relation
ii. Demonstrate the usage of following clauses for the above relation
    a. Where c. Having
    b. Order By d. Group By
iii. Demonstrate the usage of following clauses for the above relation
    a. Sum c. Count e. Between
    b. Avg d. Like f. Max & Min
iv. Demonstrate the rollback and commit command for the above relation

B) Consider the following database that maintain information about employees & Departments.

Employee(empid: int, ename:string, age:int, salary:int, #deptno:int)

Department(deptno:int, dname: string, #manager-id: int)

i. Create the above tables by properly specifying the primary keys & foreign keys.
ii. Enter at least 5 tuples for each relation.
iii. Display emp-id & emp name whose salary lies between 10,000 and 50,000.
iv. List empname & salary for all the employee working for CS Dept.
v. Display empname & deptname for all the managers.

2. Consider the following schema for Order Database:
SALESMAN (Salesman_id, Name, City, Commission)

CUSTOMER (Customer_id, Cust_Name, City, Grade,Salesman_id)

ORDERS (Ord_No, Purchase_Amt, Ord_Date, #Customer_id, Salesman_id)

Write SQL queries to

i. Count the customers with grades above Bangalore's average.
ii. Find the name and numbers of all salesmen who had more than one customer.
iii. List all salesmen and indicate those who have and don't have customers in their cities (Use UNION operation.)
iv. Create a view that finds the salesman who has the customer with the highest order of a day.
v. Demonstrate the DELETE operation by removing salesman with id 1000. All his orders must also be deleted.

3. Consider the Insurances database given below. The primary keys are underlined and the data types are specified.

PERSON (DRIVER-ID#: string, name: string, address: string)

CAR (Regno: string, model: string, year: int)

ACCIDENT (report-number: int, date: date, location: string)

OWNS (#driver-id: string, #Regno: string)

PARTICIPATED (#driver-id: string, #Regno: string, #report-number: int,

Damage amount: int)

i. Create the above tables by property specifying the primary keys and the foreign keys.
ii. Enter atleast five tables for each relation.
iii. Demonstrate how you
a. Update the damage amount for the car with a specific Regno in the accident with report number 12 to 25000.
b. Add a new accident to the database.
iv. Find the total number of people who owned cars that were involved in accidents in 2002.
v. Find the total number of accidents in which cars belonging to a specific model were involved

4. The following tables are maintained by a book dealer.

AUTHOR (<u>author-id:</u> int, name: string, city: string, country: string)

PUBLISHER (<u>publisher-id</u>: int, name: string, city: string, country: string)

CATALOG (<u>book-id</u>: int, title: string, author-id#: int, publisher-id#: int, category-id#: int, year: int, price: int)

CATEGORY (<u>category-id</u>: int, description: string)

ORDER-DETAILS (<u>order-no</u>: int, #book-id: int, quantity: int)

i. Create the above tables by properly specifying the primary keys and the foreign keys.

ii. Enter at least five tuples for each relation.
iii. Give the details of the authors who have 2 or more books in the catalog and the price of the books is greater than the average price of the books in the catalog.
iv. Find the author of the book, which has maximum sales.
v. Demonstrate how you increase the price of books published by a specific publisher by 10%.

5. Consider the following database of student enrolment in courses and books adopted each course.

STUDENT (<u>regno</u>: string, name: string, major: string, bdate: date)

COURSE (<u>course</u>: int, cname: string, dept: string)

ENROLL (#regno: string, course#: int, <u>sem:</u> int marks: int)

TEXT (<u>book-ISBN</u>: int, book-title: string, publisher: string, author: string)

BOOK_ADOPTION (course#: int, sem: int, book-ISBN#: int)

a. Create the above tables by properly specifying the primary keys and the foreign Keys.

i. Enter at least five tuples for each relation.

ii. Demonstrate how you add a textbook to the database and make this book be adapted by some department.

iii. Produce list of textbooks (include Course#, Book-ISBN, Book-title) in the alphabetical order for courses offered by the CS department that use more than two books.

iv. List any department that has its adopted books published by a specific publisher.

6. Consider the following database for library management system

BOOK (Book_id, Title, Publisher_Name, Pub_Year)

BOOK_AUTHORS (#Book_id, Author_Name)

PUBLISHER (Name, Address, Phone)

BOOK_COPIES (#Book_id, #Branch_id, No-of_Copies)

BOOK_LENDING (#Book_id, #Branch_id, Card_No, Date_Out, Due_Date)

LIBRARY_BRANCH (Branch_id, Branch_Name, Address)

Write SQL queries to

i. Retrieve details of all books in the library – id, title, name of publisher, authors, number of copies in each branch, etc.

ii. Get the particulars of borrowers who have borrowed more than 3 books, but from Jan 2017 to Jun2017

iii. Delete a book in BOOK table. Update the contents of other tables to reflect this data manipulation operation.

iv. Create a view of all books and its number of copies that are currently available in the Library.

7. Consider the schema for Company Database:

EMPLOYEE (SSN, Name, Address, Sex, Salary, #SuperSSN, DNo)

DEPARTMENT (DNo, DName, MgrSSN, MgrStartDate)

DLOCATION (#DNo,DLoc)

PROJECT (PNo, PName, PLocation, #DNo) WORKS_ON (#SSN,# PNo, Hours)

Write SQL queries to

i. Make a list of all project numbers for projects that involve an employee whose last name is ‘Scott’, either as a worker or as a manager of the department that controls the project.
ii. Show the resulting salaries if every employee working on the ‘IoT’ project is given a 10 percentraise.
iii. 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.
iv. Create a view with columns dept name and dept location. Display name of dept located in ‘Dharwad’ on this view.

Note : 1. All the experiments are to be carried out using MySql.

2. Draw ER diagram and Schema diagram for each lab program.

Subject Title (Theory): **Java Script Programming**

Course code	Type of Course	Theory / Practical	Credits	Instruction hour per week	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
C4CS6T1	Skill	Practical	02	03	3hrs	10	40	50

Course Outcomes (COs): At the end of the course, students will be able to:

CO1. Evaluate the concepts of web programming and analyze their impact on problem solving and program

CO2. implementation, demonstrate concepts by building web pages generated by JavaScript programming.

Unit I: **15 hrs.**

What is JavaScript General overview of JavaScript, what is JavaScript?, JavaScript history, Relation between JavaScript and ECMAScript, Versions of JavaScript. JavaScript Core Syntax, Variables, Values, Data Types Syntax review, Keywords and reserved words, Variable declaration, Variable scope, Block scope. Data Types Primitive values, Reference values, Types, Type conversion. Expressions and Operators Expressions (arithmetic, relational, logical, assignment and others), Operators overview.

Unit II: **15 hrs.**

Control structures Flow control and conditionals, Loops and iteration. Jumps Error handling Throwing errors, Error handling. Numbers Number literals, Number object, Number methods, Math object Date object Working with Numbers. Strings String literals, String object, string methods, Working with Strings. Arrays Creating and populating Arrays, Array methods, Working with Arrays. Functions Defining functions, Calling functions, Functions as values, Arguments and parameters, Function scope, Closures, Arrow functions. Indexed Collections Set object type Map object type

Unit III: **15 hrs.**

JSON Iterators and generators Working with Iterators Working with Generators Modules Promises Regular Expressions Creating regular expressions, RegExp object and its methods, String methods for matching patterns. Objects Creating object, Properties, Methods, Build-in JavaScript objects. Prototype based Object Oriented Programming Defining Constructors, Prototypes, Inheritance, Classes Metaprogramming Proxy, Reflection Server-side JavaScript General overview of server-side JavaScript JavaScript engines, Basics of server-side solutions. JavaScript in Browser JavaScript in Web browser Embedding JavaScript in HTML, Execution of JavaScript code.

Unit IV: **15 hrs.**

Browser Object Model The window object, Dialog boxes, Timers, The location object, The navigator object, Browsing history. Document Object Model, Document structure, Selecting document elements and query selectors, Moving thorough DOM tree, HTML elements and attributes, Creating, changing and deleting nodes. Handling Events, Event propagation, Event handlers registering and invocation, Event object, Types of event. Ajax JavaScript and HTTP communication, Synchronous and asynchronous requests. Graphics Multimedia basics, Canvas API basics. Data Storage Cookies, Web Storage, IndexedDB. Security Filesystem security, The Same Origin Policy Plugins Cross-Site Scripting

Text Books:

1. JavaScript for Impatient Programmers by Axel Rauschmayer by 2022 edition.
2. JavaScript from Beginner to Professional by Laurence Lars Svekis, Maaike van Putten, Codestars by Rob Percival – 2021
3. JavaScript Bible By Danny Goodman · 2007
4. Pro JavaScript Techniques by John Resig

List of Programs

1. Write a JavaScript program to check whether the given number is perfect, abundant, or deficient. Use alert box to display the output.

2. Design a JavaScript program to display the multiplication table by accepting the number and limit.

3. Write a Java Script program to store different colors in an array and change the background color of the page using these array elements.

4. Write a Java Script program to change the text color and back color of a Textbox using on focus and On Blur event.

5. Write a Java Script function to display current date and time.

6. Write a Java Script program that calculates the squares and cubes of the numbers 0 to 10 and outputs HTML texts that displays the resulting values in a HTML table format.

7. Design a student registration form and apply validation on it by using external Java Script.

8. Design a simple calculator by using html, css and Java script.

9. Write a Java Script program to calculate factorial of any number by using html.

10. Write a JavaScript function to check whether a given value is IP value or not

B.Sc. Semester – V

Subject Title (Theory) : Web Technologies

Course code	Type of Course	Theory / Practical	Credits	Instruction hour per week	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
C5CS2T1	DSC-9A	Theory	04	04	3hrs	20	80	100

Course Outcome: At the end of the course, students will be able to:

CO 1: Be acquainted with elements, Tags and basic structure of HTML files.
CO 2: Develop the concept of basic and advanced text formatting.
CO 3: Practice the use of multimedia components in HTML documents.
CO 4: Designing of webpage-Document Layout, Working with List, Working with Tables.
CO 5: Practice Hyper linking, Designing of webpage-Working with Frames, Forms and Controls.
CO 6: Prepare creating style sheet, CSS properties, Background, Text, Font and styling etc.
CO 7: Working with List, HTML elements box, Positioning and Block properties in CSS.

Total Hrs.: 60

Unit I: 15 hrs.

Web Design Principles: Basic principles involved in developing a web site, Planning process, Five Golden rules of web designing, Designing navigation bar, Page design, Home Page Layout, Design Concept.

Basics in Web Design: Brief History of Internet, What is World Wide Web, Why create a web site, Web Standards, Audience requirement.

Unit II: 15 hrs.

Introduction to HTML: What is HTML, HTML Documents, Basic structure of an HTML document, Creating an HTML document, Mark up Tags, Heading-Paragraphs, Line Breaks, HTML Tags.

Elements of HTML: Introduction to elements of HTML, Working with Text, Working with Lists, Tables and Frames, Working with Hyperlinks, Images and Multimedia, Working with Forms and controls.

Unit III: 15 hrs.

Introduction to Cascading Style Sheets: Concept of CSS, Creating Style Sheet, CSS Properties, CSS Styling(Background, Text Format, Controlling Fonts), Working with block elements and objects, Working with Lists and Tables, CSS Id and Class, Box

Model(Introduction, Border properties, Padding Properties, Margin properties), CSS Advanced(Grouping, Dimension, Display, Positioning, Floating, Align, Pseudo class, Navigation Bar, Image Sprites, Attribute sector), CSS Color, Creating page Layout and Site Designs.

Unit IV: **15 hrs.**

XML: Introduction to XML, Defining XML tags, their attributes and values, Document type definition, XML Schemas, Document Object model, XHTML Parsing XML Data - DOM and SAX parsers in java.

Introduction to Web Publishing or Hosting: Creating the Web Site, Saving the site, Working on the web site, Creating web site structure, Creating Titles for web pages, Themes-Publishing web sites.

Text Books:

1. Kogent Learning Solutions Inc, HTML 5 in simple steps, Dreamtech Press, A beginner's guide to HTML, NCSA,14th May,2003
2. Murray,Tom/Lynchburg , Creating a Web Page and Web Site College,2002
3. Murray,Tom/Lynchburg, Creating a Web Page and Web Site, College,2002

Reference Books:

1. Web Designing & Architecture-Educational Technology Centre, University of Buffalo
2. Steven M. Schafer HTML, XHTML, and CSS Bible, 5ed, Wiley India
3. John Duckett, Beginning HTML, XHTML, CSS, and JavaScript, Wiley India
4. Ian Pouncey, Richard York, Beginning CSS: Cascading Style Sheets for Web Design ,Wiley India
5. Kogent Learning, Web Technologies: HTML, Javascript, Wiley India

Formative Assessment for Theory	
Assessment Occasion/ type	**Marks**
Internal Assessment Test 1	05
Internal Assessment Test 2	05
Assignment	10
Total	20
Formative Assessment as per guidelines	

Subject Title (Practical): Web Technologies Lab

Course code	Type of Course	Theory / Practical	Credits	Instruction hour per week	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
C5CS2P1	DSC-9B	Practical	02	04	3hrs	10	40	50

Course Outcome: At the end of the course (practical), students will be able to:
CO 1: Develop webpages using HTML, DHTML and Cascading Stylesheets.
CO 2: Build and consume web services.
CO 3: Develop a Program using XML.

Programs List:

1. Acquaintance with elements, Tags and basic structure of HTML files.
2. Practicing basic and advanced text formatting.
3. Practicing use of multimedia components (Image, Video & Sound) in HTML document.
4. Designing of webpage-Document Layout.
5. Designing of webpage-Working with List.
6. Designing of webpage-Working with Tables.
7. Practicing Hyper linking of webpages.
8. Designing of webpage-Working with Frames.
9. Designing of webpage-Working with Forms and Controls.
10. Acquaintance with creating style sheet, CSS properties and styling.
11. Working with Background, Text and Font properties.
12. Working with List properties
13. Working with HTML elements box properties in CSS
14. Working with Positioning and Block properties in CSS
15. Designing with cascading style sheet-Internal style sheet
16. Designing with cascading style sheet-External style sheet

B.Sc. Semester – V

Subject Title (Theory): Python Programming

Course code	Type of Course	Theory / Practical	Credits	Instruction hour per week	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
C3CS1T1	DSC-5	Theory	04	04	3hrs	20	80	100

Course Outcome (CO): After completion of course (Practical), students will be able to:

CO 1: Explain the basic concepts of Python Programming.
CO 2: Demonstrate proficiency in the handling of loops and creation of functions.
CO 3: Identify the methods to create and manipulate lists, tuples and dictionaries.
CO 4: Discover the commonly used operations involving file handling.
CO 5: Interpret the concepts of Object-Oriented Programming as used in Python

Total 60 hrs.

Unit I: **15 hrs.**

Introduction: Installing Python, Simple program using Python, Expressions and Values, Variables and Computer, Memory, error detection, multiple line statements, Designing and using functions, functions provided by Python, Tracing function calls in memory model, omitting return statement. Working with Text: Creating Strings of Characters, Using Special Characters in Strings, Creating a Multiline String, Printing Information, Getting Information from the Keyboard, A Boolean Type, Choosing Statements to Execute, Nested If Statements, remembering the Results of a Boolean Expression Evaluation.

Unit II: **15 hrs.**

A Modular Approach to Program Organization: Importing Modules, Defining Your Own Modules, Testing Code Semi Automatically Grouping Functions Using Methods: Modules, Classes, and Methods, Calling Methods the Object-Oriented Way, Exploring String Methods, Underscores, Storing Collections of Data Using Lists: Storing and Accessing Data in Lists, modifying Lists, Operations on Lists, Slicing Lists, Aliasing, List Methods, Working with a List of Lists.

Unit III: 15 hrs.

Repeating Code Using Loops: Processing Items in a List, Processing Characters in Strings, Looping, Over a Range of Numbers, Processing Lists Using Indices, Nesting Loops in Loops, Looping Until a Condition Is Reached, Repetition Based on User Input, Controlling Loops Using Break and Continue. Reading and Writing Files: Kinds of files, Opening a File, Techniques for Reading Files, Files over the Internet, Writing Files, and Writing Algorithms That Use the File-Reading Techniques, Multiline Records.

Unit IV: **15 hrs.**

Storing Data Using Other Collection Types: Storing Data Using Sets, Storing Data Using Tuples, Storing Data Using Dictionaries, Inverting a Dictionary, Using the In Operator on Tuples, Sets, and Dictionaries, Comparing Collections. Collection of New Information Object-Oriented Programming: Understanding a Problem Domain, Function "Isinstance", Class Object, and Class Book, writing a Method in Class Book.

Plugging into Python Syntax: More Special Methods. Creating Graphical User interface: Building a Basic GUI, Models, Views, and Controllers, Customizing the Visual Style Introducing few more Widgets, Object-Oriented GUIs, Keeping the Concepts from Being a GUI Mess.

References:

1. Think Python How to Think Like a Computer Scientist, Allen Downey et al., 2nd Edition, Green Tea Press. Freely available online @ https://www.greenteapress.com/thinkpython/thinkCSpy.pdf, 2015.
2. Introduction to Python Programming, Gowrishankar S et al., CRC Press, 2019.
3. Python Data Analytics: Data Analysis and Science Using Pandas, matplotlib, and the Python Programming Language, Fabio Nelli, Apress®, 2015
4. Advance Core Python Programming, Meenu Kohli, BPB Publications, 2021.
5. Core PYTHON Applications Programming, Wesley J. Chun, 3rd Edition, Prentice Hall, 2012.
6. Automate the Boring Stuff, Al Sweigart, No Starch Press, Inc, 2015.
7. Data Structures and Program Design Using Python, D Malhotra et al., Mercury Learning and Information LLC, 2021.
8. http://www.ibiblio.org/g2swap/byteofpython/read/
9. https://docs.python.org/3/tutorial/index.html

Formative Assessment for Theory	
Assessment Occasion/ type	**Marks**
Internal Assessment Test 1	05
Internal Assessment Test 2	05
Assignment	10
Total	20
Formative Assessment as per guidelines	

Subject Title (Practical): Python Programming Lab

Course code	Type of Course	Theory / Practical	Credits	Instruction hour per week	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
C3CS1P1	DSC-6	Practical	02	04	3hrs	10	40	50

Course Outcomes (COs): At the end of the course, students will be able to:

CO1: To demonstrate different number data types in Python.

CO2: Perform different Arithmetic Operations on numbers in Python.

CO3: Ability to explore python especially the object-oriented concepts, and the built in objects of Python

CO4: To be able to introduce core programming basics and program design with

functions using Python programming language

Program List:

1. a. Write a python program to print "Hello Python" b. Write a python program to do arithmetical operations
2. Write a python program to find the area of a triangle
3. Write a python program to solve quadratic equation
4. Write a python program to swap two variables
5. Write a python program to convert Celsius to Fahrenheit
6. Write a python Program to Check if a Number is Odd or Even
7. Write a python Program to Print all Prime Numbers in an Interval
8. Write a python Program to Find the Factorial of a Number
9. Write a python Program to Display the multiplication Table
10. Write a python Program to Multiply Two Matrices
11. Write a python Program to Find LCM & GCD using functions
12. Write a python program to read a word and print the number of letters, vowels in the word.
13. Write a python program to input an array of n numbers and find separately the sum of positive numbers and negative numbers.
14. Write a python program to search an element using linear equation.
15. Write a python program to search an element using binary search
16. Write a python program to insert a number in a sorted array.
17. Write a python program to stimulate stack operation.
18. Write a python program to draw shapes & GUI controls.
19. Write a python program to using the built-in methods of the string, list, and dictionary classes.
20. Write a python program to demonstrate exception handling

Subject Title (Theory) : Computer Concepts and Office Automation

Course code	Type of Course	Theory / Practical	Credits	Instruction hour per week	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
C5CS5T1	EC-1	Theory	03	04	3hrs	20	80	100

Course Outcomes (COs): At the end of the course, students will be able to:

CO1.Provide knowledge of different units of computer like processing unit, IO unit, and storage unit.

CO2.To earn knowledge of different types of memory.

CO3. Understand and apply the basic concepts of electronic spreadsheet software.

Co4. To make students well familiar with computer and networking fundamentals.

Unit-I: 15 hrs.

Basics: History and generations of Computer, Types of Computers, Organization of Computer System, Hardware and Software Components, **Memory unit:** Types of memory, ROM, RAM, types of RAM & ROM, Introduction to cache and virtual memory.

Unit-II: 15 hrs.

Number system: Binary Octal, Hexa-decimal, Number base conversion, Binary addition, Subtraction, One's and Two's compliment, Character codes – ASCII, EBCDIC.

Unit-III: **15 hrs.**

Operating System: Types of operating system, Functions, Introduction to DOS and WINDOWS operating system.

Software: Types of languages, Types of software (System and Application software).

Unit-IV: **15 hrs.**

Network and Internet: History and evolution of Computer Network, Types of networks (LAN, MAN & WAN), Internet and its applications.

Office Automation: Working with MS-Word, MS-Excel and MS-POWER POINT.

References:

1. Computer Concepts & C Programming, P.B.Kottur, Sapna Book House Bangalore 2009
2. Computer Fundaments, V. Rajaraman ,Prentice Hall of India,2008
3. Computer Fundamental P.K. Sinha , Prentice Hall of India, 6th Edition,1992
4. Fundamentals of Information Technology second edition, Alexis Leon,2009
5. Microsoft Office-Complete reference ,Curt Simmons, Mc Graw Hill,2003

Formative Assessment for Theory	
Assessment Occasion/ type	**Marks**
Internal Assessment Test 1	05
Internal Assessment Test 2	05
Assignment	10
Total	20
Formative Assessment as per guidelines	

B.Sc. Semester – VI

Subject Title (Theory): Artificial Intelligence

Course code	Type of Course	Theory / Practical	Credits	Instruction hour per week	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
C6CS2T1	DSC-11A	Theory	04	04	3hrs	20	80	100

Course Outcomes (COs): At the end of the course, students will be able to:

CO1.To develop semantic-based and context-aware systems to acquire, organize process, share and use the knowledge embedded in multimedia content.

CO2.Research will aim to maximize automation of the complete knowledge lifecycle and achieve semantic interoperability between Web resources and services.

CO3. The field of Robotics is a multi-disciplinary as robots are amazingly complex system comprising mechanical, electrical, electronic H/W and S/W and issues germane to all these.

Unit I: **15 hrs.**

AI problems, foundation of AI and history of AI intelligent agents: Agents and Environments, the concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation. Searching- Searching for solutions, uniformed search strategies – Breadth first search, depth first Search. Search with partial information (Heuristic search) Hill climbing,

Unit II: **15 hrs.**

A*, AO* Algorithms, Problem reduction, Game Playing-Adversial search, Games, mini-max algorithm, optimal decisions in multiplayer games, Problem in Game playing, Alpha-Beta pruning, Evaluation functions**.**

Knowledge representation issues, predicate logic- logic programming, semantic nets- frames and inheritance, constraint propagation, representing knowledge using rules, rules-based deduction systems. Reasoning under uncertainty, review of probability, Baye's probabilistic interferences and dempster Shafer theory.

Unit III: **15 hrs.**

First order logic. Inference in first order logic, propositional vs. first order inference, unification & lifts forward chaining, Backward chaining, Resolution, Learning from observation Inductive learning, Decision trees, Explanation based learning, Statistical Learning methods, Reinforcement Learning.

Unit IV: **15 hrs.**

Expert systems: Introduction, basic concepts, structure of expert systems, the human element in expert systems how expert systems works, problem areas addressed by expert systems, expert systems success factors, types of expert systems, expert systems and the internet interacts web, knowledge engineering, scope of knowledge, difficulties, in knowledge acquisition methods of knowledge acquisition, machine learning, intelligent agents, selecting an appropriate knowledge acquisition method, societal impacts reasoning in artificial intelligence, inference with rules, with frames: model based reasoning, case based reasoning, explanation & meta knowledge inference with uncertainty representing uncertainty.

Reference:

1. S. Russel and P. Norvig, "Artificial Intelligence – A Modern Approach", Second Edition, Pearson Education

2. David Poole, Alan Mackworth, Randy Goebel, "Computational Intelligence: a logical approach", Oxford University Press.

3. G. Luger, "Artificial Intelligence: Structures and Strategies for complex problem solving", Fourth Edition, Pearson Education.

4. J. Nilsson, "Artificial Intelligence: A new Synthesis", Elsevier Publishers.

Formative Assessment for Theory	
Assessment Occasion/ type	**Marks**
Internal Assessment Test 1	05
Internal Assessment Test 2	05
Assignment	10
Total	20
Formative Assessment as per guidelines	

Subject Title (Practical): Artificial Intelligence Lab

Course code	Type of Course	Theory / Practical	Credits	Instruction hour per week	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
C6CS2P1	DSC-11B	Practical	02	04	3hrs	10	40	50

Course Outcomes (COs): At the end of the course (practical), students will be able to:

CO1. Apply the good programming skills to formulate the solutions for computational problems.

CO2. Design and develop solutions for informed and uninformed search problems in AI.

CO3. Utilize advanced package like NLTK for implementing artificial intelligence.

CO4. Demonstrate and enrich knowledge to select and apply AI tools to synthesize information and develop models within constraints of application area

CO5. Develop a minor project in multidisciplinary areas to demonstrate team work through reports and presentation.

CO6. Design and develop an Expert System that operates in a realistic problem domain and communicate effectively in a team or individual and prepare reports.

Program list:

1. Write a Program to Implement Breadth First Search using Python.
2. Write a Program to Implement Depth First Search using Python.
3. Write a Program to Implement Tic-Tac-Toe game using Python.
4. Write a Program to Implement 8-Puzzle problem using Python.
5. Write a Program to Implement Water-Jug problem using Python.
6. Write a Program to Implement Travelling Salesman Problem using Python
7. Write a Program to Implement Tower of Hanoi using Python.
8. Write a Program to Implement Monkey Banana Problem using Python.
9. Write a Program to Implement Alpha-Beta Pruning using Python.
10. Program to Implement 8-Queens Problem.

Subject Title (Theory): Cryptography and Information Security

Course code	Type of Course	Theory / Practical	Credits	Instruction hour per week	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
C6CS2T1	DSC-12A	Theory	04	04	3hrs	20	80	100

Course Outcomes (COs): At the end of the course, students will be able to:

CO1. Identify basic security attacks and services
CO2. Use symmetric and asymmetric key algorithms for cryptography
CO3. Design a security solution for a given application
CO4. Analyze Key Management techniques and importance of number Theory.
CO5. Understanding of Authentication functions the manner in which Message Authentication Codes and Hash Functions works.
CO6. To examine the issues and structure of Authentication Service and Electronic Mail Security

Unit I: **15 hrs.**

Introduction: Security trends, The OSI Security Architecture, Security Attacks, Security Services and Security Mechanisms, A model for Network security.

Classical Encryption Techniques: Symmetric Cipher Modes, Substitute Techniques, Transposition Techniques, Rotor Machines, Stenography.

Unit II: **15 hrs.**

Block Cipher and Data Encryption Standards: Block Cipher Principles, Data Encryption Standards, the Strength of DES, Differential and Linear Crypt Analysis, Block Cipher Design Principles.

Advanced Encryption Standards: Evaluation Criteria for AES, the AES Cipher.

More on Symmetric Ciphers: Multiple Encryption, Triple DES, Block Cipher Modes of Operation, Stream Cipher and RC4.

Introduction to Number Theory: Prime Numbers, Fermat's and Euler's Theorem, Testing for Primality, The Chinese Remainder Theorem, Discrete logarithms.

Unit III: **15 hrs.**

Public Key Cryptography and RSA: Principles Public key crypto Systems, Diffie Hellman Key Exchange, the RSA algorithm, Key Management, Elliptic Curve Arithmetic, Elliptic Curve Cryptography.

Message Authentication and Hash Functions: Authentication Requirement, Authentication Function, Message Authentication Code, Hash Function, Security of Hash Function and MACs.
Hash and MAC Algorithm: Secure Hash Algorithm, Whirlpool, HMAC, CMAC.
Digital Signature: Digital Signature, Authentication Protocol, Digital Signature Standard.

Unit IV: **15 hrs.**
Authentication Application: Kerberos, X.509 Authentication Service, Public Key Infrastructure.
Email Security: Pretty Good Privacy (PGP) and S/MIME.
IP Security: Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.

Text Books:

1. William Stallings (2006), Cryptography and Network Security: Principles and Practice, 4th edition, Pearson Education, India.
2. William Stallings (2000), Network Security Essentials (Applications and Standards), Pearson Education, India.

References:

1. Charlie Kaufman (2002), Network Security: Private Communication in a Public World, 2nd edition, Prentice Hall of India, New Delhi.
2. Atul Kahate (2008), Cryptography and Network Security, 2nd edition, Tata Mc Grawhill, India.
3. Robert Bragg, Mark Rhodes (2004), Network Security: The complete reference, Tata Mc GrawHill, India.

Formative Assessment for Theory	
Assessment Occasion/ type	**Marks**
Internal Assessment Test 1	05
Internal Assessment Test 2	05
Assignment	10
Total	20
Formative Assessment as per guidelines	

Subject Title (Practical): Cryptography and Information Security Lab

Course code	Type of Course	Theory / Practical	Credits	Instruction hour per week	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
C6CS2P1	DSC-12B	Practical	02	04	3hrs	10	40	50

Course Outcomes (COs): At the end of the course (Practical), students will be able to:

CO1. Identify basic security attacks and services.
CO2. Use symmetric and asymmetric key algorithms for cryptography
CO3. Design a security solution for a given application.

Programs List:

1. Write a C program that contains a string (char pointer) with a value\Hello World. The programs should XOR each character in this string with 0 and display the result.

2. Write a C program that contains a string (char pointer) with a value \Hello World. The program should AND or and XOR each character in this string with 127 and display the result.
3. Write a Java program to perform encryption and decryption using the following algorithms:

- Ceaser Cipher
- Substitution Cipher
- Hill Cipher

4. Write a Java program to implement the DES algorithm logic.

5. Write a C/JAVA program to implement the Blowfish algorithm logic

6. Write a C/JAVA program to implement the Rijndael algorithm logic

7. Write the RC4 logic in Java Using Java Cryptography, encrypt text “Hello world” using Blowfish Create your own key using Java key tool.

8. Write a Java program to implement RSA Algorithm.

9. Implement the Diffie-Hellman Key Exchange mechanism using HTML and JavaScript.

10. Calculate the message digest of a text using the SHA-1 algorithm in JAVA

11. Calculate the message digest of a text using the MD5 algorithm in JAVA

Subject Title (Theory): Cyber Security and cyber-Law

Course code	Type of Course	Theory / Practical	Credits	Instruction hour per week	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
C6CS5T1	EC-2	Theory	03	03	3hrs	20	80	100

Course Outcomes (COs): At the end of the course, students will be able to:

CO1. Develop cyber security strategies and policies.

CO2. Knowledge of Cyber World and Cyber Law in general.

CO3. The various aspects of cybercrimes.

CO4. Understanding the problems relating to e-commerce transactions.

CO5. Intellectual Property issues in IT Act.

Unit I: **15 hrs.**

Digital Crime: Overview of digital crime, criminology of computer crime. Information Gathering Techniques: Tools of the attacker, information and cyber warfare, scanning and spoofing, password cracking, malicious software, session hijacking.

Unit II: **15 hrs.**

Risk analysis and Threat: risk analysis, process, key principles of conventional computer security, security policies, authentication, data protection, access control, internal vs external threat, security assurance, passwords, authentication, and access control, computer forensics and incident response.

Unit III: **15 hrs.**

Introduction to Cryptography and Applications: Important terms, Threat, Flaw, vulnerability, exploit, attack, ciphers, codes, substitution cipher (caeser), Transposition cipher (Rail-Fence), Public key cryptography (definition only), Private key Cryptography (Definition and Examples), Cyber forensics, Stenography.

Unit IV: **15 hrs.**

Safety Tools and Issues: Firewalls, logging and intrusion detection systems, Windows and windows XP/NT security, UNIX/LINUX security, ethics of hacking and cracking.

Cyber Laws to be covered as per IT 2008:

Digital Signature and Electronic Signature, Digital Certificate

i. [Section 43] Penalty and compensation for damage to computer etc.
ii. [Section 65] Tampering with computer source documents
iii. [Section 66A] Punishment for sending offensive messages through communication service etc.
iv. [Section 66B] Punishment for dishonestly receiving stolen computer resource or communication device
[Section 66C] Punishment for identity theft
v. [Section 66D] Punishment for cheating by impersonation by using computer resource vii. [Section 66E] Punishment for violation of privacy
vi. [Section 66F] Punishment for cyber terrorism
vii. [Section 67] Punishment for publishing or transmitting obscene material in electronic form
viii. [Section 67A] Punishment for publishing or transmitting of material containing sexually explicit act, etc. in electronic form
ix. [Section 67B] Punishment for publishing or transmitting of material depicting children in sexually explicit act, etc. in electronic form
x. [Section 72] Breach of confidentiality and privacy.

References:

1. Merkow, M., & Breithaupt, J.(2005) Information Security Principles and Practices. 5th edition.
2. Snyder, G.F. (2010). Network Security, Cengage Learning.
3. Basta, A., & Halton, W., (2010) Computer Security: Concepts, Issues and Implementation, Cengage Learning India.
4. Anderson, R. (2008) Security engineering: A guide to building dependable Distributed Systems. 2nd edition. John Wiley & Sons.

Formative Assessment for Theory	
Assessment Occasion/ type	**Marks**
Internal Assessment Test 1	05
Internal Assessment Test 2	05
Assignment	10
Total	20
Formative Assessment as per guidelines	