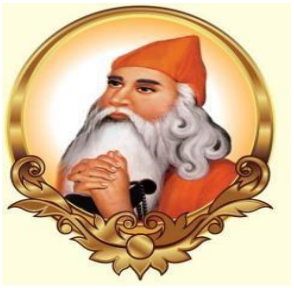

Department of Computer Science & Engineering

Scheme of Examination and Syllabus for
Under Graduate Programme

Under Multiple Entry and Exit, Internship and
CBCS-LOCF as per NEP-2020
w.e.f. session 2024-25 (in phased manner)

Subject: Computer Science

Guru Jambheshwar University of Science &Technology
Hisar-125001, Haryana

(A+ NAAC Accredited State Govt. University)

Guru Jambheshwar University of Science and Technology
Hisar-125001, Haryana
('A+'NAAC Accredited State Govt. University)

Scheme of Examination and Syllabus for Under Graduate Programme w.e.f. session 2024-25
for affiliated Degree Colleges according to National Education Policy-2020

Subject: Computer Science

First Year

SEMESTER-I								
Type of Course	**Course Code**	**Nomenclature of Paper/Course**	**Credits**	**Contact Hours**	**Internal Marks**	**External Marks**	**Total Marks**	**Duration of Exam (Hrs)**
Discipline Specific Course	C24COS101T	Fundamentals of Computer and Programming in C	3	3	20	50	70	2.5
	C24COS101P	Programming in C Lab	1	2	10	20	30	3
Minor Course/ Vocational Course	C24MIC102T	Computer Programming Fundamentals	2	2	15	35	50	2
Minor Course/ Vocational Course#	C24MIN102T	Problem Solving using C	3	3	20	50	70	2.5
	C24MIN102P	Problem Solving using C Lab	1	2	10	20	30	3
Multidisciplinary Course	C24MDC105T	Information Technology	2	2	15	35	50	2.5
	C24MDC105P	Information Technology Lab	1	2	10	15	25	3
Skill Enhancement Course	C24SEC103T	Office Tools	2	2	15	35	50	2
	C24SEC103P	Office Tools Lab	1	2	10	15	25	3
		OR						
	C24SEC203T	Digital Efficiency Tools	2	2	15	35	50	2
	C24SEC203P	Digital Efficiency Tools Lab	1	2	10	15	25	3
Value Added Course	C24VAC109T	Digital Empowerment	2	2	15	35	50	2
SEMESTER-II								
Type of Course	**Course Code**	**Nomenclature of Paper/Course**	**Credits**	**Contact Hours**	**Internal Marks**	**External Marks**	**Total Marks**	**Duration of Exam (Hrs)**
Discipline SpecificCourse	C24COS201T	Data Structure Using C	3	3	20	50	70	2.5
	C24COS201P	Data Structure Using C Lab	1	2	10	20	30	3
Minor Course/ Vocational Course	C24MIC202T	Internet and Web Design	2	2	15	35	50	2
Minor Course/ Vocational Course#	C24MIN202T	Internet and Web Design	3	3	20	50	70	2.5
	C24MIN202P	Internet and Web Design Lab	1	2	10	20	30	3
Multidisciplinary Course	C24MDC205T	Internet and Web Design	2	2	15	35	50	2
	C24MDC205P	Internet and Web Design Lab	1	2	10	15	25	3
Skill Enhancement Course	C24SEC103T	Office Tools	2	2	15	35	50	2
	C24SEC103P	Office Tools Lab	1	2	10	15	25	3
		OR						
	C24SEC203T	Digital Efficiency Tools	2	2	15	35	50	2
	C24SEC203P	Digital Efficiency Tools Lab	1	2	10	15	25	3
Value Added Course	C24VAC109T	Digital Empowerment	2	2	15	35	50	2

#For Scheme C only

Guru Jambheshwar University of Science and Technology
Hisar-125001, Haryana
('A+'NAAC Accredited State Govt. University)

Scheme of Examination and Syllabus for Under Graduate Programme w.e.f. session 2024-25
for affiliated Degree Colleges according to National Education Policy-2020

(Offered by the Department)
Subject: Computer Science

SECOND YEAR

SEMESTER-III								
Type of Course	**Course Code**	**Nomenclature of Paper/Course**	**Credits**	**Contact Hours**	**Internal Marks**	**External Marks**	**Total Marks**	**Duration of Exam (Hrs)**
Discipline Specific Course	C24COS301T	Data Base Management Systems	3	3	20	50	70	2.5
	C24COS301P	DBMS Lab	1	2	10	20	30	3
Minor Course/ Vocational Course	C24MIC302T	IT & E-Commerce	3	3	20	50	70	2.5
	C24MIC302P	IT & E-Commerce Lab	1	2	10	20	30	3
Multidisciplinary Course	C24MDC305T	C Programming	2	2	15	35	50	2
	C24MDC305P	C Programming Lab	1	2	10	15	25	3
Skill Enhancement Course	C24SEC303T	Data Analysis Using Excel	2	2	15	35	50	2
	C24SEC303P	Data Analysis Using Excel Lab	1	2	10	15	25	3

SEMESTER-IV								
Type of Course	**Course Code**	**Nomenclature of Paper/Course**	**Credits**	**Contact Hours**	**Internal Marks**	**External Marks**	**Total Marks**	**Duration of Exam (Hrs)**
Discipline Specific Course	C24COS401T	Computer Networks	3	3	20	50	70	2.5
	C24COS401P	Computer Networks Lab	1	2	10	20	30	3
Minor Course/ Vocational Course	C24VOC402T	Basics of Programming Using R	2	2	15	35	50	2
	C24VOC402P	R Programming Lab	2	4	15	35	50	3
Value Added Course	C24VAC313T	Internet Ethics	2	2	15	35	50	2

Guru Jambheshwar University of Science and Technology
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Scheme of Examination and Syllabus for Under Graduate Programme w.e.f. session 2024-25
for affiliated Degree Colleges according to National Education Policy-2020

(Programme-wise)
Subject: Computer Science

SECOND YEAR

SEMESTER-III

Type of Course	Course Code	Nomenclature of Paper/Course	Credits	Contact Hours	Internal Marks	External Marks	Total Marks	Duration of Exam (Hrs)
Discipline Specific Course	C24COS301T	Data Base Management Systems	3	3	20	50	70	2.5
	C24COS301P	DBMS Lab	1	2	10	20	30	3
Minor Course/ Vocational Course		To be taken from MIC Pool	3	3	20	50	70	2.5
		To be taken from MIC Pool	1	2	10	20	30	3
Multidisciplinary Course		To be taken from MDC Pool	2	2	15	35	50	**2**
		To be taken from MDC Pool	1	2	10	15	25	3
Ability Enhancement Course		To be taken from AEC Pool	2	2	15	35	50	2
Skill Enhancement Course		To be taken from SEC Pool	2	2	15	35	50	2
		To be taken from SEC Pool	1	2	10	15	25	3

SEMESTER-IV

Type of Course	Course Code	Nomenclature of Paper/Course	Credits	Contact Hours	Internal Marks	External Marks	Total Marks	Duration of Exam (Hrs)
Discipline Specific Course	C24COS401T	Computer Networks	3	3	20	50	70	2.5
	C24COS401P	Computer Networks Lab	1	2	10	20	30	3
Minor Course/ Vocational Course		To be taken from MIC/VOC Pool	2	2	15	35	50	2
		To be taken from MIC/VOC Pool	2	4	15	35	50	3
Ability Enhancement Course		To be taken from AEC Pool	2	2	15	35	50	2
Value Added Course		To be taken from VAC Pool	2	2	15	35	50	2

Computer Science
Fundamentals of Computer and Programming in C (Semester-I)
Discipline Specific Course (DSC)

Paper Code: C24COS101T
45 Hrs (3 Hrs /Week) **External Marks : 50**
Credits: 3 **Internal Marks : 20**
Exam. Time: 2.5 Hrs **Total Marks: 70**

Note: The examiner is required to set nine questions in all. The first question will be compulsory consisting of five short questions covering the entire syllabus consisting of 2 marks each. In addition to this, eight more questions (each question may be of 2-3 parts) will be set consisting of two questions from each unit. The student/candidate is required to attempt five questions in all selecting one from each unit consisting of 10 marks each in addition to the compulsory Question No.1. All questions carry equal marks.

Course Objective: The course covers an introduction to computer fundamentals, including hardware and software components. It then transitions into programming basics in C, covering data types, variables, operators, control structures, functions, arrays, pointers and structure in C programming.

Unit-I

Basics of Computers: Definition of a Computer - Characteristics and Applications of Computers – Block Diagram of a Digital Computer – Classification of Computers based on size and working – Central Processing Unit – I/O Devices.
Storage: Primary, Auxiliary and Cache Memory – Memory Devices. Software, Hardware, Firmware.
Operating System – Definition and Functions of an Operating System – MS-DOS – MS Windows – Desktop, Computer, Documents, Pictures, Music, Videos, Recycle Bin, Task Bar – Control Panel.

Unit-II

C Programming Fundamentals: Keywords, Variables and Constants, Structure of a C Program, Input/Output.
Operators & Expressions: Arithmetic, Unary, Logical. Bit-wise, Assignment & Conditional Operators
Decision Making: Decision making using if...else. Else If Ladder; Switch, break. Continue and Goto statements.
Loop Control Structure: While and do-while, for loop and Nested for loop, Decision using switch; goto, break and continue statements.

Unit-III

Functions: Introduction, using functions – Function declaration/ prototype – Function definition function call – return statement – Passing parameters, Recursive functions
Arrays: Introduction, Declaration of Arrays, Accessing elements of the Array – Storing Values in Array, Passing array element to a function: Call by Value and Call by Reference, One dimensional array -declaration, initialization, Accessing one dimensional array, Two dimensional Arrays-declaration, initialization, Accessing two dimensional arrays.

Unit-IV

Strings: Introduction, String and Character functions**,** String Operations using String functions- strcat() , strcmp() , strcpy() , strlen().
Pointers: Declaring Pointer Variable, Pointer Expressions and Pointer Arithmetic, Passing Arguments to Functions using Pointers. Dynamic Memory Allocation: malloc(), calloc(), realloc(), free() functions
Structures and Unions: Declaration of structures, Structure Initialization, Accessing structure members, Arrays of structure, Nested structures, Structure with pointers, Union

Text/ Reference Books:

1. P. K. Sinha, “Computer Fundamentals”, 6th edition
2. E. Balaguruswamy, “Fundamentals of Computer” (First Edition- 2009), McGraw-Hill
3. Yashvant Kanetkar, “Let Us C”, 15th Edition, BPB Publications
4. E. Balaguruswami : Programming with C Language, Tata McGraw Hill, New Delhi.

Course Outcomes:

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

CO1: **Recall** components and classification of computer systems.
CO2: **Explain** CPU functions, I/O devices, and memory types.
CO3: **Apply** software, hardware, and firmware concepts in computing.
CO4: **Analyze** and compare programming constructs such as loops and operators.
CO5: **Evaluate** advanced programming concepts such as functions, array.
CO6*: **Develop** programs based on learned concepts.

Mapping of COs with POs: (C24COS101T)

Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1								
CO2								
CO3								
CO4								
CO5								
CO6								

S=Strong, M=Medium, W=Weak

Programming in C Lab

Paper Code: C24COS101P
30 Hrs (2 Hrs /Week) **External Marks: 20**
Credits: 1 **Internal Marks: 10**
Exam.Time: 3 Hrs **Total Marks: 30**

The following activities be carried out/ discussed in the lab during the semester.

List of Experiments: C Programming Lab

1. Write a C program to find roots of quadratic equation.
2. Program to accept a positive integer and find the sum of the digits in it.
3. Program to check whether the given number is Prime or Not.
4. Program to Check whether given number is Palindrome or Not.
5. Program to perform i) Matrix Addition ii) Matrix Multiplication.
6. Program to find GCD and LCM using non-recursive function.
7. Program to find largest number in the array.
8. Program to find factorial of a given number using functions.
9. Program to accept and display Student Details using Structures
10. Program to swap two numbers using different parameter passing techniques.

Note: In addition to the above experiments, the teacher may add more programs on the behalf of the theory syllabus.

Course Outcomes:

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

CO1. **Develop** basic C programs using appropriate syntax and semantics.
CO2. **Analyze and debug** C programs to identify and fix errors effectively.
CO3. **Evaluate** the impact of different coding practices on the performance and readability of C programs.
CO4. **Design and execute** programs involving control structures, arrays, and functions.
CO5. **Create** lab assignment record that includes problem definitions, solutions, results, and conclusions.
CO6. **Demonstrate** ethical practices while solving problems individually or in groups.

Mapping of COs with POs: (C24COS101P)

Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1								
CO2								
CO3								
CO4								
CO5								
CO6								

S=Strong, M=Medium, W=Weak

Computer Science
Computer Programming Fundamentals (Semester-I)
Minor Course (MIC)

Paper Code: C24MIC102T
30 Hrs (2 Hrs /Week) **External Marks : 35**
Credits: 2 **Internal Marks : 15**
Exam. Time: 2 Hrs **Total Marks: 50**

Note: The examiner is required to set five questions in all. The first question will be compulsory consisting of five short questions covering the entire syllabus consisting of 3 marks each. In addition to this, four more questions (each question may be of 2-3 parts) will be set consisting of two questions from each unit. The student/candidate is required to attempt three questions in all selecting one from each unit in consisting of 10 marks in addition to the compulsory Question No.1.

Course Objective: This introduces core concepts like variables, loops, and conditionals, essential for all aspiring programmers. This course covers the building blocks of coding, emphasizing problem-solving and algorithmic thinking.

Unit - I

Introduction to Programming: Overview of programming concepts, **Computer Languages**: Machine Language, Assembly Language, High Level Language; Source code, Compiler, Interpreter, Object Code; Algorithm, Flow Chart and pseudocode, Basics of problem-solving in programming, Debugging, **Error**: Types of Error.

Unit – II

Programming fundamentals: Data types: Integers, floating-point numbers, strings, and Booleans, Variables and constants, Input/output operations, Operators and expressions, **Conditional statements**: if, else if, else, **Loops:** while loops, for loops; Control structures: break, continue;

T**ext and Reference Books:**

1. E. Balagurusamy, Fundamentals of Computer and Programming, Tata McGraw-Hill Education
2. J.B. Dixit, Fundamentals of Computer Programming and IT, Laxmi Publications
3. P. K. Sinha, "Computer Fundamentals", 6th edition, 2003.

Course Outcomes
At the end of the course, the students would be able to :
CO1: **Recall** fundamental programming language concepts. (LOTS: Level 1 - Remember)
CO2: **Define** data types input/output operations, and control structures. (LOTS: Level 2 -Understand)
CO3: **Apply** problem-solving techniques in programming (LOTS: Level 3 - Apply)
CO4: **Compare** various conditional and control statements. (HOTS: Level 4 – Analyze)
CO5: **Evaluate** advanced programming concepts to solve complex programming problems effectively. (HOTS: Level 5 - Evaluate)

Mapping of COs with POs: C24MIC102T:

Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1								
CO2								
CO3								
CO4								
CO5								

S=Strong, M=Medium, W=Weak

Computer Science
Problem Solving using C (Semester-I)
Minor Course (MIN)

Paper Code: C24MIN102T
45 Hrs (3 Hrs /Week) **External Marks : 50**
Credits: 3 **Internal Marks : 20**
Exam. Time: 2.5 Hrs **Total Marks: 70**

Note: The examiner is required to set nine questions in all. The first question will be compulsory consisting of five short questions covering the entire syllabus consisting of 2 marks each. In addition to this, eight more questions (each question may be of 2-3 parts) will be set consisting of two questions from each unit. The student/candidate is required to attempt five questions in all selecting one from each unit consisting of 10 marks each in addition to the compulsory Question No.1. All questions carry equal marks.

Course Objective: Programming for problem Solving is a basic and important for every graduate in Engineering. This course introduces basic constructs of programming language like algorithms, conversion of algorithms to programs etc. By studying this course students will get to know about C programming language with its various programming paradigms like branching, looping, arrays, functions, recursion, structure, pointers, etc. to be implemented for solving real world problems. It includes various sorting and searching algorithms as well with notion of order of complexity through simple programs
.

Unit - I

Introduction to Programming: Introduction to components of a computer system (disks, memory, processor, where a program is storedand executed, operating system, compilers etc.).
Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudo code with examples.
From algorithms to programs; source code, variables (with data types) variables and memory locations,Syntax and Logical Errors in compilation, object and executable code.

Unit – II

Arithmetic expressions and precedence, Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branching,Iteration and loops.
Arrays: Arrays (1-D, 2-D), Character arrays and Strings, Basic Algorithms: Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required).

Unit-III

Function: Functions (including using built in libraries), Parameter passing in functions, call by value, passing arrays to functions: idea of call by reference.
Structure: Structures, Defining structures and Array of Structures.

Unit-IV

Pointers: Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linkedlist (no implementation)
File handling (only if time is available, otherwise should be done as part of the lab)

T**ext and Reference Books:**

1. E. Balagurusamy, Fundamentals of Computer and Programming, Tata McGraw-Hill Education
2. J.B.Dixit, Fundamentals of Computer Programming and IT, Laxmi Publications
3. P. K. Sinha, “Computer Fundamentals”, 6th edition, 2003.

Course Outcomes

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

CO1**. Describe** the algorithms to programs (in C language) to test and execute the programs and correct syntax and logical errors.
CO2. **Demonstrate** the use of conditional branching, iteration and recursion.
CO3. **Apply** programming to solve matrix addition and multiplication problems and searching and sorting problem, apply programming to solve simple numerical method problems, namely root finding of function, differentiation of function and simple integration.
CO4. **Compare** the suitability of arrays, pointers and structures to formulate algorithms and programs for various problem situations
CO5. **J ustify** a problem into functions and synthesize a complete program using divide and conquer approach.

Mapping of COs with POs: C24MIN102T:

Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1								
CO2								
CO3								
CO4								
CO5								

S=Strong, M=Medium, W=Weak

Problem Solving using C Lab

Paper Code: C24MIN102P
30 Hrs (2 Hrs /Week) **External Marks: 20**
Credits: 1 **Internal Marks: 10**
Exam.Time: 3 Hrs **Total Marks: 30**

The following activities be carried out/ discussed in the lab during the semester.

List of Experiments: C Programming Lab

1. One assignment to familiarize with programming environment.
2. One assignment on simple computational problems using arithmetic expressions.
3. One assignment on problems involving if-then-else structures.
4. One assignment on iterative problems e.g., sum of series.
5. One assignment on One Dimensional Array manipulation.
6. One assignment on different Matrix problems, String operations.
7. One assignment on implementing simple functions.
8. One assignment on Recursive functions.
9. One assignment on pointers and structures.
10. One assignment on file operations

Note: In addition to the above experiments, the teacher may add more programs on the behalf of the theory syllabus.

Course Outcomes:

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

CO1. Implement simple, iterative as well as recursive programs. (LOTS: Level 3: Apply)
CO2. Analyze given algorithms to a working and correct program. (LOTS: Level 4: Analyze)
CO3. Compare solutions on the basis of the appropriateness of data structure used like arrays, strings and structures and manipulate through implementation. (HOTS: Level 5: Evaluate)
CO4. Integrate knowledge of programming with identification and correcting logical errors encountered at run time. (HOTS: Level 6: Create)
CO5. Create written records for the given assignments with problem definition, design of solution and conclusions.. (HOTS: Level 6: Create)
CO6. **Demonstrate** ethical practices while solving problems individually or in groups (LOTS: Level 3: Apply).

Mapping of COs with POs: (C24MIN102P)

Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1								
CO2								
CO3								
CO4								
CO5								
CO6								

S=Strong, M=Medium, W=Weak

Computer Science
Information Technology (Semester-I)
Multidisciplinary Course (MDC)

Paper Code: C24MDC105T
30 Hrs (2 Hrs /Week) **External Marks : 35**
Credits: 2 **Internal Marks : 15**
Exam. Time: 2 Hrs **Total Marks: 50**

Note: The examiner is required to set five questions in all. The first question will be compulsory consisting of five short questions covering the entire syllabus consisting of 3 marks each. In addition to this, four more questions (each question may be of 2-3 parts) will be set consisting of two questions from each unit. The student/candidate is required to attempt three questions in all selecting one from each unit in consisting of 10 marks in addition to the compulsory Question No.1.

Course Objective: To make student understanding in various components of Information Technology and Learn IT Concepts.

Unit – I

Introduction to Computers, Characteristics and Limitations of Computers, Block Diagram of Computer, Classification of Computers, Hardware and Software, Types of software, Computer Languages. Data and information, Types of data & information, Data processing using Computer.
Units of a Computer, CPU, ALU, Types of Memory and Memory Hierarchy, Registers, Input Output devices, Mother Board. Processing numerical data using Spreadsheets, Processing and displaying textual data using word processor.

Unit – II

Societal impact of IT, social use of WWW, privacy security and integrity of Information, Internet, Web Browsers, Internet Connection Types, How Internet Works, ISPs, Search Engines, Emails and Its Working, Internet Security, Uses of Internet, Introduction to Cloud and its Applications.

Text and Reference Books:

1. Introduction to Information Technology by V. Rajaraman., PHI
2. Information Technology by P.K. Sinha, PHI
3. ITL Education Solutions Limited, "Introduction to Computer Science", Pearson Education, 2nd Edition 2012.

Course Outcome

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

CO1: **Recognize** Computer system components and classifications. (LOTS: Level 1 - Remember)
CO2: **Understand** Computer System functions.(LOTS: Level 2Understand)
CO3: **Explore** Software productivity tools such as MS word and Excel. (LOTS: Level 3 - Explore)
CO4: **Insights** The Internet and Cloud Computing concepts.(HOTS: Level4-Analyze)
CO5: **Evaluate** Advanced IT concepts and MS office. (HOTS: Level 5 - Evaluate)
CO6: **Create** Programs based on acquired knowledge.(HOTS: Level 6– Create)

Mapping of COs with POs: (C24MDC105T)

Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1								
CO2								
CO3								
CO4								
CO5								
CO6								

S=Strong,M=Medium,W=Weak

Information Technology Lab

Paper Code: C24MDC105P
30 Hrs (2 Hrs /Week) **External Marks : 15**
Credits: 1 **Internal Marks : 10**
Exam. Time: 3 Hrs **Total Marks: 25**

Course Objective: To make student understand various components of computer and their working, Learn Basic IT Concepts.

The following activities to be carried out/discuss in the Lab during the practical.

List of Experiments:

1. Create a class timetable using table option in MS- Word.
2. Make your resume in MS-Word.
3. Create worksheet of 10 students and apply basic formula and functions in MS Excel.
4. Create worksheet of a company employee and calculate their salary and other benefits.
5. Basics knowledge about Internet and Google's applications (including Google Chrome, Google Docs, Gmail, Google weather, google sheet etc.).
6. To Compose and send an email to single person and multiple recipients. Also use CC and BCC option of email.
7. To send an email with an attachment.
8. To use Digilocker app and Google drive.

Note: In addition to above experiments, the teacher concerned may add more experiments based on theory syllabus

Course Outcome

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

CO1. **Develop** basic programs with MS Word, Excel& IT Concepts
CO2.**Explore**programs to identify formatting effectively.
CO3.**Evaluate** the impact of formatting documents.
CO4.**Design**programsinvolvingformulas, functions.
CO5. **Create** lab assignment record that includes problem definitions, solutions, results, and conclusions.
CO6.**Demonstrate** ethical practices while solving problems individually or in groups.

Mapping of COs with POs: (C24MDC105P)

Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1								
CO2								
CO3								
CO4								
CO5								
CO6								

S=Strong, M=Medium, W=Weak

Computer Science
Office Tools (Semester-I/II)
Skill Enhancement Course (SEC)

Paper Code: C24SEC103T

30 Hrs. (2 Hrs /Week) **External Marks: 35**
Credits: 2 **Internal Marks: 15**
Exam. Time: 2 Hrs **Total Marks: 50**

Note: The examiner is required to set five questions in all. The first question will be compulsory consisting of five short questions covering the entire syllabus consisting of 3 marks each. In addition to this, four more questions (each question may be of 2-3 parts) will be set consisting of two questions from each unit. The student/candidate is required to attempt three questions in all selecting one from each unit in consisting of 10 marks in addition to the compulsory Question No.1.

About the Course: To impart the basic knowledge about the software and hardware. The student will learn about the basics of operating systems and spreadsheets.

Unit I

Operating System - Definition, Functions, Types of Operating System, Basics of Popular Operating Systems, The User Interface, Exploring Computer, Icons, taskbar, desktop, Using Menu and Menu-selection, managing files and folders, Control panel – display properties, add/remove software and hardware, Common utilities.
Basic Word Processing - Introduction to Word Processing, Menus, Creating, Editing & Formatting Document, Spell Checking, Printing.

Unit II

Advanced Word Processing: Views, Tables, modifying page setup, applying document themes, applying document style sets, Inserting headers and footers
Spread Sheet: Elements of Electronics Spread Sheet, Applications, Creating and Opening of Spread Sheet, Menus, Manipulation of cells: Enter texts numbers and dates, Cell Height and Widths, copying of cells, Mathematical, Statistical and Financial function, Drawing different types of charts, Sort and Filter Data. Creating Presentation, Type of presentation views. Using sound, Animation, Working with Objects, Printing.

Text books and references:

1. Help files from Apache Open Office, https://wiki.openoffice.org/wiki/Documentation
2. Channelle Andy, "Beginning OpenOffice 3: From Novice to Professional", a Press Publications
3. Beginning OpenOffice 3: From Novice to Professional, Andichannele, Apress.
4. Microsoft Office 2016 Step by Step: MS Office 2016 Step by Step, By Joan Lambert,
5. Curtis Frye
6. Computer Fundamentals - By Pradeep K. Sinha, Priti Sinha, BPB Publications, 6th Edition
7. Getting Started with Libre Office, Friends of Open Documents Inc.,
8. https://www.freetechbooks.com/friends-of-opendocument-inc-p1851.html
9. Documentation from LibreOffice, https://documentation.libreoffice.org/en/englishdocumentation

Course Outcome

At the end of the course a student is able to:
CO1: Recall classification of operating system.
CO2: Define basic functions of operating systems and word processing.
CO3: Apply editing and formatting in a document.
CO4: Compare working of word processor and spread-sheets.
CO5: Evaluate the spread-sheets using built-in functions.

Mapping of COs with POs: (C24SEC103T)

Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1								
CO2								
CO3								
CO4								
CO5								

S=Strong, M=Medium, W=Weak

Office Tools Lab (Semester-I/II)

Paper Code: C24SEC103P
30 Hrs (2 Hrs /Week) **External Marks : 15**
Credits: 1 **Internal Marks : 10**
Exam. Time: 3 Hrs **Total Marks: 25**

The following activities to be carried out/discuss in the Lab during the practical.

Operating System:

- Starting with basics of Operating Systems and its functionalities

Word Processing:

- Create and format word documents.
- Use tables, word Art and other features in your documents.
- Use macros to simplify the tasks in a document.
- Use mail merge to write once for many.

Spread Sheet:

- Use spreadsheet for basic data handling
- Apply formulas to sheet for automation.
- Use Charts & Shapes for better visualization of the data.
- Use sorting and filtering of the data

Presentation Software:

- Prepare and format presentations.
- Apply slide transitions, animations and sequencing for slides.
- Apply different formatting and insert options to make presentation better.
- Appling sound and animation.

Note: In addition to above experiments, the teacher concerned may add more experiments based on theory syllabus

Course Outcome

At the end of the course a student is able to:

CO1: Basic working and functions of operating system.
CO2: Effective use of formatting skills on paragraphs, tables, lists, and pages.
CO3: Demonstrate the mechanics and uses of Word tables to organize and present data.
CO4: To evaluate accounting operations.
CO5: Utility of functions and formulas on excel spreadsheet.
CO6: Manipulate data using data names and ranges, filters and sort, and validation lists.

Mapping of COs with POs: (C24SEC103P)

Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1								
CO2								
CO3								
CO4								
CO5								
CO6								

S=Strong, M=Medium, W=Weak

Computer Science
Digital Efficiency Tools (Semester-I/II)
Skill Enhancement Course (SEC)

Paper Code: C24SEC203T
30 Hrs. (2 Hrs /Week) **External Marks: 35**
Credits: 2 **Internal Marks: 15**
Exam. Time: 2 Hrs **Total Marks: 50**

Note: The examiner is required to set five questions in all. The first question will be compulsory consisting of five short questions covering the entire syllabus consisting of 3 marks each. In addition to this, four more questions (each question may be of 2-3 parts) will be set consisting of two questions from each unit. The student/candidate is required to attempt three questions in all selecting one from each unit in consisting of 10 marks in addition to the compulsory Question No.1.

Course Objective: This course introduces simple and practical techniques to improve digital productivity. Students will learn about basic time management tools, digital collaboration using G Suite applications, organizing files, and handling digital distractions. The course aims to help students streamline their digital tasks, reduce distractions, and increase efficiency.

Unit-I

Introduction to Digital Efficiency: What is Digital Efficiency? Benefits of Being Digitally Efficient, Handling Digital Distractions. **Basic Time Management Tools:** Using Digital Calendars (Google Calendar), Google Tasks. **Email management and File organisation:** Basics of Digital Note-Taking (Google Keep), Simple File and Folder Organization, Managing Emails Effectively (Gmail).

Unit – II

Digital Collaboration with G Suite: File sharing and storage (Google Drive), Online Meetings (Google Meet), Collaborative Document Editing (Google Docs, Google Sheets), Using Google Classroom for Education, Creating Surveys and Forms (Google Forms)

Text and Reference:

1. Newport, C., Digital Minimalism: Choosing a Focused Life in a Noisy World, Portfolio, 2019
2. Google keep: https://support.google.com/keep/answer/2888240?hl=en&co=GENIE.Platform%3DAndroid&sjid=12352778224802636 84-AP
3. Google drive: https://support.google.com/drive/answer/2424384?hl=en&co=GENIE.Platform%3DAndroid&sjid=1235277822480263684-AP
4. Google meet: https://support.google.com/a/users/answer/9282720?hl=en&sjid=1235277822480263684-AP
5. Google docs: https://support.google.com/a/users/answer/9282664?hl=en&sjid=1235277822480263684-AP
6. Google sheet: https://support.google.com/a/users/answer/9282959?hl=en
7. Google forms:https://support.google.com/a/users/answer/9303071?hl=en
8. Managing Emails Effectively: https://support.google.com/a/users/answer/9260550?hl=en
9. Google classroom: https://sites.google.com/view/classroom-workspace/

Course Outcomes

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

CO1. **Define** basic concepts of digital efficiency.
CO2. **Explain** simple tools and strategies for managing digital tasks.
CO3. **Apply** basic digital tools to improve personal productivity.
CO4. **Compare** different digital tools for specific tasks.
CO5. **Develop** a simple digital efficiency plan using selected tools.

Mapping of COs with POs:

Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1								
CO2								
CO3								
CO4								
CO5								

S=Strong, M=Medium, W=Weak

Digital Efficiency Tools Lab (Semester-I/II)

Paper Code: C24SEC203P
30 Hrs (2 Hrs /Week) **External Marks : 15**
Credits: 1 **Internal Marks : 10**
Exa. Time: 3 Hrs **Total Marks: 25**

Course Objective: This lab course provides hands-on practice with tools and techniques covered in the Digital Efficiency course. Students will gain practical experience in using digital productivity tools, managing files, and collaborating effectively using G Suite applications.

List of experiments/assignments:

1. **Setting Up Google Calendar:** Create a Google account if not already done. Set up Google Calendar and explore its interface. Add personal events, set reminders, and manage notifications.
2. **Task Management with Google Tasks:** Sign up for Google Tasks or a similar task management tool. Create task lists for daily, weekly, and long-term goals. Prioritize tasks using labels, due dates, and priority levels.
3. **Managing Emails with Gmail:** Use Gmail to manage emails effectively. Organize emails using labels, folders, and filters. Practice archiving, deleting, and searching for emails.
4. **Digital Note-Taking with Google Keep:** Explore Google Keep for creating and organizing notes. Use labels, colours, and reminders for better organization. Share notes with peers and collaborate on a note-taking activity.
5. **File Management with Google Drive:** Upload files to Google Drive and organize them into folders. Share files with specific permissions (view, edit, comment).Practice searching for files and using advanced features like offline access.
6. **Collaborative Document Editing:** Collaborate on a document using Google Docs. Edit the document simultaneously with peers. Use comments, suggestions, and version history features.
7. **Online Meetings with Google Meet:** Schedule an online meeting using Google Calendar. Host and join meetings using Google Meet. Share screens, collaborate on documents, and record meetings for future reference.

Note: In addition to the above experiments, the teacher may add more programs on the behalf of the theory syllabus.

Course Outcomes

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

CO1. **Apply** digital tools for efficient personal organization and productivity.
CO2. **Analyse** and prioritize tasks using task management strategies.
CO3. **Critique** the usability and user experience of each tool based on practical use.
CO4. **Design** comprehensive digital documentation.
CO5. **Create** lab assignment record that includes problem definitions, solutions, results, and conclusions.
CO6. **Demonstrate** ethical practices while solving problems individually or in groups.

Mapping of COs with POs: (C24SEC203P)

Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1								
CO2								
CO3								
CO4								
CO5								
CO6								

S=Strong, M=Medium, W=Weak

Computer Science
Digital Empowerment (Semester-I/Semester-II)
Value Aided Courses (VAC)

Paper code: C24VAC109T
30 Hrs. (2 Hrs /week) **External Marks: 35**
Credits: 2 **Internal Marks: 15**
Exam. Time: 2 Hrs **Total Marks: 50**

Note: The examiner is required to set five questions in all. The first question will be compulsory consisting of five short questions covering the entire syllabus consisting of 3 marks each. In addition to this, four more questions (each question may be of 2-3 parts) will be set consisting of two questions from each unit. The student/candidate is required to attempt three questions in all selecting one from each unit in consisting of 10 marks in addition to the compulsory Question No.1.

Course Objective: The course aims to promote digital empowerment by understanding the digital landscape, creating awareness of Digital India, and emphasizing cyber safety and security for effective communication and collaboration in cyberspace.

Unit - I

Digital Empowerment: Needs and challenges, Vision of Digital India: DigiLocker, E-Hospitals, e-Pathshala, BHIM, e-Kranti (Electronic Delivery of Services), e-Health Campaigns; Public utility portals of Govt. of India such as RTI, Health, Finance, Income Tax filing, Education.

Unit – II

Electronic Communication: Electronic mail, blogs, social media, Tools/platforms for online learning, Collaboration using file sharing, messaging, video conferencing; **Safe and Secure Cyberspace:** Online security and privacy, Data breach and Cyber Attacks, Security Initiatives by the Govt of India, Ethics in Cyberspace.

Text and Reference Books:

1. Rodney H. Jones, Christoph A. Hafner, Understanding Digital Literacies: A Practical Introduction, Routledge Books, 2nd Edition, 2021
2. David Sutton, Cyber Security: A practitioner's guide, BCS Learning & Development Limited, UK, 2017

Course Outcomes

At the end of the course students will be able to:
CO1: **Recall** fundamental concepts of digital empowerment.
CO2: **Understand** different initiatives of digital empowerment.
CO3: **Apply** electronics communication tools like Email and social media.
CO4: **Analyze** different types cyber attack and security concerns.

Mapping of COs with POs: (C24VAC109T)

Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1								
CO2								
CO3								
CO4								

S=Strong, M=Medium, W=Weak

Computer Science
Data Structure using C (Semester-II)
Discipline Specific Course (DSC)

Paper Code: C24COS201T
45 Hrs (3 Hrs /Week) **External Marks : 50**
Credits: 3 **Internal Marks : 20**
Exam. Time: 2.5 Hrs **Total Marks: 70**

Note: The examiner is required to set nine questions in all. The first question will be compulsory consisting of five short questions covering the entire syllabus consisting of 2 marks each. In addition to this, eight more questions (each question may be of 2-3 parts) will be set consisting of two questions from each unit. The student/candidate is required to attempt five questions in all selecting one from each unit consisting of 10 marks each in addition to the compulsory Question No.1. All questions carry equal marks.

Course Objective: Achieve an understanding of fundamental data structures, which allow one to store collections of data with fast updates and queries. Study theoretical analysis, implementation and application of data structures.

Unit I

Introduction: Data Structures Definition and its types, Data Structure operations, Static and dynamic memory storage, Algorithms complexity and time-space tradeoff, Big-O notation. **Strings:** Introduction, storing strings, String operations, Pattern matching algorithms.

Unit II

Arrays: one-dimensional arrays, matrices, sparse matrices, multi-dimensional arrays, operations on arrays, Linear search, Binary search, Insertion sort, selection sort, Bubble sort, Merge sort.

Linked List: Array vs linked list, Types (singly, doubly, singly circular, header, doubly circular,), Operations on Lists – create, insert, delete, search, Applications of linked lists.

Unit III

Stack: Definition, Array implementation of stacks, Linked implementation of stacks, Applications of Stacks: Infix, Postfix and prefix expression, conversions and evaluation of expressions, Recursion, Quick Sort.

Queue: Definition, Array implementation of queues, Linked implementation of queues, Circular queues, Priority queues, Double-ended queues, Applications of queue.

Unit IV

Trees: Binary Trees and their properties, Linked and static Representation of binary trees, Complete Binary Tree, Threaded Binary tree, Different tree traversal algorithms, Binary Search Tree (create, delete, search, insert, display).

Graph: Definition, Array and linked representation of graphs, Graph Traversal (BFS and DFS), Adjacency matrix and adjacency lists, path matrix, Finding Shortest Path - Warshall's Algorithm.

Text and Reference Books:

1. Seymour Lipschutz, "Data Structures", Tata McGraw- Hill Publishing Company Limited, Schaum's Outlines, New Delhi.
2. Yedidyan Langsam, Moshe J. Augenstein, and Aaron M. Tenenbaum, "Data Structures Using C", Pearson Education., New Delhi.
3. Bala Guruswamy, "Data Structures Using C", TMH.
4. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Addison- Wesley.

Course Outcome:

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

CO1: **Identify** components and classifications of computer systems.
CO2: **Understand** CPU functions, I/O devices, and memory types.
CO3: **Apply** software, hardware, and firmware concepts in computing.
CO4: **Analyze and compare** programming constructs like loops and operators.
CO5: **Evaluate** advanced programming concepts including functions and arrays.
CO6: **Develop** programs based on learned concepts. (HOTS: Level 6 – Create)

Mapping of CO's with PO's: (C24COS201T)

Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1								
CO2								
CO3								
CO4								
CO5								
CO6								

S=Strong, M=Medium, W=Weak

Data Structure using C Lab

Paper Code: C24COS201P
30 Hrs (2 Hrs /Week) **External Marks: 20**
Credits: 1 **Internal Marks: 10**
Exam. Time: 3 Hrs **Total Marks: 30**

Course: Achieve an understanding of fundamental data structures, which allow one to store collections of data with fast updates and queries. Study theoretical analysis, implementation and application of data structures.

The following activities be carried out/ discussed in the lab during the initial period of the semester.

List of Laboratory Assignments Data Structure Using C:

1. Write a program to insert an element in an array.
2. Write a program to delete an element from an array.
3. Write a program for Pattern Matching Algorithm.
4. Write a program for Bubble Sort/ Selection Sort/ Insertion Sort.
5. Write a program for Linear Search/ Binary search.
6. Write a program to insert a node in linked list at beginning, end, after a given node, before a given node.
7. Write a program to delete the starting node, last node or a given node from a linked list.
8. Write a program to implement push and pop operation in a stack using array.
9. Write a program to implement push and pop operation in stack using Linked List.
10. Write a program for Quick Sort.
11. Write a program to insert and delete an element in Queue using array.
12. Write a program to insert and delete an element in Queue using Linked List.

Note: In addition to the above experiments, the teacher may add more programs on the behalf of the theory syllabus.

Course Outcome:
At the end of the course, the students would be able to :
CO1. **Develop** basic data structure programs using appropriate syntax and semantics in C.
CO2. **Analyze and debug** programs to identify and debug errors.
CO3. **Explore** how various coding practices affect the performance and readability of C programs.
CO4. **Design and execute** programs that include control structures, arrays, and functions.
CO5. **Create** lab assignment record that includes problem definitions, solutions, results, and conclusions.
CO6. **Demonstrate** ethical practices while solving problems individually or in groups.

Mapping of COs with POs: (C24COS201P)

Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1								
CO2								
CO3								
CO4								
CO5								
CO6								

S=Strong, M=Medium, W=Weak

Computer Science
Internet and Web Design (Semester-II)
Minor Course (MIC)

Paper Code: C24MIC202T
30 Hrs (2 Hrs /Week) **External Marks : 35**
Credits: 2 **Internal Marks : 15**
Exam. Time: 2 Hrs **Total Marks: 50**

Note: The examiner is required to set five questions in all. The first question will be compulsory consisting of five short questions covering the entire syllabus consisting of 3 marks each. In addition to this, four more questions (each question may be of 2-3 parts) will be set consisting of two questions from each unit. The student/candidate is required to attempt three questions in all selecting one from each unit in consisting of 10 marks in addition to the compulsory Question No.1.

Course Objective: This course introduces core concepts of Internet and web designing emphasizing on HTML.

Unit I

Introduction to Internet: Internet Evolution and Concept, Internet Vs Intranet, Growth of Internet, Internet Service Provider (ISP) & its Function, Connectivity- Dialup, Leased line; URL, Protocols.
E-MAIL: Email Basics, Address, Features, Sending & Receiving email, Email Protocols, Labels in Email, Email services providers, Internet chatting - Voice chat, Text chat
World Wide Web (www): History of WWW, Web Browser, Web server, Search Engines, working of Search Engine, Web Protocols (HTTP, FTP, SNMP etc.), TCP/IP layer with protocols.

Unit II

Web Designing: Steps for developing a Website; contents selection; Webpage, Home page; Domain Names; website publishing.
HTML: Concepts of Hypertext, Versions of HTML, Elements of HTML, Syntax, Tags & Attributes, Head & Body Sections, Inserting Texts, Images, Hyperlinks, Backgrounds and Color Controls, Different HTML Tags, Table Layout and Presentation, Creating Lists, Use of Font Size & Attributes, List Types and Its Tags, Use of Frames and Forms in Web Pages.

Text and Reference Books:

1. Raj Kamal, Internet and Web Technologies, Tata McGraw- Hill, 2002.
2. Wendy Willard, HTML Beginners Guide, Tata McGraw- Hill, 2009.
3. Deitel and Goldberg, Internet and World Wide Web, How to Program, PHI, 2004.

Course Outcomes

At the end of the course, the students would be able to:
CO1: **Recall** the basic concepts of Internet and WWW.
CO2: **Explain** ISPs and different connection types for networking
CO3: **Apply** basic web designing tool: HTML.
CO4: **Analyze** and discuss various components of a web page.
CO5: **Evaluate** and prepare a report describing or making recommendations for a website design.
CO6: **Design** a basic webpage having different elements of HTML.

Mapping of COs with POs: (C24MIC202T)

Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1								
CO2								
CO3								
CO4								
CO5								
CO6								

S=Strong, M=Medium, W=Weak

Computer Science
Internet and Web Design (Semester-II)
Minor Course (MIN)

Paper Code: C24MIN202T
45 Hrs (3 Hrs /Week) **External Marks : 50**
Credits: 3 **Internal Marks : 20**
Exam. Time: 2.5 Hrs **Total Marks: 70**

Note: The examiner is required to set five questions in all. The first question will be compulsory consisting of five short questions covering the entire syllabus consisting of 3 marks each. In addition to this, four more questions (each question may be of 2-3 parts) will be set consisting of two questions from each unit. The student/candidate is required to attempt three questions in all selecting one from each unit in consisting of 10 marks in addition to the compulsory Question No.1.

Course Objective: This course introduces core concepts of Internet and web designing emphasizing on HTML.

Unit I

Introduction to Internet: Internet Evolution and Concept, Internet Vs Intranet, Growth of Internet, Internet Service Provider (ISP) & its Function, Connectivity- Dialup, Leased line; URL, Protocols.
E-MAIL: Email Basics, Address, Features, Sending & Receiving email, Email Protocols, Labels in Email, Email services providers, Internet chatting - Voice chat, Text chat

Unit-II

World Wide Web (www): History of WWW, Web Browser, Web server, Search Engines, working of Search Engine, Web Protocols (HTTP, FTP, SNMP etc.), TCP/IP layer with protocols.

Unit III

Web Designing: Steps for developing a Website; contents selection; Webpage, Home page; Domain Names; website publishing.

Unit-IV

HTML: Concepts of Hypertext, Versions of HTML, Elements of HTML, Syntax, Tags & Attributes, Head & Body Sections, Inserting Texts, Images, Hyperlinks, Backgrounds and Color Controls, Different HTML Tags, Table Layout and Presentation, Creating Lists, Use of Font Size & Attributes, List Types and Its Tags, Use of Frames and Forms in Web Pages.

Text and Reference Books:

- Raj Kamal, Internet and Web Technologies, Tata McGraw- Hill, 2002.
- Wendy Willard, HTML Beginners Guide, Tata McGraw- Hill, 2009.
- Deitel and Goldberg, Internet and World Wide Web, How to Program, PHI, 2004.

Course Outcomes

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

CO1: **Recall** the basic concepts of Internet and WWW. (LOTS: Level 1 - Remember)
CO2: **Explain** ISPs and different connection types for networking (LOTS: Level 2 - Understand)
CO3: **Apply** basic web designing tool: HTML. (LOTS: Level 3 - Apply)
CO4: **Analyze** and discuss various components of a web page. (HOTS: Level 4 - Analyze)
CO5: **Evaluate** and prepare a report describing or making recommendations for a website design. (HOTS: Level 5 - Evaluate)
CO6: **Design** a basic webpage having different elements of HTML (HOTS: Level 6 – Create)

Mapping of COs with POs: (C24MIN202T)

Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1								
CO2								
CO3								
CO4								
CO5								
CO6								

S=Strong, M=Medium, W=Weak

Internet and Web Design Lab

Paper Code: C24MIN202P
30 Hrs (2 Hrs /Week) **External Marks : 20**
Credits: 1 **Internal Marks : 10**
Exam. Time: 3 Hrs **Total Marks: 30**

The following activities to be carried out/discuss in the Lab during the practical.
List of Experiments:

1. Use the HTML tags for Font features.
2. Create Ordered and Unordered List in Table.
3. Create a simple webpage using HTML.
4. Designing of registration form with table and use of hyperlink.
5. Design a page with frames to include Images and Videos.
6. Add a cascading style sheet for designing the web page.
7. Use user defined function to get array of values and sort them in ascending order on web page
8. Demonstrate Request and Response object using HTML Form.
9. Register your website domain with DNS Provider.

Note: In addition to above experiments, the teacher concerned may add more experiments based on theory syllabus

Course Outcome

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

CO1. **Develop** Different Web pages using appropriate syntax and semantics. (LOTS: Level 3: Apply)
CO2. **Analyze and debug** webpage and fix errors effectively. (LOTS: Level 4: Analyze)
CO3. **Evaluate** the impact of different coding practices on the performance and readability of HTML tags. (HOTS: Level 5: Evaluate)
CO4. **Design and execute** programs inserting image, videos etc in webpage. (HOTS: Level 6: Create)
CO5. **Create** lab assignment record that includes problem definitions, solutions, results, and conclusions. (HOTS: Level 6: Create)
CO6. **Demonstrate** ethical practices while creating website projects individually or in groups (LOTS: Level 3: Apply).

Mapping of COs with POs: (C24MIN202P)

Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1								
CO2								
CO3								
CO4								
CO5								
CO6								

S=Strong, M=Medium, W=Weak

Computer Science
Internet and Web Design (Semester-II)
Multidisciplinary Course (MDC)

Paper Code: C24MDC205T

30 Hrs (2 Hrs /Week) **External Marks : 35**
Credits: 2 **Internal Marks : 15**
Exam. Time: 2 Hrs **Total Marks: 50**

Note: The examiner is required to set five questions in all. The first question will be compulsory consisting of five short questions covering the entire syllabus consisting of 3 marks each. In addition to this, four more questions (each question may be of 2-3 parts) will be set consisting of two questions from each unit. The student/candidate is required to attempt three questions in all selecting one from each unit in consisting of 10 marks in addition to the compulsory Question No.1.

Course Objective: This course introduces core concepts of Internet and web designing emphasizing on HTML& CSS.

Unit I

Introduction to Internet: Internet Evolution and Concept, Internet Vs Intranet, Growth of Internet, Internet Service Provider (ISP) & its Function, Connectivity- Dialup, Leased line; URL, Protocols.
E-MAIL: Email Basics, Address, Features, Sending & Receiving Email, Email Protocols, Lables in Email, Email services providers, Internet chatting - Voice chat, Text chat.
World Wide Web (www): History of WWW, Web Browser, Webserver, Search Engines, working of Search Engine, Web Protocols (HTTP, FTP, SNMP etc.), TCP/IP layer with protocols.
Web Designing: Steps for developing a Website; contents selection; Webpage, Home page; Domain Names; website publishing.

Unit II

HTML: Concepts of Hypertext, Versions of HTML, Elements of HTML, Syntax, Tags & Attributes, Head & Body Sections, Inserting Texts, Images, Hyperlinks, Backgrounds and Color Controls, Different HTML Tags, Table Layout and Presentation, Creating Lists, Use of Font Size & Attributes, List Types and Its Tags,Use of Frames and Forms in Web Pages.
Cascading Style sheets : Introduction to CSS**,** External Style sheet**,** Internal style sheet**,** Inline style sheet**,** CSS Syntax- Selector, Property, Value**,** Overriding, Comments, color, background, Font, images.

Text and Reference Books:

1. Raj Kamal, Internet and Web Technologies, Tata McGraw- Hill, 2002.
2. Wendy Willard, HTML Beginners Guide, Tata McGraw- Hill, 2009.
3. Deitel and Goldberg, Internet and World Wide Web, How to Program, PHI, 2004.

Course Outcomes

At the end of the course , the students would be able to :
CO1: **Recall** the basic concepts of Internet and WWW.
CO2: **Explain** ISPs and different connection types for networking.
CO3: **Apply** basic web designing tool: HTML.
CO4: **Analyze** and discuss various components of a web page.
CO5: **Evaluate** and prepare a report describing or making recommendations for a website design.
CO6: **Design** a basic webpage having different elements of HTML& CSS.

Mapping of COs with POs: (C24MDC205T)

Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1								
CO2								
CO3								
CO4								
CO5								
CO6								

S=Strong, M=Medium, W=Weak

Internet and Web Design Lab (Semester-II)

Paper Code: C24MDC205P
30 Hrs (2 Hrs /Week) **External Marks : 15**
Credits: 1 **Internal Marks : 10**
Exam. Time: 3 Hrs **Total Marks: 25**

The following activities to be carried out/discuss in the Lab during the practical. List of Experiments:

10. Use the HTML tags for Font features.
11. Create Ordered and Unordered List in Table.
12. Create a simple webpage using HTML.
13. Designing of registration form with table and use of hyperlink.
14. Design a page with frames to include Images and Videos.
15. Add a cascading style sheet for designing the web page.
16. Use user defined function to get array of values and sort them in ascending order on web page
17. Demonstrate Request and Response object using HTML Form.
18. Register your website domain with DNS Provider.

Note: In addition to above experiments, the teacher concerned may add more experiments based on theory syllabus

Course Outcome
At the end of the course, the students would be able to :
CO1. **Develop** Different Web pages using appropriate syntax and semantics. CO2.
Analyze and debug webpage and fix errors effectively.
CO3. **Evaluate** the impact of different coding practices on the performance and readability of HTML tags. CO4.
Design and execute programs inserting image, videos etc in webpage.
CO5. **Create** lab assignment record that includes problem definitions, solutions, results, and conclusions. CO6.
Demonstrate ethical practices while creating website projects individually or in groups.

Mapping of COs with POs: (C24MDC205P)

Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1								
CO2								
CO3								
CO4								
CO5								
CO6								

S=Strong, M=Medium, W=Weak

Computer Science
Data Base Management System (Semester III)
Discipline Specific Course (DSC)

Paper Code: C24COS301T
45 Hrs (3Hrs /Week) **External Marks: 50**
Credits: 3 **Internal Marks: 20**
Exam Time:2.5 Hrs **Total Marks: 70**

Note: The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains five short answer questions covering entire syllabus. Rest eight more questions (each question of at least two parts) will be set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt five questions in all by selecting one question from each of unit in addition to compulsory Question No.1. All questions will carry equal marks.

Course Objective: This course provides foundational knowledge in Data Base Management System. It covers data models and database languages, and a survey of implementation techniques applied in modern DBMS. It also provides practical skills of conceptual/logical database design and general familiarity with the problems and issues of database management. It develops skills that are appropriate for Database Administrators, Database Application Developers, Database Specialists, and DBMS developers.

UNIT – I

Basic Introduction: Data, Information, Records, Files and Database. Characteristics of Database Management System. DBMS over File Processing System. Advantages and Disadvantages of DBMS. Database Users and various types of DBMS users. Database Administrator (DBA) and responsibilities of DBA. Schema and Instance. Views of Database. Physical and Logical Data Independence. Database Languages. DBMS Architecture: Three Schema Database Architecture.

UNIT-II

Data Models: Hierarchical, Network and Relational Data Models.
Entity-Relationship Model: Entity, Entity Sets, and Entity Type, Attributes: Type of Attributes, **Relationships-**Relationship set, Degree of Relationship, Cardinality Ratio. Participation Constraints. **ER Diagram:** Symbolic Notations for Designing ER Diagram,

UNIT – III

Relational Model: Relational model concepts (Domain, Attribute, Tuple, Relations, Characteristics of a relation), Keys**:** Super Key, Candidate Key, Primary Key, Foreign Key. Constraints- Key constraints, Domain constraints, Referential integrity constraints; **Relational algebra :** Basic operations like Select, Project, Union, Intersection, Difference, Projection, Selection, Join.

UNIT - IV

Relational Database design: functional dependencies, Normal forms (1 NF, 2 NF, 3 NF and BCNF). Decomposition, types of decomposition, properties of decomposition.
SQL: Introduction, Data Types; DDL-Create, Alter and Drop table Commands. DML- SELECT/ FROM/WHERE, INSERT INTO/ VALUES, UPDATE /SET/ WHERE/ORDER BY/HAVING, DELETE, Commands.

Suggested Readings:

1. Elmasri & Navathe: Fundamentals of Database systems, 3rd Edition, Addison Wesley, New Delhi.
2. Ivan Bayross : SQL, PL/SQL-The Program Language of ORACLE, BPB Publication, New Delhi.
3. Korth & amp; Silberschatz : Database System Concept, 4th Edition, McGraw Hill International Edition.
4. C. J. Date : An Introduction to Data bases Systems 7th Edition, Addison Wesley, New Delhi.

Course Outcomes: After completing this Course, the learner will be able to:

CO1: Identify: Learn the basic concepts of Data Base Management System.
CO2: Understand: Understand the architecture of DBMS, and different data models, and various keys.
CO3: Apply: Design relational database system.
CO4: Analyze and compare: Design and execute queries using SQL.

Mapping of CO-PO
C24COS301T

Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1								
CO2								
CO3								
CO4								

*Attainment Levels:-None,1:Low,2:Medium,3:High

Computer Science
DBMS LAB
(SemesterIII)
Discipline Specific Course (DSC)

Paper Code: C24COS301P
30 Hrs (2Hrs /Week) **External Marks: 20**
Credits: 1 **Internal Mark: 10**
Exam Time:3 Hrs **Total Marks: 30**

Note: An internal practical examination is conducted by the Course coordinator. The end semester practical examination is conducted jointly by external and internal examiners. External examiner is appointed by the COE of the university from the panel of examiners approved by BOSR of the Department of Computer Science and Engineering, GJUS&T Hisar and the internal examiner is appointed by the Principal of the college.

Course Objective: This course Understand basic concept of SQL and database concepts. Analyze the real-life problem and execute DDL, DML and DCL commands to solve the problem. It increases proficiency in database design and query using SQL.

List of Laboratory Assignments:

1. Creation of database having different fields and data types.
2. Adding various constraints using DDL commands
3. Alter the schema of the existing database
4. Delete the schema of the database
5. Add records in the database using DML command
6. SQL query for various views of the database.
7. Update and delete existing records in the database using DML command
8. Using SQL queries for various aggregate function
9. Using SQL queries Ordering and grouping of records on the database
10. Using SQL queries for logical operations on relational database

Students are given ten or more laboratory assignments with soft and hard deadlines. The lab assignments are evenly spread over the semester. Every student is required to prepare a file of laboratory assignments done.

Course Outcomes: After completing this Course, the learner will be able to:

CO1: Identify: identify the various SQL commands.
CO2: Understand: Understand the data types, and various constraint, and nature of SQL commands.
CO3: Apply: Create a Data base and design various queries for the data base.
CO4: Analyze and compare: Enforce integrity constraints on a database using SQL commands

Mapping of CO-PO
C24COS301P

Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1								
CO2								
CO3								
CO4								

*Attainment Levels:-None, 1:Low, 2:Medium, 3:High

Computer Science UG Programs (B.Sc./B.A.)

(Semester-III)

IT & E-Commerce Lab
Minor Course (MIC)

Paper Code: C24MIC302P
30 Hrs (2 Hrs /Week) **External Marks: 20**
Credits: 1 **Internal Marks: 10**
Exam.Time: 3 Hrs **Total Marks: 30**

Note: An internal practical examination is conducted by the Course coordinator. The end semester practical examination is conducted jointly by external and internal examiners. External examiner is appointed by the COE of the university from the panel of examiners approved by BOSR of the Department of Computer Science and Engineering, GJUS&T Hisar and the internal examiner is appointed by the Chairperson of the Department.

Course Objective: The course aims to provide students with hands-on experience in networking and e-commerce technologies by enabling them to: design and simulate network topologies and understand DNS resolution mechanisms, explore, and compare various e-commerce models and platforms, analyze real-world e-commerce security issues, develop practical skills in mobile payment platforms and digital signatures for secure online transactions.

List of Laboratory Assignments:

1. Create and identify different network topologies using network simulation tools.
2. Practical on resolving domain names to IP addresses and analyzing how DNS works.
3. Design diagrams or mock-ups of B2B, B2C, C2C, and C2B e-commerce models.
4. Explore and compare e-commerce portals like Amazon, Flipkart, etc. and study their user interfaces.
5. Simulate a mobile banking transaction or use a mobile payment platform (e.g. Paytm, BHIM, and Google Pay).
6. Practical on creating and verifying digital signature.
7. Analyze a simple case study related to the IT Act 2000 and its applications in e-commerce security.
8. Create an E-commerce Web site using HTML/WORD PRESS. (Take your own concepts to develop site.)

Note: In addition to the above experiments, the teacher may add more programs on the behalf of the theory syllabus.

Students are given seven or more laboratory assignments with soft and hard deadlines. The lab assignments are evenly spread over the semester. Every student is required to prepare a file of laboratory experiments done.

Course Outcomes: After completing this Course, the learner will be able to:
CO1: Identify: Learn how to implement various network concepts, e-commerce models and secure digital transaction mechanism.
CO2: Understand: Make the students familiar with various E-Commerce platforms, mobile banking interfaces and sites.
CO3: Apply: Learn the students how to deal with network simulation tools, various payment platforms and designing secure e-commerce portals.

Mapping of CO-PO
C24MIC302P

Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1								
CO2								
CO3								

*Attainment Levels: - None, 1: Low, 2: Medium, 3: High

Computer Science UG Programs (B.Sc./B.A.)
IT & E-Commerce (Semester-III)
Minor Course (MIC)

Paper Code: C24MIC302T
45 Hrs (3 Hrs /Week) **External Marks: 50**
Credits: 3 **Internal Marks: 20**
Exam. Time: 2.5 Hrs **Total Marks: 70**

Note: The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains five short answer questions covering entire syllabus. Rest eight more questions (each question of at least two parts) will be set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt five questions in all by selecting one question from each of unit in addition to compulsory Question No.1. All questions will carry equal marks.

Course Objective: The course aims to provide a foundational understanding of the Internet and its applications, focusing on e-commerce models, technologies, and real-world applications. It equips students with knowledge of networking, online payment systems, cryptography, digital signatures, and mobile commerce. Additionally, the course emphasizes risk management, cybersecurity, data privacy laws, and fraud prevention to prepare students for effectively managing and securing e-commerce platforms and transactions in diverse industries.

Unit I

Introduction to the Internet: Networking, Network Topologies, Types of Networks, Network Devices: Nodes and Hosts, TCP/IP, IP Address, Web Browsers and Web Servers, URL, Domain Names, WWW, Search Engines, Internet vs. Intranet vs. Extranet, Network Devices: Routers, Switches, Hubs, Modems, and their roles, Uses of Computer Networks.

Unit II

Introduction to E-commerce, E-commerce Models: B2B, B2C, C2C, C2B. Applications of E-commerce: Service Industry, Retail Sector, Financial Services, Travel & Tourism. Future of E-commerce, Online Shopping: Web Portals. Mobile commerce: Internet Services through Mobile, Mobile Banking, WAP & WML, Mobile Information Devices, POS.

Unit III

Online Payment Mechanism, Electronic Payment System: Legal Issues & Digital Currency - E-Cash & E-Cheque - Electronic Fund Transfer (EFT) - Advantages and Risks - Digital Token-Based E-Payment System - Smart Cards.
Payment Gateways, Risk Management options for E-Payment Systems,
Cryptography, Authentication, Data Encryption, Decryption, Public Key, Private Key, Digital Signature, E-check Certification, Digital Certification.

Unit IV

Threats in E-commerce, Fraud Prevention, E-commerce Data Protection: PCI Compliance and Data Privacy Laws, Security of Client & Service Provider, Security Issues over the Web, Cyber Law-IT Act 2000.

Text and Reference Books:

1. Kenneth C. Laudon, E-Commerce: Business, Technology, Society, 4th Edition, Pearson
2. Rayudu- C.S - "E-commerce E-business"- Himalaya Publishing House Mumbai.
3. E-Commerce & Mobile Commerce Technologies: Pandey, Saurabh Shukla, S. Chand.
4. E-Commerce: An Indian Perspective: P.T. Joseph, S.J, PHI
5. Electronic Commerce: A Managerial Perspective, Turban, E. et al., Prentice Hall-2008.

Course Outcomes: After completing this Course, the learner will be able to:

Course Outcomes:

CO1: Identify: Key networking components, e-commerce models, payment mechanisms, and security challenges in the digital ecosystem.
CO2: Understand: The working principles of the Internet, web technologies, and the role of cryptography, public/private keys, and digital signatures in e-commerce security.
CO3: Apply: Networking and e-commerce concepts to design and develop secure online platforms and integrate payment gateways effectively.
CO4: Analyze: Risks associated with e-commerce systems, cybersecurity threats, fraud cases, and legal compliance requirements under IT laws.
CO5: Compare: Different e-commerce models (B2B, B2C, C2C, C2B), their applications, and technologies used in mobile commerce versus traditional e-commerce systems.

Mapping of CO-PO C24MIC302T

Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1								
CO2								
CO3								
CO4								

*Attainment Levels: - None, 1: Low, 2: Medium, 3: High

Computer Science
C Programming (Semester-III)
Multi Disciplinary Course (MDC)

Paper Code: C24MDC305T
30 Hrs (2 Hrs /Week) **External Marks: 35**
Credits:2 **Internal Marks: 15**
Exam Time: 2 Hrs **Total Marks: 50**

Note: The end semester examination will be of 35 marks. The examiner is required to set five questions in all. The first question will be compulsory, consisting of five short questions covering the entire syllabus, each carrying three marks. In addition to these, four more questions (each question may have two parts) will be set, comprising two questions from each unit. The student is required to attempt three questions in all, selecting one question from each unit, each carrying 10 marks, in addition to the compulsory Question Number 1.

Course Objective: This course provides foundational knowledge in problem-solving using the C programming language. It covers C programming essentials such as data types, operators, control structures, arrays, functions, strings, pointers, and user-defined data types like structures and unions. The course emphasizes practical programming skills and problem-solving techniques.

Unit I

Overview of C: Character Set, Constants and Variables, Identifiers and Keywords, Data Types, Assignment Statement, Symbolic Constant, Formatted input/output function
Operators & Expression: Arithmetic, Relational, Logical, Bitwise, Increment and decrement operators, Assignment Operator, Conditional Operators and Special Operators, Arithmetic Expressions, Evaluation of Arithmetic Expression, Operator Precedence and Associativity,
Decision making with if statement, if-else statement, nested if statement, else-if ladder, Switch and Break statement, **Looping Statements:** for, while, and do-while loop, jumps in loops.

Unit II

Arrays: Declaration and Initialization of One Dimensional arrays, Declaration and Initialization of two Dimensional Arrays, Declaration and Initialization of String Variable, String Handling Functions: String Length, Copy, Compare, Concatenate, Search for a Substring etc.
Functions: definition, prototype, function call, passing arguments to a function: call by value; call by reference. **Structure and Union:** Structure definition, declaring structure variables, accessing structure members, Union definition, Difference between Structure and Union.

Text and Reference Books:

1. Gottfried, Byron S., Programming with C, Tata McGraw Hill.
2. Balagurusamy, E., Programming in ANSI C, Tata McGraw Hill.
3. Yashwant Kanetker, Let us C, BPB.
4. Rajaraman, V. , Computer Programming in C, PHI.

Course Outcomes: After completing this Course, the learner will be able to:

CO1: Identify: Learn the basics of C Language
CO2: Understand: Understand data types and input/output statements, different types of operators, their hierarchies
CO3: Apply: Implement programs using arrays and strings.
CO4: Analyze and compare: Get familiar with advanced concepts like structures, union etc. in C language.

Mapping of CO-PO
C24MDC305T

Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1								
CO2								
CO3								
CO4								

*Attainment Levels:-None, 1:Low, 2:Medium, 3:High

Computer Science
C Programming Lab (Semester-III)
Multi Disciplinary Course (MDC)

Paper Code: C24MDC305P
30Hrs (2Hrs /Week) **External Marks: 15**
Credits:1 **Internal Marks:10**
Exam Time:3 Hrs **Total Marks:25**

Note: An internal practical examination is conducted by the Course coordinator. The end semester practical examination is conducted jointly by external and internal examiners. External examiner is appointed by the COE of the university from the panel of examiners approved by BOSR of the Department of Computer Science and Engineering, GJUS&T Hisar and the internal examiner is appointed by the Principal of the college.

Course Objective: This practical lab course focuses on fundamental programming skills using C language, with an emphasis on problem-solving techniques. Students will complete a series of laboratory assignments that cover various topics such as basic arithmetic operations, control structures, array manipulation, and matrix operations. Assignments are designed to enhance practical coding skills and prepare students for more advanced programming tasks.

List of Laboratory Assignments:

1. To read radius of a circle and to find area and circumference of a circle.
2. To read three numbers and find the greatest out of three numbers.
3. To find the roots of quadratic equation.
4. To check whether the number is prime or not.
5. To find the factorial of a number.
6. To find the sum of the digits of a number, reverse the number, and also check the number is palindrome or not.
7. To read percentage of marks and to display appropriate message.
8. To read marks scored by n students and find the average of marks.
9. To check whether a given number is present in one dimensional integer Array.
10. To perform addition, multiplication of Matrices.

Students are given ten or more laboratory assignments with soft and hard deadlines. The lab assignments are evenly spread over the semester. Every student is required to prepare a file of laboratory assignment done.

Course Outcomes: After completing this Course, the learner will be able to:

CO1: Identify: Learn how to implement c program in a programming language.
CO2: Understand: Make the students familiar with various data types, operators.
CO3: Apply: Learn how to deal with control statement, arrays.
CO4: Analyze and compare: Compare various conditional statement and loops

Mapping of CO-PO
C24MDC305P

Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1								
CO2								
CO3								
CO4								

*Attainment Levels:-None, 1:Low, 2:Medium, 3:High

Computer Science
Data Analysis Using Excel
Skill Enhancement Course (SEC)

Paper Code: C24SEC303T
30 Hrs. (2 Hrs/week)
Credit: 2
Exam. Time: 2 Hrs

External Marks: 35
Internal Marks: 15
Total Marks: 50

Note: The end semester examination will be of 35 marks. The examiner is required to set five questions in all. The first question will be compulsory, consisting of five short questions covering the entire syllabus, each carrying three marks. In addition to these, four more questions (each question may have two parts) will be set, comprising two questions from each unit. The student is required to attempt three questions in all, selecting one question from each unit, each carrying 10 marks, in addition to the compulsory Question Number 1.

About the Course: This course provides a comprehensive introduction to mastering spreadsheet functions.

Unit I

Introduction to Excel : About Excel , Uses of Excel, Spreadsheet window pane, Ribbon, Home Tab – Cut, Copy, Paste, Font, Alignment, data types, conditional formatting, insert cell, delete cell, format cell, fill, clear, find and replace, Page Layout Tab- Theme group, Page setup group, Formula Bar.
Creating Formulas : Using Formulas, Formula Functions – Sum, Average, if, Count, max, min, Proper, Upper, Lower, Using AutoSum, Create and run a macro.

Unit II

Spreadsheet Chart : Creating Charts, Different types of chart, Formatting Chart Objects, Changing the Chart Type, Showing and Hiding the Legend, Showing and Hiding the Data Table

Data Handling and Analysis: Data Sorting, Filter, Advance Filter, data table, text to columns, remove duplicates, Data validation, consolidate, Data Outline : Group, Ungroup and Subtotal, VLook function.

Text and Reference Books:

- Microsoft Office- Complete Reference, BPB Publication
- Kevin Wilson, Essential Office 2016
- Michael Alexander and Richard Kusleika, Excel 2019 Bible
- Greg Harvey, Excel 2019 All-in-One For Dummies

Course Outcome:

By the end of the course a student is able to:

CO1: **Recall** Excel features, understanding spreadsheet components. (LOTS: Level 1 - Remember)
CO2: **Explain** Excel structure, Columns, Rows, Cells, and basic navigation. (LOTS: Level 2 - Understand)
CO3: **Apply** formatting tools for Columns, Rows, Cells, and data manipulation. (LOTS: Level 3 - Apply)
CO4: **Analyze** Excel formula functions, charting options, and data analysis tools. (HOTS: Level 4 - Analyze)
CO6: **Develop** Excel proficiency for advanced data manipulation and analysis skills. (HOTS: Level 5 - Create)

Mapping of COs with POs : C24SEC303P:

Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
C01								
C02								
C03								
C04								
C05								

S=Strong, M= Medium, W=Weak

Computer Science
Data Analysis Using Excel Lab
Skill Enhancement Course (SEC)

Paper Code: C24SEC303P
30 Hrs. (2 Hrs/week)
Credit: 1
Exam. Time: 3 Hrs

External Marks: 15
Internal Marks: 10
Total Marks: 25

Note: An internal practical examination is conducted by the Course coordinator. The end semester practical examination is conducted jointly by external and internal examiners. External examiner is appointed by the COE of the university from the panel of examiners approved by BOSR of the Department of Computer Science and Engineering, GJUS&T Hisar and the internal examiner is appointed by the Chairperson of the Department.

Course Objective: The course aims to equip students with practical skills to perform data analysis using Microsoft Excel. It focuses on data organization, use of formulas and functions, data visualization through charts, and basic statistical analysis tools. Students will gain hands-on experience in analyzing datasets and drawing meaningful insights for informed decision-making.

The following activities will be carried out/ discussed in the lab during the semester.

List of experiments:

1. Insert Rows and Columns in specific positions.
2. Working of different tools in format menu. (write any three tools).
3. Make use of different mathematical formulas such as =SUM, =COUNT, =AVERAGE, =MIN, =MAX.
4. Create employees salary sheet of a company with allowances and calculate gross salary.
5. Create students Marks sheet with Five subjects ;
    a. Apply total and percentage of marks using Formulas.
    b. Find maximum and minimum marks in a marksheet.
6. Create a chart showing the marks of a student in different subjects.
7. Create a worksheet with sorting of data based on specific condition.
8. Explore VLook function.

Note: In addition to above experiments, the teacher may add more experiments based on theory syllabus.

Course outcomes:

At the end of the course, the student would be able to:

CO1. **Develop** basic Excel programs using MS Excel. (LOTS: Level 3: Apply)
CO2. **Demonstrate** programs to identify formulas. (LOTS: Level 4: Analyse)
CO3. **Evaluate** the impact of different functionalities of available menus . (HOTS: Level 5: Evaluate)
CO4. **Develop** programs involving Work on mathematical functions.. (HOTS: Level 6: Create)
CO5. **Create** lab assignment record that includes problem definitions, solutions, results, and conclusions. (HOTS: Level 6: Create)

Mapping of COs with POs : C24SEC303P:

Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
C01								
C02								
C03								
C04								
C05								

S=Strong, M= Medium, W=Weak

Computer Science
Computer Networks (Semester-IV)
Discipline Specific Course (DSC)

Paper Code: C24COS401T
45 Hrs (3 Hrs /Week) **External Marks : 50**
Credits: 3 **Internal Marks : 20**
Exam. Time: 2.5 Hrs **Total Marks: 70**

Note: The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains five short answer questions covering entire syllabus. Rest eight more questions (each question of at least two parts) will be set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt five questions in all by selecting one question from each of unit in addition to compulsory Question No.1. All questions will carry equal marks.

Course Objective: This course provides a comprehensive overview of data communication and computer networks. It covers key algorithms for data routing, forwarding, and switching across network nodes. Emphasizing the layered architecture, it enhances understanding of structured network communication.

Unit I

Data communication: Components, Data representation and Data flow; Network: Uses, Topologies, Network Services, OSI and TCP/IP Reference Models; Network categories: LAN, MAN, WAN; Guided Transmission Media, Wireless Transmission Media, Networking Devices: Hubs, Repeaters, Bridges, Modems, Switches, Routers, and Gateways

Unit II

Data Link Layer-design issues, Framing & Error Handling: Framing Protocols, Error detection and correction mechanisms; Switching Techniques: Circuit Switching, Packet Switching, Message Switching Flow Control Protocols: Stop-and-wait, Sliding Window protocols: Go-back-N and Selective Repeat;

Unit III

Multiple Access Communication: Random Access-ALOHA, Slotted-ALOHA, CSMA, CSMA-CD. Routing algorithms: optimality principle, shortest path, flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Congestion control algorithms, Internetworking: IPV4 and IPV6, IP Addressing, ARP, RARP, ICMP.

Unit IV

Transport Layer: Transport layer Services: Addressing, Multiplexing, Flow control, Internet Transport Protocols: UDP, TCP, TCP Segment, TCP Connection.
Application Layer: Introduction to DNS, FTP, TELNET, HTTP, SMTP, Electronic Mail, WWW.

Text and Reference Books:

1. Andrew S Tanenbaum, Computer Networks, 5th Edition, Pearson publications, 2010.
2. Forouzan, Data Communication and networking ,5th Edition, Tata McGrawHill, 2012.
3. William Stalling, Data & Computer Communication 6th edition, LPE Pearson Education, 2013.
4. Todd Lammle, CCNA Study Guide, 6th Edition, 2013.
5. RFCs and Internet Drafts available from Internet Engineering Task Force.

Course Outcomes: After completing this Course, the learner will be able to:

CO1. **Outline** various models, topologies and devices of Computer Networks. (LOTS: Level 1: Remember)

CO2. **Explain** the functions of various layers in Network Reference Model. (LOTS: Level 2: Understand)

CO3. **Apply** different network concepts in various network communication protocols. (LOTS: Level 3: Apply)

CO4. **Analyse** performance of various protocols in different scenarios. (HOTS: Level 4: Analyse)

CO5. **Design** network for an organisation. (HOTS: Level 6: Create)

Mapping of CO-

PO C24COS401T

Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1								
CO2								
CO3								
CO4								

*Attainment Levels: - None, 1: Low, 2: Medium, 3: High

Computer Networks Lab

Paper Code: C24COS401P **External Marks: 20**
30 Hrs (2 Hrs /Week) **Internal Marks: 10**
Credits: 1 **Total Marks: 30**
Exam.Time: 3 Hrs

Note: An internal practical examination is conducted by the Course coordinator. The end semester practical examination is conducted jointly by external and internal examiners. External examiner is appointed by the COE of the university from the panel of examiners approved by BOSR of the Department of Computer Science and Engineering, GJUS&T Hisar and the internal examiner is appointed by the Chairperson of the Department.

Course Objective: The Computer Network Lab aims to provide hands-on experience in understanding network fundamentals, protocols, and data transmission techniques. Students will implement routing algorithms, configure networks, and analyze performance using simulation tools like Cisco Packet Tracer. The lab enhances problem-solving skills in network configuration, troubleshooting, and security measures.

List of Laboratory Assignments:

1. Study of different types of Network cables and Practically implement the cross-wired cable and straight through cable using clamping tool.
2. Study of Network Devices in Detail.
3. Study of network IP
4. Connect the computers in Local Area Network
5. Connectivity troubleshooting using PING, IPCONFIG commands
6. Study of basic network command and Network configuration commands.
7. Performing an Initial Switch Configuration
8. Configure a network topology using Packet Tracer software.
9. Configure a network using Distance Vector Routing Protocol.
10. Configure a network using Link State Vector Routing Protocol.

Course Outcomes: After completing this Course, the learner will be able to:

CO1. **Demonstrate** various network topologies and networking devices.(LOTS: Level: 3: Apply)
CO2. **Justify** a particular routing protocol for any network.(HOTS: Level: 5: Evaluate)
CO3. **Construct** a network and implement various network protocols.(HOTS: Level: 6: Create)
CO4. **Devise** solutions for various routing and switching problems. (HOTS: Level: 6:Create)
CO5. **Create lab** records for the solutions of the assignments. (HOTS: Level: 6: Create)

Mapping of CO-PO
C24COS401P

Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1								
CO2								
CO3								

*Attainment Levels: - None, 1: Low, 2: Medium, 3: High

R Programming Lab

Paper Code: C24VOC402P
60 Hrs (4 Hrs /Week) **External Marks: 35**
Credits: 2 **Internal Marks: 15**
Exam Time: 3 Hrs **Total Marks: 50**

Note: An internal practical examination is conducted by the Course coordinator. The end semester practical examination is conducted jointly by external and internal examiners. External examiner is appointed by the COE of the university from the panel of examiners approved by BOSR of the Department of Computer Science and Engineering, GJUS&T Hisar and the internal examiner is appointed by the Chairperson of the Department.

Course Objective: This practical lab course focuses on fundamental programming skills using R language, with an emphasis on data analytics techniques. Students will complete a series of laboratory assignments that cover various topics such as creating and manipulating objects, functions and loops, graphs and charts. Assignments are designed to enhance practical coding skills and prepare students for more statistics concepts for data exploration.

List of Laboratory Assignments:

11. Download and install R-programming environment and install packages using install. Packages () command in R.
12. Learn all the basics of R-Programming (Data types, Variables, Operators etc.)
13. Implement different data structures in R (Vectors, Lists, and Data Frames).
14. Learn the basics of functions in R and implement with examples.
15. Write R program to demonstrate the matrix addition, subtraction and multiplication.
16. Implement data frames in R. Write a program to join columns and rows in a data frame.
17. Create a list containing a vector, a matrix and a list and give names to the elements in the list. Access the first and second element of the list.
18. Implement R-Loops with different examples.
19. Create a script file to compute Sum, Range, Mean and Standard Deviation of the numeric variable in BOSTON dataset.
20. Create bar charts and histograms using R.

Students are given ten or more laboratory assignments with soft and hard deadlines. The lab assignments are evenly spread over the semester. Every student is required to prepare a file of laboratory experiments done.

Course Outcomes: After completing this Course, the learner will be able to:

CO1: Identify: Learn different R data types for developing programs.
CO2: Understand: Show the installation of R Programming Environment.
CO3: Apply: Make use of different R Data Structures.
CO4: Design: Develop programming logic using R packages.

Mapping of CO-PO C24VOC402P

Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1								
CO2								
CO3								
CO4								

*Attainment Levels: - None, 1: Low, 2: Medium, 3: High

Basics of Programming Using R (Semester-IV)
Minor Course / Vocational Course

Paper Code: C24VOC402T
30 Hrs (2 Hrs /Week) **External Marks: 35**
Credits: 2 **Internal Marks: 15**
Exam. Time: 2 Hrs **Total Marks: 50**

Note: The end semester examination will be of 35 marks. The examiner is required to set five questions in all. The first question will be compulsory, consisting of five short questions covering the entire syllabus, each carrying three marks. In addition to these, four more questions (each question may have two parts) will be set, comprising two questions from each unit. The student is required to attempt three questions in all, selecting one question from each unit, each carrying 10 marks, in addition to the compulsory Question Number 1.

Course Objective: This course provides foundational knowledge in R language and data analysis using the R programming language. It includes working with data in various ways with the help of programming in R. Students will learn about R's environment and programming essentials such as factors, arrays and matrices, data frames, functions and I/O in R. With this course students learn about how to visualize data in R.

Unit I

About R's Environment: Basics of R and RStudio, Setting Variables, Knowing about objects in R, Creating sequences in R, Operators in R, Packages in R, Creating script files in R.
Vectors in R: Type of vectors, Accessing and manipulating vectors, Basic arithmetic operations on numeric vectors, Finding descriptive summary like mean, median, mod, range, quartiles, standard deviation etc. of numeric vectors, Comparing vectors, sorting vectors, Character vectors and operations on character vectors.
Factors in R: What are factors in R? Useful operations on factors,
Arrays and Matrices in R: Arrays in R, Creating, accessing and manipulating matrices, Naming the dimensions of matrices, Arithmetic operations on matrices, Concatenating matrices, various operations on matrices.

Unit II

Data Frames: Creating and accessing data frames, Finding and assigning column and row names to data frames, Binding data frames, various operations on data frames.

Lists: Creating a List, Useful Operations on Lists.

Control Structures: If, If-else, If-else if-else, and switch statements, Loops in R, Break and next statements.

Functions in R: Defining functions, Calling functions, Scope of variables in functions, Returning values from functions

Input Output in R: Reading and writing txt and CSV files in R.
Visualizing Data in R: Creating bar chart, histograms, polygons and boxplots.

Text and Reference Books:

1. Venables W. N., Smith D. M. and the R Core Team, "An Introduction to R, 2016.
2. Teetor Paul, R Cookbook, O'Reilly Media, 2011.
3. Chang Winston, R Graphics Cookbook, O'Reilly, 2012.
4. Ratnoo Saroj Dahiya, Ratnoo Himmat Singh, Essentials of R for Data Analytics, Wiley, 2021.

Course Outcomes: After completing this Course, the learner will be able to:

CO1: Define the data analytics terminology and concepts related to R programming.
CO2: Describe the operations on data stored in vectors, matrices and data frames.
CO3: Apply the required operations to manipulate data stored in various R objects.
CO4: Compare various data objects and their related operations in R**.**
CO5: Create appropriate plots for data visualization.

Mapping of CO-PO C24VOC402T

Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1								
CO2								
CO3								
CO4								
CO5								

*Attainment Levels: - None, 1: Low, 2: Medium, 3: High

Computer Science
Internet Ethics
(Semester-IV) Value Added Course (VAC)

Paper Code: C24VAC313T
30 Hrs (2 Hrs /Week) **External Marks : 35**
Credits: 2 **Internal Marks : 15**
Exam. Time: 2 Hrs **Total Marks: 50**

Note: The end semester examination will be of 35 marks. The examiner is required to set five questions in all. The first question will be compulsory, consisting of five short questions covering the entire syllabus, each carrying three marks. In addition to these, four more questions (each question may have two parts) will be set, comprising two questions from each unit. The student is required to attempt three questions in all, selecting one question from each unit, each carrying 10 marks, in addition to the compulsory Question Number 1.

Course Objective: This course covers Internet Ethics and Cybersecurity, focusing on ethical principles, digital citizenship, and emerging challenges. It explores cyber threats, legal frameworks, and issues like privacy, AI ethics, and cybercrimes. Students will develop ethical awareness and analyse security concerns in the digital world.

Unit I

Foundations of Internet Ethics: Basics of Internet Ethics-definition, scope, and historical evolution, Core Ethical Principles-Respect, responsibility, fairness, and transparency; Digital Citizenship; Ethical Challenges in Digital world-Privacy and surveillance, Intellectual Property and Copyright, Cybersecurity and Hacking, Cyberbullying; Emerging Issues in Internet Ethics- Artificial Intelligence in decision making, Digital Divide and accessibility, Environmental impact of the Internet.

Unit II

Cyber Security: Concept of cyber security, Issues and challenges of cyber security; Cyber crimes- Classification of cyber crimes, Emerging cyber threats- Financial frauds, malware and ransomware attacks;
Legal perspective of Cyber crime : IT Act 2000, cyber offences under the IT act, Personal Data Protection Bill, Cyber Appellate Tribunal, Process for filing complaints and appeals.

Text and Reference Books:

1. Tiji Thomas, Stephen James, Dr. Terry Jacob Mathew, “Informatics and Cyber Ethics”, Prakash Publication
2. Craig B, “Cyber Law: The Law of the Internet and Information Technology”. Pearson Education
3. Vakul Sharma, "Handbook of Cyber Laws" Macmillan India Ltd, Second Edition, PHI, 2003

Course Outcomes: After completing this Course, the learner will be able to:

CO1: **Recall** fundamental concepts of Internet ethics (LOTS: Level 1 - Remember)
CO2: **Understand** ethical challenges in the digital world, such as privacy, intellectual property, cybersecurity, and cyberbullying. (LOTS: Level 2 - Understand)
CO3: **Apply** ethical principles in digital citizenship and evaluate emerging (LOTS: Level 3 - Apply)
CO4: **Analyse** cyber threats, security concerns, and legal frameworks. (HOTS: Level 4 - Analy

Mapping of CO-PO C24VAC313T

Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1								
CO2								
CO3								
CO4								

*Attainment Levels: - None, 1: Low, 2: Medium, 3: High