Course	Bachelor of Science in Information Technology (B.Sc. (IT))	**Semester - 1**
Type of Course	Skill Enhancement Courses	
Prerequisite	Basic knowledge of English	
Course Objective	1. To understand the process of e-mail communication minutes of meeting. 2. To make aware about barriers to communication with ethical context. 3. To make effective and impressive communication. 4. Better presentation and communication using proper body language.	

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks		**Lab**	**Total Marks**
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**		
2	0	0	2	25	25		50

SEE - Semester End Examination, **CIA** - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)

Course Content

T - Teaching Hours | **W** - Weightage

Sr.	Topics	T	W
1	**Fundamentals of grammar**	12	25
	Parts of Speech (Noun, Pronoun, Adjective, Verb, Adverb, Conjunction, Preposition, Interjection) Article Tense: Application of tenses with respect to time, All tenses & their Sub-divisions Forming of Sentences & Clauses, "WH's Concepts,Understanding Sentences, Punctuation I, Degree of comparison I (Positive, Comparative & Superlative), Tenses (Introduction & Usage) Vocabulary (Roots, Prefix, Suffix, Homonyms, Synonyms & Antonyms) Auxiliaries, Modal Verbs		
2	**Listening**	11	25
	Introduction, Definition of Listening, Listening vs Hearing, Process of Listening, Problems Students Face in Listening, Strategies of Listening, Barriers to Listening, Listening in the Workplace, Activities That Help you to become better listeners.		
3	**Reading**	11	25
	Introduction, The Reading Process, Reading and Meaning, Methods to improve Reading, Strengthening your Vocabulary, Understanding Graphics and Visual Aids, Previewing, Reading in thought Groups, Avoiding the Re-reading of the same phrases, Barriers to Reading, Skills for Speed Reading, Sub-Skills of Reading, Skimming, Scanning, Extensive Reading, Intensive Reading, Reading E-Mail, E-Books, Blogs and Web Pages		
4	**Letter writing**	11	25
	Formal and informal; CV; Report Writing; Presentation as a skill?Elements of Presentation Strategies – Audience – Objectives –Medium - Key Ideas, Structuring The Material, Organizing Content, Audio -Visual Aids – Handouts - Use of Power Point		
	Total	**45**	**100**

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy

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Level	Understanding	Analyze	Evaluate	Create
Weightage	25	25	25	25

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes

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

CO1 to understand and execute English Grammar and Vocabulary in an effective manner.

CO2 to be aware about barriers to communication with ethical context and get the benefits of listening skills.

CO3 to make effective and impressive communicative skills by proper reading process.

CO4 to perform better presentation and communication using proper body language and several writing skills.

Reference Books

1. **High School English Grammar & Composition (TextBook)**
   By Wren & Martin | Blackie
2. **Learn English vocabulary at a Glance**
   By Dr. Rakesh Bharadwaj | Dr. Rakesh Bharadwaj
3. **Kenneth, Anderson, Tony Lynch, Joan Mac Lean. (TextBook)**
   By Study Speaking. | New Delhi: CUP
4. **Effective Business Communication**
   By Asha Kaul | Prentice Hall – Economy Edition
5. **Writing with a purpose (TextBook)**
   By Champa Tickoo and Jaya Sasikumar | oxford University Press, Mumbai

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Course	Bachelor of Science in Information Technology (B.Sc. (IT))	**Semester - 1**
Type of Course	Core Courses	
Prerequisite	Basic of Computer	
Course Objective	1. Programming basics and the fundamentals of C 2. Data types in C 3. Mathematical and logical operations 4. Using if statement and loops 5. Arranging data in arrays 6. Implementing pointers 7. File management and dynamic memory allocation	

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks			**Total Marks**
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	
4	0	0	4	50	50		100

*SEE - Semester End Examination, **CIA** - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)*

Course Content		**T** - Teaching Hours | **W** – Weightage		
Sr.	**Topics**		**T**	**W**
1	**UNIT NO.1**		20	25
	Introduction **Fundamental of Computer** Basic block diagram of Computer component, hardware, software, memory, generation of computer, Flowcharts and algorithm. **Overview of C** Introduction, Importance of C, Sample C programs, Basic structure of C programs, Programming style, Executive a C program. **Constants, Variables and data Types** Introduction, Character Set, C tokens, Keywords and Identifiers, Constants, Variables, Data types, Declaration of Variables, assigning values to variables, Defining symbolic constants. **Operators and Expression** Introduction, Arithmetic of Operators, Relational Operators, Logical Operators, Assignment Operators, Increment and Decrement Operators, Conditional Operators, Bit-wise Operators, Special Operators, Arithmetic Expressions, Evaluation of expressions, Precedence of arithmetic operators, Some computational problems, Type conversions in expressions, Operator precedence and associatively, Mathematical function.			
2	**UNIT NO.2**		20	30
	Management Input and Output Operators, Loop and arrays Introduction, reading a character, writing a character, formatted input, formatted output, structure of c program input output function **Decision Making statement** Introduction, Decision making with IF statement, Simple IF statement, the IF ELSE statement, Nesting of IF … ELSE statements, The ELSE IF ladder, The switch statement, the turnery (? :) Operator, the GOTO statement. **Decision Making Looping** Introduction, the WHILE statement, the DO statement, The FOR statement, Jumps in loops Break and continue. **Array** Introduction, One-dimensional arrays, Two-dimensional arrays, Initialization of two-dimensional arrays, Concept of Multidimensional arrays			
3	**UNIT NO.3**		10	25
	Handling of Character strings Introduction, Declaring and initializing string variables, reading string from terminal, writing string to screen, Arithmetic operations on characters, Putting string together, String Operations String Copy, String Compare, String Concatenation and String Length, String Handling functions. **User-Defined Functions** Introduction, Need for user-defined functions, The form of C function, Return values and their types, Calling a function, category of functions, No arguments and no return values, Arguments with return values, Handling of non-integer functions, Nesting of functions, Recursion, Functions with arrays, The scope and Lifetime of variables in functions, ANSI C functions			
4	**UNIT NO 4**		10	20

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Structures , Unions and Pointer
Introduction, Structure definition, giving values to members, Structure initialization, Comparison of structures, Arrays of structures, Arrays within structures, Structures within Structures, Structures and functions, Unions, Size of structures, Bit fields. **Pointers** Introduction, understanding pointers, Accessing the address of variable, Declaring and initializing pointers, Accessing a variable through its pointer, Pointer expressions, Pointer increments and scale factor, Pointers and arrays, Pointers and character strings, Pointers and Functions, Pointers and structures. Dynamic memory allocation **File Management in C** Introduction, Defining files and its Operations, Error handling during I/O operations, Random access files, Command line arguments.

Total   60   100

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy

Level	Remembrance	Understanding	Application	Analyze
Weightage	10	30	30	30

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes

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

CO1   Formulate algorithm/flowchart for given arithmetic and logical problem.

CO2   Translate algorithm/flowchart into C program using correct syntax and execute it.

CO3   Write a program using branching ,looping, iteration and recursion.

CO4   Implement simple program using structure and Union.

CO5   Implement simple program using array and pointer.

Reference Books

1.   **"Computer programming" (TextBook)**
     By Ashok N. Kamthane | Pearson Education

2.   **Let Us C**
     By Yashwant Kanetker | BPB Publication

3.   **ANSI C**
     By Balaguruswami | Wiley India Pvt Ltd

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List of Practical

1. Write a program to display "Hello Computer" on the screen.

2. Write a C program to display Your Name, Address and City in different lines.

3. Write a C program to find the area of a circle using the formula: Area = PI * r

4. Write a C program to swap a variable value of no1 and no2.

5. Write a C program to print the multiply, addition, division & subtraction value of two accepted numbers.

6. Write a program to find a maximum from given two numbers.

7. Write a program to find a minimum from given two numbers.

8. Write a program to find a maximum from given three numbers.

9. Write a program to find a minimum from given three numbers.

10. Write a C program to print a multiplication table from 1 to 12.

11. Write a C program to find addition of 45 to 65 using loop.

12. Write a C program to check whether a number is prime or not.

13. Write a C program to show month using Switch statement.

14. Write a C program to print the 3x3 array

15. Write C program to print range of 101 to 130 using array.

16. Write a C program to find the length of the given string.

17. Write a C program to copy one string into another string.

18. Write a C program to concate (merge) the two strings.

19. Write a C program to print the following shape. * * * * * * * * * *

20. Write a C program to find the addition of two values using function.

Rai University
EVOLVING THINKING MINDS

Course	Bachelor of Science in Information Technology (B.Sc. (IT))	**Semester - 1**
Type of Course	General Elective Courses	
Prerequisite	Basic knowledge of Maths	
Course Objective	1. Student will be able to solve problems based on set theory. 2. Student will able to explain relations and functions. 3. Student will able to solve problems based on matrix and determinant. 4. Able to compute limits, derivatives, and integrals. 5. Able to remember formulas based on differentiation.	

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks		**Practical Marks**	**Total Marks**
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	
2	0	0	2	25	25		50

*SEE - Semester End Examination, **CIA** - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)*

Course Content

T - Teaching Hours | **W** – Weightage

Sr.	Topics	T	W
1	**Set theory**	7	28
	Introduction, Definition, Sets and their representation, The empty set, Finite and infinite set, Equal set, Subsets and supper set, Intervals, Power set, Venn diagram, Union of sets, Intersection of sets.		
2	**Relation and function**	12	26
	Cartesian product of the sets, relations, Functions, Types of functions, algebra of functions, Examples		
3	**Matrix and determinants**	8	18
	Introduction of matrices, Definition of different matrices, Determinants ofmatrix, minors, cofactors, determinant ofmatrix. Adjoint of matrix, Inverse of the matrix		
4	**Limit Differentiation and integration**	13	28
	Limit, Concept of limit, some standard limit, continuity of function, Definition ofderivative, rules of derivative, Standard formulae and examples based on standard forms.		
	Total	**40**	**100**

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy

Level	Understanding	Analyze	Evaluate	Create
Weightage	25	25	25	25

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

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Course Outcomes

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

CO1 Student will be able to solve problems based on set theory.

CO2 Student will able to explain relations and functions.

CO3 Student will able to solve problems based on matrix and determinant.

CO4 Able to compute limits, derivatives, and integrals.

CO5 Able to remember formulas based on differentiation.

Reference Books

1. **Class XI Mathematics NCERT book (TextBook)**
    By NCERT | NCERT

2. **Basic mathematics**
    Atul Prakashan

3. **Business Mathematics (TextBook)**
    By V.K.Kapoor. | S. Chand and sons, New Delhi.

4. **Elementary Engineering mathematics**
    By B.S. Grewal | Khanna Publication

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EVOLVING THINKING MINDS

Course	Bachelor of Science in Information Technology (B.Sc. (IT)) **Semester - 1**
Type of Course	Skill Enhancement Courses
Prerequisite	A basic understanding of science and mathematics.
Course Objective	Understand key concepts from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions. Appreciate concepts and methods from ecological and physical sciences and their application in environmental problem solving. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems. Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks		**LAB**	**Total Marks**
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**		
2	0	0	2	25	25		50

SEE - Semester End Examination, **CIA** *- Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)*

Course Content		**T** - Teaching Hours | **W** - Weightage

Sr.	Topics	T	W
1	**Introduction**	15	25

The multidisciplinary nature of environmental studies. Environmental Science – definition, scope & importance, Evolution of the universe, origin of the earth; solar system; atmosphere of the primitive earth, abiotic component of environment, Environmental balance**,** balance in O_2 and CO_2 in air; thermal balance; balance in predator and prey population.

2	**Ecology**	15	25

Ecology & its branches, scope of Ecology and its relation to other divisions of sciences; autecology and synecology, Concept and structure of ecosystem, functions of ecosystem, Types of Ecosystems, Concept of habitat; Significance of ecological adaptation; ecological adaptation in plants and animals.

3	**Ecosystem**	15	25

Concept and scope of environmental chemistry, chemical toxicology, hazardous chemicals, carcinogens, occupier, effluent etc. The natural cycles of the environment, Ozone depletion –causes and effects; Global warming – major greenhouse gases, causes and effects; Acid rain –causes and effects, Acid – base reactions in water

4	**Biogeochemical cycles and Environmental Pollution**	15	25

Biogeochemical cycles: Carbon cycle**,** Nitrogen cycle**,** Oxygen cycle**,** Water cycle

Environmental Pollution: Types of Environmental Pollution, Water Pollution, Air Pollution, Land and Noise Pollution Current Issues in environment sciences

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Total 60 100

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy

Level	Understanding	Analyze	Evaluate	Create
Weightage	25	25	25	25

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes

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

CO1 Understand key concepts from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions.

CO2 Appreciate concepts and methods from ecological and physical sciences and their application in environmental problem solving.

CO3 Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.

CO4 Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.

Reference Books

1. **Textbook of Environmental (TextBook)**
    By Erach Bharucha | Universities Press (India) Private Ltd, Hyderabad. | Second edition, Pub. Year 2013

2. **Environmental Sciences**
    By Daniel B Botkin & Edward A Keller | John Wiley & Sons.

Course	Bachelor of Science in Information Technology (B.Sc. (IT)) **Semester - 1**
Type of Course	Core Courses
Prerequisite	Basic knowledge of Computer
Course Objective	1. Understand computer hardware concepts, generations, and input/output technologies. 2. Gain proficiency in operating systems, software development, and data analysis. 3. Explore functions and types of operating systems. 4. Acquire knowledge of data communication, networks, and the Internet. 5. Understand functional systems, decision-making processes, and computer networking needs.

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks		**LAB**	**Total Marks**
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**		
3	0	1	4	50	50	50	150

SEE - Semester End Examination, **CIA** *- Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)*

Course Content

T - Teaching Hours | **W** - Weightage

Sr.	Topics	T	W
1	**Computer Hardware System** Concepts and generation of computer, CPU, Basic Logic Gates, Computer Memory and Mass Storage Devices, Computer Hierarchy, Input and Output Technologies	10	15
2	**Operating Systems and Application, System Software Application and System Software** Application and System Software, Compilers and Interpreters, Process of Software Development, Data Analysis using Spreadsheets **Operating Systems** Functions of Operating Systems, Types of Operating Systems (Batch Processing, Multi-tasking, Multi-programming and Real-time Systems)	25	35
3	**Data Communication and Networks** Concepts of Data Communication, Types of Data-Communication, Communications Media, Concepts of Computer Networks, Primary Network Topologies, Operation of the Internet and services provided by Internet, World Wide Web, Intranets and Extranets	10	25
4	**Functional and Enterprise Systems** Data, Information and Knowledge Concepts, Decision Making Process, Physical Components of Information Systems, Computer N/W: Need for computer networking (LAN and WAN) their characteristics, features and uses, Networking goals and applications; International, national, public and private networks, Networking aspects of video conferencing, imaging and multimedia.	15	25

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Total 60 100

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy			
Level	Understanding	Analyze	Evaluate	Create
Weightage	25	25	25	25

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes

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

CO1 Understand computer hardware concepts, generations, and input/output technologies.

CO2 Gain proficiency in operating systems, software development, and data analysis.

CO3 Explore functions and types of operating systems.

CO4 Acquire knowledge of data communication, networks, and the Internet.

CO5 Understand functional systems, decision-making processes, and computer networking needs.

Reference Books

1. **Introduction to computers (TextBook)**
   By Peter Norton | Mc Grew Hill

List of Practical

1. MS-WORD Microsoft Word is a word processor developed by Microsoft. It was first released in 1983 under the name Multi-Tool Word for Xenix systems. MSWord is a popular word-processing program used primarily for creating documents such as letters, brochures, learning activities, tests, quizzes and students' homework assignments. There are many simple but useful features available in Microsoft Word to make it easier for study and work. That's why so many people would prefer to convert the read-only

2. Create a employee table (EMP_ID , EMP_NAME , SALARY , SALE_AMOUNT , COMMISSION , TOTAL SALARY)

3. Create item table (ITEM_NO , NO OF ITEM , ITEM PRICE , TAX)

4. Create a presentation about your self-introduction.

5. Create power point presentation to introduction about Rai University.

6. Write a medical leave application for student to their mentor and below all steps are used to write application.

7. Create power point presentation to introduction about festival celebration in India.

8. Write closing account in bank for customer to manager and below all steps are used to write application.

9. Clear Print Guidelines Example A: Example A is Times New Roman, size ten, with single spacing. Example B is Arial, size twelve with 1.5 spacing. As you can see, smaller font sizes, single spacing and serif fonts are harder to read. Additionally, it is easier to keep one's place on a page with left aligned text, as in example B, as left alignment gives the body of the text a specific shape and gives uniformity between words. Example A, which is justified, has no natural shape.

10. Create power point presentation to introduction about India.

Course	Bachelor of Science in Information Technology (B.Sc. (IT))	**Semester - 1**
Type of Course	Core Courses	
Prerequisite	Basic Knowledge of Computer Network and Web Surfing	
Course Objective	1. Able to understand Computer Network and Internet Environment 2. Able to understand design and develop static and/or interactive website using HTML5, CSS and Javascript. 3. Able to explore different web elements. 4. Able to understand knowledge of CSS3, Javascript and Bootstrap Framework.	

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks		**LAB**	**Total Marks**
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**		
4	0	0	4	50	50		100

SEE - Semester End Examination, CIA - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)

Course Content

T - Teaching Hours | **W** - Weightage

Sr.	Topics	T	W
1	**Introduction to Computer Network and its Applications**	**10**	**20**
	Different Terminologies used in Computer Network Internet, ISP (Internet Service Provider), Intranet, VSAT (very small aperture terminal), URL, Portal, Domain Name Server, World Wide Web (WWW), Search Engine, Remote Login, Telnet, Email, E-Commerce, E-Business, E-Governance, Mobile Commerce Website Basics (WebPages; Hyper Text Transfer Protocol, File Transfer Protocol, Domain Names; URL; Protocol Address; Website[Static, Dynamic, Responsive etc, Web browser, Web Servers; Web Hosting		
2	**Basic of HTML & Advance HTML 5**	**10**	**15**
	Fundamental of HTML, Basic Tag and Attribute, The Formatting Tags, The List Tags, Link Tag, inserting special characters, adding images and Sound, lists types of lists, Table in HTML, Frame in HTML, Forms HTML 5 & Syntax, HTML5 Document Structure (section, article, aside, header, footer, nav, dialog, figure) Attributes of HTML 5 Web Form (datetime, date, month, week, time, number, range, email, url) Audio / Video – Canvas		
3	**Cascading Style Sheet & CSS 3**	**20**	**35**
	Introduction to CSS,Types of Style Sheets, Class & ID Selector, CSS Pseudo, CSS Font Properties, CSS Text Properties, CSS Background Properties, CSS List Properties, CSS Margin Properties, CSS Comments CSS 3 - Border Property, Background & Gradient Property, Drop Shadow Property - 2D & 3D Transform Property, Transition Property, Box Sizing Property, Position Property Media Query, CSS Flexbox Properties (display, flex-direction, flex-wrap, flex-flow, justify-(display, flex-direction, flex-wrap, flex-flow, justify-gap) CSS Advance Properties (Overflow, text-overflow, Cursor, Visibility, filter,backdrop-filter, object- fit), How to use Google Fonts & Custom Fonts (@font-face), BEM Naming Convention		
4	**Java Script**	**10**	**15**
	Introduction to JavaScript, Variables, JavaScript Operators, Conditional Statements, JavaScript Loops, Break and Continue Statements, Dialog B, JavaScript User Define Function, Built in Function: string, Maths, Array, Date, Events (onclick, ondblclick, onmouseover, onmouseout, onkeypress, onkeyup, onfocus, onblur, onload, onchange, onsubmit, onreset), DOM & History Object, Form Validation & E-mail Validation		
5	**Bootstrap Framework**	**10**	**15**
	Introduction to Bootstrap, Bootstrap Layout (Container, Row, Columns, Responsive classes, Offset Column, Reordering Columns), Bootstrap Content (Typography, Tables, Images, Forms), Bootstrap Components (Navbar, Navs and tabs, Dropdowns, Buttons, Button Groups, Breadcrumb, Pagination, Labels, Alerts, Progress Bars, Accordion, Card, Modal) Bootstrap Utilities (Colors, Background, Borders, Display, Overflow, Position, Spacing, Text, Vertical align)		

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Total 60 100

Course Outcomes

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

CO1 Able to understand Computer Network and Internet Environment.

CO2 Able to understand design and develop static and/or interactive website using HTML5, CSS and Javascript.

CO3 Able to explore different web elements.

CO4 Able to understand knowledge of CSS3, Javascript and Bootstrap Framework.

CO5 Students will acquire skills in using the bootstrap framework to create responsive & user-friendly web

List of Practical

1. Basic HTML Page
2. Adding Images and Links
3. HTML Tables
4. CSS Styling
5. CSS Box Model
6. Responsive Design
7. • CSS Flexbox Layout
8. Basic JavaScript Functions
9. Variable Manipulation
10. Conditional Statements
11. Loops
12. Form Validation
13. Interactive Web Pages

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Course	Bachelor of Science in Information Technology (B.Sc. (IT))	**Semester - 2**
Type of Course	Core Courses	
Prerequisite	02080201-T - COMPUTER FUNDAMENTALS AND PROGRAMMING WITH C	
Course Objective	1. Understand types of data structure mechanisms. 2. Implement various types of algorithms using Data Structures. 3. Implement various types of searching and sorting algorithms using Data Structures. 4. Compare different Sorting and Searching Algorithms. 5. Apply various hashing techniques.	

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks		LAB	**Total Marks**
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**		
4	0	0	4	50	50		100

SEE - Semester End Examination, **CIA** - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)

Course Content			

T - Teaching Hours | **W** - Weightage

Sr.	Topics	T	W
1	**Introduction to Data Structure**	15	25
	Introduction to Data Structure and different types of data Data types, primitive and non-primitive Linear & Non Linear Data Structures String, Introduction, Operation performed on string Array, Introduction to Arrays, Linear array and its representation		
2	**Linear data Structure ,Stack ,Queue ,Linked List**	15	25
	Representation of arrays, Applications of arrays, sparse matrix and its representation Stack-Definitions & Concepts, Operations On Stacks, Applications of Stacks, Polish Expression, Reverse Polish Expression ,Recursion Representation Of Queue, Operations On Queue, Circular Queue, Priority Queue, Array representation of Priority Queue, Double Ended Queue, Applications of Queue Singly Linked List, Doubly Linked list, Circular linked list, Linked implementation of Stack, Linked implementation of Queue, Applications of linked list		
3	**Non Linear Data Structure, Tree Graph**	15	25
	Definitions and Concepts, Representation of binary tree, Binary tree traversal (In order, post order, preorder), Threaded binary tree, Binary search trees, Conversion of General Trees To Binary Trees, Applications of Trees- Some balanced tree mechanism, Height Balanced, Weight Balance , Representation Of Graphs, Elementary Graph operations,(Breadth First Search, Depth First Search, Spanning Trees, Shortest path, Minimal spanning tree)		
4	**Hashing ,Sorting and Searching , Hashing ,Sorting and Searching**	15	25
	The symbol table, Hashing Functions, Collision-Resolution Techniques Sorting types, Insertion, sort, Selection Sort, Quick Sort, Merge Sort, Radix sort, Searching types, Sequential Search and Binary Search		
	Total	**60**	**100**

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy					
Level	Remembrance	Understanding	Application	Analyze	Evaluate
Weightage	15	30	20	15	20

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

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Rai University
EVOLVING THINKING MINDS

Course Outcomes

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

CO1 Understand types of data structure mechanisms.

CO2   Implement various types of algorithms using Data Structures.

CO3   Implement various types of searching and sorting algorithms using Data Structures.

CO4 Compare different Sorting and Searching Algorithms.

CO5 Apply various hashing techniques.

Reference Books

1. **An Introduction to Data Structures with Applications (TextBook)**
   By Jean-Paul Tremblay & Paul G. Sorenson | Tata McGraw Hill.
2. **Fundamentals of Computer Algorithms by**
   By Horowitz, Sahni | Galgotia Pub. 2001 ed.

List of Practical

1. Perform string operation using c language.
2. Algorithm to search an element using linear search.
3. Algorithm to search an element using binary search.
4. Write a program of matrix multiplication.
5. Write a program of matrix addition.
6. Write a program to implement PUSH and POP operation of STACK
7. Write program to implement simple queue using c language.
8. Write program to implement simple queue using c language.
9. Write program to implement Bubble sort.
10. Write program to implement Insertion sort.
11. Write program to implement Merge sort.
12. Write program to implement Selection sort.

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Rai University
EVOLVING THINKING MINDS

Course	Bachelor of Science in Information Technology (B.Sc. (IT))	**Semester - 2**
Type of Course	Core Course	
Prerequisite	Basics of Maths & Statistics	
Course Objective	1. Understand and explain the importance of critical thinking 2. Identify the core skills associated with critical thinking 3. Demonstrate the difference between deductive and inductive reasoning 4. Construct a logically sound and well-reasoned argument 5. Avoid the various fallacies that can arise through the misuse of logic 6. Apply chapter concepts in final questions and activities	

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks			**Total Marks**
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	
2	-	-	2	25	25		50

*SEE - Semester End Examination, **CIA** - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)*

Course Content

T - Teaching Hours | **W** - Weightage

Sr.	Topics	T	W
1	**Logical Reasoning**	8	25
	Analogy based and kinds of relationships, Simple Analogy; Pattern and Series of Numbers, Letters, Figures. Coding- Decoding of Numbers, Letters, Symbols (Figures), Blood relations.		
2	**Visual Reasoning**	7	25
	Venn Diagrams, Mirror Images, Problems on cubes & dices, Image & Figure Counting, Direction & Speed.		
3	**Statistics Based Aptitude**	8	25
	Basic concepts, Percentage, Profit & Loss, Simple Interest, Ratio & Proportion, Mixture		
4	**Quantitative Aptitude**	7	25
	Average, Time & Work, Pipes & Cisteren, Probability, Data Interpretation Test		
	Total	**30**	**100**

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy

Level	Remembrance	Understanding	Application	Analyze	Evaluate
Weightage	20	20	20	20	20

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

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Course	Bachelor of Science in Information Technology (B.Sc. (IT))	Semester - 2
Type of Course	Core Courses	
Prerequisite	03080101-T - PROGRAMMING IN C	
Course Objective	1. To understand the Fundamental of Database Management System, RDBMS and locking mechanism. 2. To learn the fundamental of data models and SQL query. 3. To develop application using PL/SQL blocks.	

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks			**Total Marks**
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	
4	0	0	4	50	50		100

SEE - Semester End Examination, **CIA** *- Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)*

Course Content

T - Teaching Hours | **W** - Weightage

Sr.	Topics	T	W
1	**Introduction**	10	15
	What is database system, purpose of database system, view of data, Types of Databases, database architecture, transaction management **Data Models** Hierarchical data model, Network data model, Relational Data model		
2	**Relational Data Base Design and E-R Model**	15	25
	Structure of Relational databases, Domains, Relations, Relational algebra – fundamental operators and syntax, relational algebra queries, tuple relational calculus **E-R Model** Basic concepts, Design process, constraints, Keys, Design issues, E-R diagrams, weak entity sets, extended E-R features – generalization, specialization, aggregation, reduction to E-R database schema, Data redundancy **Normalization** Normal forms 1NF, 2NF, 3NF		
3	**Structured Query Language**	20	30
	Introduction to SQL, DDL, DML, DCL, TCL. Basic commands and Functions of SQL, Data Definition Language (DDL), Data Manipulation language (DML),Data Control Language (DCL), Transaction control Language (TCL) and all related commands, Use of Group by, Having, order by **Constraints** Primary key, foreign key, unique, not null, check, IN operator		
4	**Advanced SQL and Transaction Management and Concurrency Control**	15	30
	Functions Aggregate functions, Built-in functions –numeric, date, string functions **Advanced Query** Set operations, Sub-queries and correlated sub-queries, Join and types of Join **Transaction Management and Concurrency Control** Transaction concepts, ACID properties, Serializability and Concurrency Control		
	Total	**60**	**100**

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy

Level	Remembrance	Understanding	Application	Analyze	Evaluate	Create
Weightage	15	25	20	20	10	10

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

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Course Outcomes

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

CO1 Design the database schema with the use of appropriate data types for data storage in database.

CO2 Understand the uses the database schema and need for normalization.

CO3 Use different types of physical implementation of database.

CO4 Write a program using SQL

CO5 Learn how to manage databases and their relations.

Reference Books

1. **Fundamentals of Database Systems (TextBook)**
    By Ramez Elmasri and Shamkant B. Navathe | Fifth Edition, Pearson Education, 2008

2. **Database System Concepts**
    By Abraham Silberschatz, Henry F. Korth and S. Sudharshan | Sixth Edition, Tata Mc Graw Hill, 2011

3. **An Introduction to Database Systems (TextBook)**
    By C.J.Date, A.Kannan and S.Swamynathan | Eighth Edition, Pearson Education, 2006.

4. **Introduction to Database Management Systems**
    By Atul Kahate | Pearson Education, New Delhi, 2006

List of Practical

1. Write a program to create a table.

2. Write a query to insert records into table.

3. Write a Select query.

4. Write a delete query.

5. Write query for updating records.

6. Write a query for modifying records.

7. Write sub query.

8. Write a query for inner join.

9. Write a query for outer join.

10. Write a query for left & right join.

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Course	Bachelor of Science in Information Technology (B.Sc. (IT))	**Semester - 2**
Type of Course	Core Courses	
Prerequisite	Basic programming concepts Program understanding and analysis	
Course Objective	1. Understand key mechanisms in design of operating systems module. 2. Understand process management, concurrent processes and threads, memory management, virtual memory concepts, deadlocks 3. Produce algorithmic solutions to process synchronization problems 4. Use modern operating system calls such as Linux process and synchronization libraries 5. Practice with operating system concepts such as process management, synchronization, networked processes and file systems 6. Compare performance of processor scheduling algorithms	

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks			**Total Marks**
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	
4	0	0	4	50	50		100

SEE - Semester End Examination, **CIA** - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)

Course Content

T - Teaching Hours | **W** - Weightage

Sr.	Topics	T	W
1	**System Concepts and Information Systems Environment**	15	25
	Definition of system**,** Characteristics of a system**,** Elements of a system**,** Types of system**,** SDLC, Prototyping**,** Role of system Analyst		
2	**System Analysis**	15	25
	System planning and initial investment, Dimensions of planning, Determining the user's information requirements, Information Gathering, Tools for structured Analysis, Cost/benefit Analysis		
3	**System Design**	15	25
	Process of design, Design methodologies, Audit considerations, Input/output Design, Database design, OOAD concepts, Architectural, behavior diagrams		
4	**System Implementation**	15	25
	System Testing**,** Nature of test**,** Test Plan**,** Quality assurance, Goals in SDLC.**,** Levels of quality Assurance**,** Software Maintenance**,** Process scheduling – what is Project Management**,** Security, Disaster/ Recovery and Ethics in development.**,** Control Measures		
	Total	**60**	**100**

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy

Level	Remembrance	Understanding	Application	Analyze	Evaluate	Create
Weightage	30	20	20	10	10	10

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes

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

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CO1 Understand the principles, methods and techniques of systems development.

CO2 Understand the problems relating to systems development.

CO3 Summarize The Key Concept Principle Of Object Oriented Analysis And Design

CO4 Understand the various stages of a phased systems analysis method

CO5 Student Will Able To Create Object Oriented Modules And Diagrams To Represent Complex System

Reference Books

1. **Systems Analysis and Design (TextBook)**
    By Elias M. Awad | Galgotia Publisher

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Course	Bachelor of Science in Information Technology (B.Sc. (IT))	**Semester - 2**
Type of Course	Core Courses	
Prerequisite	Basic knowledge of Maths	
Course Objective	1. Student will be Able to understand the basics concepts of Discrete Mathematical Structures 2. student will have developed ability to Understand the concept of Group Theory 3. Students will achieve command of the fundamental definitions and concepts of graph theory 4. Solve simple application problems 5. Student will have developed ability to Distinguish various types of graphs	

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks		**LAB**	**Total Marks**
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**		
2	-	0	2	25	25		50

SEE - Semester End Examination, **CIA** *- Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)*

Course Content

T - Teaching Hours | **W** - Weightage

Sr.	Topics	T	W
1	**UNIT-I**	12	28
	Binary operations with properties, Definition of group and examples, commutative group, Elementary properties of group, Order of a group and order of an element, Sub-group		
2	**UNIT-II**	9	26
	Cyclic group, Right Coset and left coset, equivalence class, Lagrange's theorem, Euler's theorem, Fermat's theorem, permutation and example, transposition and example		
3	**UNIT-III**	7	18
	Graph and multi graphs, degree of a vertex, paths, connectedness, connected components, cut points, bridges, complete graphs, regular graphs, matrices and graphs		
4	**UNIT-IV**	12	28
	Planner graphs, maps and regions, Euler's formula (only statement), non-planner graphs, colored graphs, coloring of maps, trees, spanning trees.		
	Total	40	100

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy

Level	Remembrance	Understanding	Application	Analyze	Evaluate
Weightage	10	25	25	25	15

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes

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

CO1 Student wil be Able to understand the basics concepts of Discrete Mathematical Structures

CO2 student will have developed ability to Understand the concept of Group Theory

CO3 Students will achieve command of the fundamental definitions and concepts of graph theory

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CO4 Solve simple application problems

CO5 Student will have developed ability to Distinguish various types of graphs

Reference Books

1. **Discrete Mathematics (TextBook)**
   By S. Lipschutz and M. l. Lipson | Schaum's Outline Series McGRAW-HILL | Third Edition

2. **Graph Theory with Applications to Engineering and Computer Science**
   By Narsingh Deo | Dover Publications Inc.

3. **GRAPH THEORY WITH APPLICATIONS (TextBook)**
   By J. A. Bondy and U. S. R. Murty | Elsevier Science Ltd, Pub. Year 1976

List of Tutorial

1. Examples on groups

2. Examples on sub groups

3. Examples on equivalence relations.

4. Examples on paths

5. Examples on Euler's formula.

Course	Bachelor of Science in Information Technology (B.Sc. (IT))	**Semester - 2**
Type of Course	Skill Enhancement Courses	
Prerequisite	An open mindset and willingness to cultivate personal growth through soft skills development.	
Course Objective	1. Effective Communication: Enhance verbal and non-verbal communication skills for interpersonal and professional success. 2. Self-Confidence: Build self-assurance and assertiveness in various personal and professional scenarios. 3. Team Collaboration: Develop teamwork, leadership, and conflict resolution skills for better collaboration. 4. Emotional Intelligence: Improve self-awareness and empathy to manage emotions and relationships effectively. 5. Adaptability and Resilience: Foster adaptability and resilience to navigate challenges and change with confidence.	

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks		**LAB**	**Total Marks**
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**		
2	0	0	2	25	25		50

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Course Content

T - Teaching Hours | **W** - Weightage

Sr.	Topics	T	W
1	**Introduction to soft skill**	6	10
	Meaning and introduction to soft skill, Types of soft skill (communication, empathy, leadership, time management, observation, conflict resolution, listening skill,) Difference between soft skill and hard skill, IQ,SQ,EQ and emotion competence		
2	**Mastering the Art of Habits**	9	15
	Guiding Principles, Identifying Good And Bad Habits, Habit Cycle; Breaking Bad Habits, Using The Zeigarnik Effect For Productivity And Personal Growth, Forming Habits of Success		
3	**Personality Development**	6	10
	Meaning of personality, elements of personality Determents of personality Personal development plan		
4	**Self-management skill**	9	15
	Time management (planning, scheduling and meeting) Emotion and stress management SWOT analysis Etiquettes and manners Personal grooming (Appearance, Dressing)		
	Total	30	50

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy

Level	Understanding	Analyze	Evaluate	Create
Weightage	25	25	25	25

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

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Course Outcomes

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

CO1 Effective Communication: Enhance verbal and non-verbal communication skills for interpersonal and professional success.

CO2 Self-Confidence: Build self-assurance and assertiveness in various personal and professional scenarios.

CO3 Team Collaboration: Develop teamwork, leadership, and conflict resolution skills for better collaboration.

CO4 Emotional Intelligence: Improve self-awareness and empathy to manage emotions and relationships effectively.

CO5 Adaptability and Resilience: Foster adaptability and resilience to navigate challenges and change with confidence.

Reference Books

1. **Soft skill know the self and know the world (TextBook)**
   By Dr. K. Alex –S.chand | PHL learning Pvt. Ltd. New Delhi

2. **Personal growth and wealth**
   By Dale Carnegie , Napoleon Hill, Dr. Joseph Murphy

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Course	Bachelor of Science in Information Technology (B.Sc. (IT))	**Semester - 3**
Type of Course	Core Courses	
Prerequisite	05070101-T - PROGRAMMING IN C(T)	
Course Objective	1. Allow programmers to think in terms of the structure of the problem rather than in terms of the structure of the computer. 2. Decompose the problem into a set of objects 3. Objects interact with each other to solve the problem	

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks			**Total Marks**
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	
4	0	0	4	70	30		100

SEE - Semester End Examination, **CIA** - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)

Course Content					

T - Teaching Hours | **W** - Weightage

Sr.	Topics	T	W
1	**Introduction of OOPS**	15	25

Introduction to Object Oriented Programming, Difference between Procedure Oriented and Object Oriented Programming, Difference between C and C++

Principles of OOP Class, Object, Inheritance, Polymorphism, Dynamic Binding, Message Passing

C++ Basics Programming Structure, Variables in C++, C++ Output/ Input, Keywords in C++, New style of header file specification, Comments in C++,Token, Enum, Typecasting, Operators ,Control Structures, Default Arguments, Scope Resolution Operator, New and Delete Operator, Manipulators

2	**Classes, Object and Function**	15	25

Introduction to Class and Objects, Access Specifier, Memory Allocation for object, Simple Function, Call and Return by Reference, Static data, Function and Members, Inline Function, Function Overloading, Friend Functions, Friend Class, Array of Class Object.

Constructor & Destructor Constructor, Characteristics of Constructor, Types of Constructor, Destructor, Characteristics of Destructor

3	**Inheritance**	15	25

Introduction, Advantages of Inheritance**,** Inheritance using different access Specifier**,** Initialization of Base class members through derived class object**,** Different forms of Inheritance**,** Virtual Base Classes**,** Abstract Class**,** Function Overriding.

4	**Operator Overloading & Pointers**	15	25

Introduction to Operator overloaded, Rules for Overloading Operator**,** Declaration of Operator Overloading**,** Unary Operator Overloading **,** Binary Operator Overloading**,** Data Conversion and Type Conversions, Pointer to constant and constant to Pointer

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Total 60 100

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy

Level	Remembrance	Understanding	Application	Analyze	Evaluate	Create
Weightage	25	25	10	10	10	20

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes

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

CO1 Learn Basic concept of C++ programming & understand the fundamental principles of OOP concept.

CO2 How to write a C++ program using the concept of Classes, Object, Function, Constructor & Destructor.

CO3 Understanding the concept of inheritance & polymorphism along with menthod over-loading concept.

CO4 Implement the concept of operator Overloading.

CO5 Use the concept of Files & Pointers using functions & arrays.

Reference Books

1. **Object Oriented Programming with C++ (TextBook)**
   By E Balaguruswami | The Mc Graw-Hill Education India Pvt. Ltd
2. **Let us C++**
   By Y kanitkar | BPB Publication
3. **Object-oriented programming in Turbo C++ (TextBook)**
   By Robert Lafore | Galgotia Publications Pvt Ltd

List of Practical

1. Write a program to print "Hello World".
2. Write a program to perform operation of calculator
3. Write a program to swap two numbers.
4. Write a program to check whether number is even or odd.
5. Write a program to find largest number among three numbers.
6. Write a program to generate multiplication table of a given number.
7. Write a program to reverse a number.
8. Write a program to multiply two numbers.
9. Write a program to subtract complex number using operator overloading.
10. Write a program to check whether a number is palindrome or not.
11. Write a program to check whether a number is prime or not.
12. Write a program to find the length of a string.
13. Write a program to concatenate two strings.

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14. Write a program of multiple inheritance.

15. Write a program which illustrates the use of parameterized constructor.

Course	Bachelor of Science in Information Technology (B.Sc. (IT))	**Semester - 3**
Type of Course	Core Course	
Prerequisite	HTML,CSS	
Course Objective	To introduce the importance of PHP in web page design.	
	· To understand the features like functions, forms in PHP.	
	· To understand Files, OOPs concepts , Cookies, Sessions and Data base.	
	· To handle requests and draw images on the server with AJAX.	

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks			**Total Marks**
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	
4	0	0	4	70	30		100

SEE - *Semester End Examination*, **CIA** - *Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)*

Course Content			**T** - Teaching Hours | **W** - Weightage

Sr.	Topics	T	W
1	**Introduction To PHP**	15	25

Building blocks of PHP: Basic syntax, Variables, Data Types, Operators and expressions, Constants. Flow Control: Switch flow, Loops, Code Block, Sending data to the browser. **Working With Arrays:** Arrays, Creating array, Array related Functions. Working with Function: Function, Calling Function, Defining Function, Returning the Values from user defined function, Variable Scope, Argument. **Working with Strings And Date and Time Functions:** formatting String with PHP, Date and Time Function, String Manipulation and Investigating Strings with PHP. **Working with Forms:** Creating form, Handling form, Validating form data, Accessing form data, use of Hidden fields to save State, Redirecting user, file Upload and Sending Mail on Form Submission

Sr.	Topics	T	W
2	**Introduction to MySQL & Interacting with MySQL**	15	25

Understanding the Database Design Process: The importance of good database design, Types of Table Relationship, Understanding Normalization. Learning Basic SQL Command: Table Creation, Insert row, Select Command Using Where Clause, Update and Delete Command, Replace Command, String Function, Date and Time Functions, Stored Procedures, Join, Indexing and Sorting query. **Using MySQL with PHP:** connecting to MySQL and selecting the database, executing simple queries, retrieving query results, counting return Records, updating, Record Addition, Viewing Record, and Deletion Record with PHP.

Sr.	Topics	T	W
3	**Introduction to Cookies & working With Files and Directories**	15	25

Working with files: Include Files with INCLUDE, creating and deleting files, opening a file for reading, writing or Appending, Reading from files, Validating Files. Working with Directories: Open Pipes to and from Process using Popen(), Running command with Exec(), Running Command with System() or Passthrough(). **Working with Cookies and User Session : -** Introduction of Cookie, Setting a Cookie with PHP, Introduction of Session, Improving Session Security, Starting a Session, Working with Session Variables, Passing Session Id in the query String, Destroying Session and Unsetting Variables.

Sr.	Topics	T	W
4	**Introduction to Object Oriented Programming With PHP and Error Handling**	15	25

Introduction, the basic, auto loading objects, Class, Extends, Constructs, Scope Resolution Operator, Parent, serializing object, The magic objects – sleep and awake, reference inside the constructor, comparing objects. Visibility, overloading, object interface, pattern, magic method, reflection, extending exception. Error Handling and Debugging: General error types and debugging, displaying PHP errors, Adjusting Error Reporting, Creating Custom error handler, PHP debugging techniques, SQL and MySQL debugging techniques

Total 60 100

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Suggested Distribution Of Theory Marks Using Bloom's Taxonomy

Level	Remembrance	Understanding	Application	Analyze	Create

Weightage	10	20	25	30	15

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes

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

CO1 Develop Web application with files and forms

CO2 Explain the working approach of PHP.

CO3   Implement simple programming logic using conditional statements, loops, Operators.

CO4 Implement Object oriented programming concepts in backend development.

CO5 Developing web application using PHP and MySQL.

Reference Books

1. **PHP MySQL and Apache, SAMS Teach Yourself (TextBook)**
   By Julie C. Meloni | SAMS

List of Practical

1. Write a Program to print "Hello World".

2. Write a program to concatenate two strings.

3. Write a program to add two integer numbers.

4. Write a program to swap two numbers.

5. Write a program to find the area and perimeter of a circle.

6. Write a program to print bio when name is echoed.

7. Write a program to print birth date and time.

8. Write a program to print the date in different formats.

9. Write a program to print current time zone.

10. Write a program to accept the details from a form and show it into different page

11. Write a program to accept the details from a form and show it into same page

12. Create a form and use different validators.

13. Write a program to check the eligibility of voting in India.

14. Write a program to connect php to MySql and show the message "Connection Established".

15. Write a program to demonstrate Cookie.

16. Write a program to demonstrate Session.

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Course	Bachelor of Science in Information Technology (B.Sc. (IT))	Semester - 3
Type of Course	Core Courses	
Prerequisite	149901205-P - SOFTWARE PROJECT – I	
Course Objective	1. Apply project management concepts and techniques to an IT project. 2. Explain project management in terms of the software development process. 3. Apply project management concepts through working in a group as team leader. 4. Identify the key phases of project management. 5. Determine an appropriate project management approach through an evaluation of the business context and scope of the project.	

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks		LAB	Total Marks
Lecture	Tutorial	Lab	Credit	SEE	CIA		
3	0	0	3	70	30		100

SEE - Semester End Examination, **CIA** - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)

Course Content				T - Teaching Hours | W - Weightage

Sr.	Topics	T	W
1	**INTRODUCTION TO SOFTWARE PROJECT MANAGEMENT** Project Definition ,Contract Management, Activities Covered By Software Project Management, Overview Of Project Planning, Stepwise Project Planning **PROJECT EVALUATION -**Strategic Assessment, Technical Assessment, Cost Benefit Analysis, Cash Flow Forecasting , Cost Benefit Evaluation Techniques, Risk Evaluation	15	30
2	**ACTIVITY PLANNING** Project Schedule ,Sequencing and Scheduling Activities, Network Planning Models Forward Pass ,Backward Pass ,Activity Float , Shortening Project Duration, Activity on Arrow Networks, Risk Management ,Nature Of Risk ,Types Of Risk , Managing Risk Hazard Identification , Hazard Analysis, Risk Planning And Control	15	25
3	**MONITORING AND CONTROL** Creating Framework, Collecting The Data ,Visualizing Progress, Cost Monitoring, Earned Value, Prioritizing Monitoring, Getting Project Back To Target – Change Control, Managing Contracts, Introduction, Types Of Contract, Stages In Contract, Placement, Typical Terms Of A Contract ,Contract Management , Acceptance	15	25
4	**MANAGING PEOPLE AND ORGANIZING TEAMS** **Introduction :** Understanding Behavior **Organizational Behavior:** A Background :Selecting The Right Person For The Job Instruction In The Best Methods **Motivation:** The Oldman, Hackman Job Characteristics Model, Working In Groups, Becoming A Team ,Decision Making ,Leadership , Organizational Structures ,Stress ,Health And Safety	15	20
	Total	**60**	**100**

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy

Level	Remembrance	Understanding	Application	Analyze	Evaluate	Create
Weightage	25	25	20	10	10	10

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes

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

CO1 Apply project management concepts and techniques to an IT project.

CO2   Explain project management in terms of the software development process.

CO3 Apply project management concepts through working in a group as team leader.

CO4 Identify the key phases of project management.

CO5 Determine an appropriate project management approach through an evaluation of the business context and scope of the project.

Reference Books

1. **Managing Global Projects (TextBook)**
   By Ramesh Gopalaswamy | Tata McGraw Hill

2. **Software Project Management**
   By Bob Hughes, Mike Cotterell | Tata McGraw Hill

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Course	Bachelor of Science in Information Technology (B.Sc. (IT))	**Semester - 3**
Type of Course	Basic Course	
Prerequisite	Basic of computer Fundamental	
Course Objective	This course presents the topic of data warehouses and their value to the organization. It takes the student from the database platform to structuring a data warehouse environment. Focus is placed on simplicity and addressing the user community's needs. Leading data warehouse platforms including SAP BW/4HANA and HANA are used in practical applications.	

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks		LAB	**Total Marks**
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**		
2	0	0	2	25	25		50

SEE - Semester End Examination, **CIA** *- Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)*

Course Content

T - Teaching Hours | **W** - Weightage

Sr.	Topics	T	W
1	**Introduction to ERP**	10	15
	Evolution of ERP, Reasons for the Growth of ERP, ERP in India; Various Modules of ERP; Advantage of ERP. **An Overview of Enterprise:** Integrated Management Information; Business Modeling; ERP for Small Business; ERP for Make to Order Companies; Business Process Mapping for ERP Module Design; Hardware Environment and its Selection for ERP Implementation.		
2	**ERP and Related Technologies:**	15	35
	ERP and Related Technologies; Business Process Reengineering (BPR); Management Information System (MIS); Executive Information System (EIS); Decision support System (DSS); . Supply Chain Management (SCM).		
3	**Project Planning:**	10	25
	Gap Analysis; Various Project Planning Phases; Project Training & Testing; Project Post Implementation & Maintenance Mode; Project Reengineering ERP Implementation Lifecycle: Pre-evaluation Screening; Package Evaluation & Implementation		
4	**ERP Vendors & Users:**	10	25
	Vendors, Consultants and Users; In-House Implementation - Pros and Cons; Future Directions in ERP; Supply Chain Management; E-Procurement & E – Logistics		
	Total	45	100

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy

Level	Remembrance	Understanding	Application	Analyze
Weightage	15	35	25	25

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes

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

CO1 Make basic use of Enterprise software, and its role in integrating business functions

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CO2 Analyze the strategic options for ERP identification and adoption

CO3 Design the ERP implementation strategies.

CO4 Create reengineered business processes for successful ERP implementation.

Reference Books

1. **Enterprise Resource Planning (TextBook)**
   By Veena Bansal | Pearson India

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Course	Bachelor of Science in Information Technology (B.Sc. (IT))	Semester - 3
Type of Course	Basic Course	
Prerequisite	Physical Education	
Course Objective	1) To enable the student to have good health.	
	2) To practice mental hygiene.	
	3) To possess emotional stability.	
	4) To integrate moral values.	
	5) To attain higher level of consciousness	

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks		LAB	Total Marks
Lecture	Tutorial	Lab	Credit	SEE	CIA		
1	0	2	2	25	25	50	100

SEE - Semester End Examination, **CIA** - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)

Course Content		**T** - Teaching Hours | **W** - Weightage

Sr.	Topics	T	W
1	**Introduction**	7	25
	Yoga: Concept, Meaning, and Origin; Relation between mind and body; Importance of healthy, body and mind; Body Management Techniques: Asana, Pranayama, Kriya. Principles of yogic, practice, Meaning of Asana, its types and principles, Meaning of pranayama, its types and principles. Impact of yoga limbs like asana, pranayama, meditation, etc. on achieving excellence in performance.		
2	**Classical and Emerging Schools of Yoga**	8	25
	Classical Schools of thoughts in Yoga: Hatha Yoga, Raja Yoga, Laya Yoga, Bhakti Yoga, Gyana Yoga, Karma Yoga; Asthang Yoga. Patanjali Yoga Sutra. Emerging schools of thoughts in Yoga.		
3	**Meditation: A Way of Life**	7	25
	Relation between body, breath, and mind; Meaning of meditation and its types and principles. Ancient Scriptures and relevance of Meditation; Meaning and importance of prayer. Psychology of mantras. Essence of Mudras. Relevance of Meditation for different age groups and body requirements. Healing and Meditation. Seven layers of existence. Meditation for adding hours to your day, excellence at workplace, harmony in relationships, better decision making, heightened awareness and concentration.		
4	**Yoga & Meditation in Modern Setting**	8	25

Course Content

T - Teaching Hours | **W** - Weightage

Sr.	Topics	T	W
	Yogic therapies and modern concept of Yoga; Naturopathy, Hydrotherapy, Electrotherapy, Mesotherapy, Acupressure, acupuncture. Anatomy and Physiology and their importance in Yogic Practices. Food and Lifestyle: Basics of Ayurveda, Yogic Diet; Importance of having Sattvic Ayurvedic Food, Workplace productivity which is directly linked to Healthy Sattvic food. Modulation of ailments through food and balanced nutrition and dieting practices, integrating traditional food items with modern food habits, mental health and food types.		
	Total	**30**	**100**

Reference Books

1. **The Science of Yoga (TextBook)**
   By Taimni, I. K. (2005) | Theosophical Publishing House, Adyar, Chennai.

2. **Ways To Improve Your Life (TextBook)**
   By Shankar, S. S. R. (2010) | Sri Sri Publications Trust, Bangalore

3. **Patanjali Yog Sutra (TextBook)**
   By Shankar, S. S. R. (2018) | Sri Sri Publications Trust, Bangalore

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Course	Bachelor of Science in Information Technology (B.Sc. (IT))	**Semester - 3**
Type of Course	Elective Course	
Prerequisite	Programming Language	
Course Objective	Identify problems where artificial intelligence techniques are applicable. Apply selected basic AI techniques; judge applicability of more advanced techniques.	

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks		**LAB**	**Total Marks**
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**		
3	0	0	3	70	30		100

*SEE - Semester End Examination, **CIA** - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)*

Course Content

T - Teaching Hours | **W** - Weightage

Sr.	Topics	T	W
1	**Introduction**	15	20
	The AI Problems, The Underlying Assumption, AI techniques, The Level of The Model, the Criteria For Success **Problems, State Space Search & Heuristic Search Techniques:** Defining The Problems As A State Space Search, Production Systems, Production Characteristics, Production System Characteristics and Issues in the Design of Search Programs, Generate-And-Test, Hill Climbing, Best-First Search, Problem Reduction, Constraint Satisfaction, Means-Ends Analysis.		
2	**Knowledge Representation**	15	30
	Representations And Mappings, Approaches To Knowledge Representation, Representation Simple Facts In Logic, Representing Instance And Isa Relationships, Computable Functions and Predicates, Resolution, Procedural versus, Declarative Knowledge, Logic Programming, Forward versus Backward Reasoning.		
3	**Symbolic Reasoning Under Uncertainty**	15	20
	Introduction To Nonmonotonic Reasoning, Logics For Non-monotonic Reasoning. **Probabilistic Reasoning:** Probability And Bays' Theorem, Certainty Factors And Rule- Base Systems, Bayesian Networks, Dempster-Shafer Theory, Fuzzy Logic		
4	**Natural Language Processing**	15	30
	Introduction, Syntactic Processing, Semantic Analysis, Discourse And Pragmatic Processing, Spell Checking **Connectionist Models:** Introduction: Hopfield Network, Learning In Neural Network, Application Of Neural Networks, Recurrent Networks, Distributed Representations, Connectionist AI, And Symbolic AI.		
	Total	60	100

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy

Level	Remembrance	Understanding	Application	Analyze	Evaluate
Weightage	20	15	15	20	20

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

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Course Outcomes

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

CO1   Define the concepts of Artificial Intelligence and their uses.

CO2   Explain the importance of knowledge representation in AI systems.

CO3   Understand the basics of probabilistic reasoning, including probability and Bayes' theorem.

CO4   Understand the different stages of NLP, including syntactic and semantic analysis, discourse, and pragmatic processing.

CO5   Understand the different stages of NLP, including syntactic and semantic analysis, discourse, and pragmatic processing.

Reference Books

1.   **"Artificial Intelligence (TextBook)**
     By Elaine Rich And Kevin Knight (2nd Edition) | Tata Mcgraw-Hill

2.   **Artificial Intelligence: A Modern Approach**
     By Stuart Russel, Peter Norvig, | PHI

List of Practical

1.   Write a program to implement Tic-Tac-Toe game problem.

2.   Write a program to implement BFS (for 8 puzzle problem or Water Jug problem or any AI search problem).

3.   Write a program to implement DFS (for 8 puzzle problem or Water Jug problem or any AI search problem)

4.   Write a program to implement Single Player Game (Using any Heuristic Function)

5.   Write a program to Implement A* Algorithm.

6.   Write a program to implement mini-max algorithm for any game development.

7.   Assume given a set of facts of the form father(name1,name2) (name1 is the father of name2).

8.   Define a predicate brother(X,Y) which holds iff X and Y are brothers. Define a predicate cousin(X,Y) which holds iff X and Y are cousins. Define a predicate grandson(X,Y) which holds iff X is a grandson of Y. Define a predicate descendent(X,Y) which holds iff X is a descendent of Y. Consider the following genealogical tree: father(a,b). father(a,c). father(b,d). father(b,e). father(c,f). Say which answers, and in which order, are generated by your definitions for the following queries in Prolog:

9.   Write a program to solve Tower of Hanoi problem using Prolog.

10.   Write a program to solve N-Queens problem using Prolog.

11.   Write a program to solve 8 puzzle problem using Prolog.

12.   Write a program to solve travelling salesman problem using Prolog.

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Course	Bachelor of Science in Information Technology (B.Sc. (IT)) **Semester - 3**
Type of Course	Elective Course
Prerequisite	Programming Language
Course Objective	Identify problems where artificial intelligence techniques are applicable. Apply selected basic AI techniques; judge applicability of more advanced techniques.

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks			Total Marks
Lecture	Tutorial	Lab	Credit	SEE	CIA	LAB	
3	0	0	3	70	30		100

*SEE - Semester End Examination, **CIA** - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)*

Course Content

T - Teaching Hours | **W** - Weightage

Sr.	Topics	T	W
1	**Cyber law & Efforts**	10	15
	Concept of Cyberspace, Issues of Jurisdiction in Cyberspace: Jurisdiction Principles under International law, Jurisdiction in different states, Position in India. Conflict of Laws in Cyberspace, International Efforts for harmonization Privacy in Cyberspace.		
2	**Cyber Crime & Law**	15	30
	Define Crime, Mens Rea, Crime in Context of Internet, Types of Cyber Crime, Computing Damage in Internet Crime, Offences under IPC (Indian Panel Code, 1860), Offences & Penalties under IT Act 2000, IT Act Amendments, Investigation & adjudication issues, Digital Evidence.		
3	**Intellectual Rights and Cyber Laws**	10	15
	Electronic Commerce, Cyber Contract, Intellectual Property Rights and Cyber Laws. UNCITRAL Model Law, Digital Signature and Digital Signature Certificates, E-Governance and Records.		
4	**International and National Instruments on Obscenity**	25	35
	Obscenity and Pornography, Internet and potential of Obscenity, International and National Instruments on Obscenity & Pornography, Child Pornography, Important Case Studies. **Case study of real world cyber-crime & incident -** Case study of real world cyber-crime incident reported in different states of India and their pattern and tools used in the crime.		
	Total	**60**	**95**

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy

Level	Remembrance	Understanding	Evaluate	Create
Weightage	25	25	25	25

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes

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

CO1 Analyze fundamentals of Cyber Law.

CO2 Discuss IT Act & its Amendments.

CO3 Relate Cyber laws with security incidents.

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CO4 Understand the legal and ethical responsibilities of security researchers.

CO5 Gain a comprehensive understanding of cyber laws, regulations, and legal frameworks at national and international levels.

Reference Books

1. **Cyber Law in India (TextBook)**
   By Ahmad, F. (2015). | Faridabad: New era law publications.

2. **Cyber Laws and IT Protection**
   By Chander, H. (2012) | New Delhi: Prentice Hall India Learning Private Limited

Course	Bachelor of Science in Information Technology (B.Sc. (IT))	Semester - 3
Type of Course	Elective Course	
Prerequisite	Programming Language	
Course Objective	Identify problems where artificial intelligence techniques are applicable. Apply selected basic AI techniques; judge applicability of more advanced techniques.	

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks		LAB	Total Marks
Lecture	Tutorial	Lab	Credit	SEE	CIA		
3	0	0	3	70	30		100

SEE - Semester End Examination, CIA - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)

Course Content

T - Teaching Hours | **W** - Weightage

Sr.	Topics	T	W
1	**Introduction to Data Analysis and Visualization**	10	15
	Overview of data analysis and visualization, Introduction to different types of data (structured, unstructured, semi-structured), Basics of data collection and cleaning, Understanding data analysis workflow, Introduction to data visualization techniques and best practices.		
2	**Data Analysis Techniques**	15	25
	Introduction to statistical analysis, Descriptive statistics: measures of central tendency and dispersion, Inferential statistics: hypothesis testing, confidence intervals, Exploratory data analysis: data exploration and visualization, Regression analysis: simple linear regression, multiple linear regression		
3	**Data Visualization Tools**	20	30
	Introduction to data visualization tools Tableau **Working on Tableau** Creating basic visualizations (bar charts, line graphs, scatter plots), Customizing visualizations: colors, labels, axes, and legends, Creating interactive visualizations (filters, tooltips, drill-downs), Incorporating visualizations into reports and dashboards		
4	**Advanced Data Analysis and Visualization**	15	30
	Time series analysis and forecasting, Cluster analysis: K-means clustering, hierarchical clustering, Decision trees and random forests for predictive modeling, Network analysis and visualization, Storytelling with data: effectively communicating insights through visualizations		
	Total	60	100

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy

Level	Remembrance	Understanding	Application	Analyze	Evaluate	Create
Weightage	10	30	20	20	10	10

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes

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

CO1 Explain the concept of visualization in the processing and analysis of data

CO2 Develop visualization methods and visualization systems using software applications

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CO3 Perform creative work in the field of visualization.

CO4 Learn how to preprocess and format data for analysis, such as data type conversion and normalization.

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CO5 Learn how to draw meaningful conclusions from data analysis and present insights to stakeholders.

Reference Books

1. **Data Visualization (TextBook)**
   By Kieran Healy | Princeton University Press
2. **Fundamentals of Data Visualization**
   By Claus O. Wilke | O'Reilly Media

Course	Bachelor of Science in Information Technology (B.Sc. (IT))	**Semester - 4**
Type of Course	Core Courses	
Prerequisite	02080201-T - COMPUTER FUNDAMENTALS AND PROGRAMMING WITH C	
Course Objective	1. Understand the basic networking and internet concepts 2. Understand principle of basic world wide web 3. Use various HTML tags and advance html to develop the user friendly web pages 4. Use various CSS to develop the user friendly web pages and more attractive. 5. Use the JavaScript to develop the dynamic web pages.	

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks			**Total Marks**
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	
4	0	0	4	70	30		100

*SEE - Semester End Examination, **CIA** - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)*

Course Content

T - Teaching Hours | **W** - Weightage

Sr.	Topics	T	W
1	**Internet and WWW**	15	25
	What is Internet? Introduction to internet and its applications, E-mail, telnet, FTP, e-commerce, video conferencing, e-business. Internet service providers, domain name server internet address. World Wide Web and its evolution, uniform resource locator (URL), browsers − internet explorer, Netscape navigator, opera, Firefox, chrome, Mozilla, search engine, web saver − apache, IIS, proxy server, HTTP protocol		
2	**Basics of HTML**	15	25
	What is Internet Language?, Understanding HTML, Create a Web page, Linking to other Web Pages, Publishing HTML Pages,		
3	**Advance HTML**	15	25
	Creating a Table, Creating HTML Forms, Creating Web Page Graphics, Putting Graphics on a Web Page, Custom Backgrounds and Colors, Creating Animated Graphics.		
4	**Cascading Style Sheet&Java Script**	15	25
	CSS, Defining Style with HTML Tags, Features of Style Sheet, Style Properties, Style Classes, External Style Sheet **JavaScript:** Introduction, Client-Side JavaScript, Server-Side JavaScript, JavaScript Objects, JavaScript Securit		
	Total	60	100

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy

Level	Remembrance	Understanding	Application	Analyze	Create
Weightage	15	15	25	25	20

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

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Course Outcomes

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

CO1 Understand the basic networking and internet concepts

CO2 Understand principle of basic world wide web

CO3 Use various HTML tags and advance html to develop the user friendly web pages

CO4 Use various CSS to develop the user friendly web pages and more attractive.

CO5 Use the JavaScript to develop the dynamic web pages

Reference Books

1. **Internet Technology and Web Design (TextBook) (TextBook)**
   By ISRD Group | Tata McGraw Hill

2. **HTML 5 in Simple Steps**
   By Kogent Learning Solutions Inc. | Dreamtech Press

List of Practical

1. Write HTML document to illustrate the basic tags with required attributes.

2. Write a HTML document to illustrate the uses of <h1> ,<h2>, <h3> ,<h4>, <h5>tags

3. Document to illustrate the uses of <h1> ,<h2>, <h3> ,<h4>, <h5>tags. Write an HTML code to create a Home page having three links: About Us, Our Services and Contact Us. Create separate web pages for the three links

4. Write an HTML code to display your CV on a web page

5. Make a table with your friend's details in it. Column One, your friends names Column Two, Address of your friends Column Three, Mobile No of your friends Column Four, Birth-Date of your friends

6. Make Student Registration form

7. Design a web page with ordered and unordered list.

8. Write an HTML code to demonstrate the usage of External CSS.

9. Write a JavaScript program to subtract two numbers and display the difference

10. Write a JavaScript program to add two numbers and display the sum in an alert box

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Course	Bachelor of Science in Information Technology (B.Sc. (IT)) **Semester - 4**
Type of Course	Core Courses
Prerequisite	03080101-T - PROGRAMMING IN C
Course Objective	1. Learn how to design and develop a Web page using HTML and CSS. 2. Learn how to link pages so that they create a Web site. 3. Learn to apply CSS in a web page

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks		**LAB**	**Total Marks**
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**		
4	0	0	4	70	30		100

*SEE - Semester End Examination, **CIA** - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)*

Course Content

T - Teaching Hours | **W** - Weightage

Sr.	Topics	T	W
1	**Introduction to Java**	10	15

Basics of Java programming, Creating first java classes. Features of Java, Adding comments to a java, Saving, compilingand running a java application. Creating a java application using GUI output Data types, Variables, Operators. Control structures including selection, Looping, Java methods, Overloading, Math class. Arrays in Java, Advantages of Java, Applications of Java, Constants, Literals, variables, Keywords, Identifiers, numeric type conversion, Operators in Java. String handling functions and string buffer class

Sr.	Topics	T	W
2	**Methods, Object , Classes, Conditions & Loops in Java**	15	25

Basics of objects and classes in Java. Constructors, Finalizer, Visibility modifiers, Methods and objects. Inbuilt classes like String, Character, String Buffer, File this reference. Method overloading, Constructors, Sending arguments to constructors, Constructors overloading. 'this' keyword, Static variable. Working with constants, if and if…..else, Nesting if… else, Using logical AND and OR operators, switch statement, Using the conditional AND not operators, Using the NOT operator, Understanding precedence. While loop, for loop, do…. while loop.

Sr.	Topics	T	W
3	**Inheritance and Polymorphism**	20	40

Inheritance in Java, Super and sub class. Overriding, Object class, Polymorphism, Dynamic binding. Generic Programming, Casting objects, Instance of operator, Abstract class, Interface in Java, Package in Java, Accessing super class methods. Constructor calling during inheritance, Extending classes. Method overriding, Final method, Final super class, Static method.

Exception Handling Learning about exceptions, Understanding the limitations of traditional error, and handling. Trying code and catching exceptions. Throwing and catching multiple exceptions. 'finally' block, Understanding the advantages of exception handling. Checked and unchecked exception, Creating own exceptions (custom exception).

Sr.	Topics	T	W
4	**Multi-Threading & Applet**	15	20

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Course Content

T - Teaching Hours | W - Weightage

Sr.	Topics	T	W
	Introduction, Thread Life Cycle. Creating and running thread (using Thread class and, Runnable interface).Thread Priorities. Thread join (), sleep () method, Thread synchronization. Exception handling with try-catch-finally, Collections in Java. Introduction to JavaBeans and Network Programming.		
	Applet Introduction of Applet, Lifecycle of an Applet, Comparing Applets and Application, Creating Applets. Parameters passing in applet, Line, Rectangles, Ovals, Arcs, Polygons, Polyline methods. Event handling in Java, Event types, Mouse and key events. GUI Basics, Panels, Frames. Layout managers: Flow Layout, Border Layout, Grid Layout.GUI components like buttons, Check boxes, Radio buttons, Labels, Text fields, Text areas, Combo boxes, Lists, Scroll bars, Sliders, Windows, Menus, Dialog box		
	Total	**60**	**100**

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy

Level	Remembrance	Understanding	Application	Analyze	Evaluate	Create
Weightage	25	25	10	10	10	20

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes

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

CO1 Learn how to write & run a JAVA code from the command line using different Methods, Objects, Class, Condition & Loops.

CO2 Use the syntax and semantics of java programming language and basic concepts of OOP.

CO3 Apply the concepts of Multithreading and Exception handling to develop efficient and error free codes.

CO4 Understanding the Applet Lifecycle along with its components.

CO5 Basic knowledge of topics such as javabeans, network programming, and collections.

Reference Books

1. **Object Oriented Programming in java (TextBook)**
   By Dr. G.T.Thampi | Dreamtech

2. **Programming with Java**
   By E. Balagurusamy | Sixth Edition, Tata Mc Graw Hill

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List of Practical

1. Write a program to convert rupees to dollar. 60 rupees=1 dollar.

2. Write a program that calculate percentage marks of the student if marks of 6 subjects are given.

3. Write a program to enter two numbers and perform mathematical operations on them.

4. Write a program to find length of string and print second half of the string.

5. Write a program to accept a line and check how many consonants and vowels are there in line.

6. Write a program to count the number of words that start with capital letters.

7. Write a program to find that given number or string is palindrome or not.

8. Create a class called Student. Write a student manager program to manipulate the student information from files by using FileInputStream and FileOutputStream.

9. Refine the student manager program to manipulate the student information from files by using the BufferedReader and BufferedWriter.

10. Refine the student manager program to manipulate the student information from files by using the DataInputStream and DataOutputStream. Assume suitable data.

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Course	Bachelor of Science in Information Technology (B.Sc. (IT)) **Semester - 4**
Type of Course	Core Courses
Prerequisite	03080101-T - PROGRAMMING IN C
Course Objective	1. Build an understanding of the fundamental concepts of computer networking 2. Familiarize the student with the basic taxonomy and terminology of the computer networking. 3. Allow the student to gain expertise in some specific areas of networking.

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks			**Total Marks**
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	
4	0	2	5	70	30	50	150

*SEE - Semester End Examination, **CIA** - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)*

Course Content

T - Teaching Hours | **W** - Weightage

Sr.	Topics	T	W
1	**Introduction to Networking**	15	25
	Definition of network and Data Communication, Network Applications, Standard organization (ISO, CCITT, ANSI, IEEE, ITU, ISOC, IETF) Data Flow: Simple Duplex, Half duplex, Full Duplex, data communications key points Categories of network :LAN, WAN, MAN Internetworks, Definition of Protocol, line configurations, multi point, point-point, unicast, multicast, broad cast		
2	**The Reference Model and Topology**	15	25
	OSI model & function of each Layer, TCP/ IP model Comparison of OSI & TCP/IP Topology and its Types: Mesh, Star, Ring, Bus, Tree Configuration of topologies in Cisco packet tracer Different types of servers, File Application, Print, Mail, Proxy**,** Web servers		
3	**Transmission Media & Network Components**	15	25
	Transmission Media: Guided Media and Unguided media Network Components: Hub ,Switches, Routers ,Bridge, NIC, Repeater, Gateway, Network software, Wired Network, Wireless Networks Network command		
4	**IP Protocol and Network Applications**	15	25
	IP protocol, IP V4 Header & protocol functions, IP addressing schemes, Subnet & subnet masking HTTP,WWW,URL,DHCP,DNS (Domain Name System),Name Server, File transfer protocol & Trivial FTP, Electronic Mail, Functions of E-mail systems (mail box & address),User agents, Message format, Mail Protocols (SMTP, POP, IMAP, MIME).		
	Total	60	100

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy

Level	Remembrance	Understanding	Application	Analyze	Evaluate	Create
Weightage	10	30	20	20	15	5

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

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Course Outcomes

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

CO1 Describe the components and infrastructure that form the basis for most computer networks

CO2 Describe the technical aspects of data communications on the Internet.

CO3 Design different topologies using Packet tracer.

CO4 Understand the use of various Network components and Transmission Media.

CO5 Explain Network Applications such as IPv4, IPv6, Subnet masking, http, DNS etc.

Reference Books

1. **Introduction to Data Communication and Networking (TextBook)**
   By Behrouz Forouzan | TMH
2. **Computer Network**
   By Andrew S. Tanenbaum | Pearson

List of Practical

1. Bus Topology using CISCO Packet Tracer
2. Star Topology using CISCO Packet Tracer
3. Mash Topology using CISCO Packet Tracer
4. Ring Topology Using CISCO Packet Tracer
5. Network basics Commands

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Course	Bachelor of Science in Information Technology (B.Sc. (IT))	**Semester - 4**
Type of Course	Core Courses	
Prerequisite	03060302-T - DIGITAL LOGIC DESIGN	
Course Objective	1. Identify various part Of System memory Hirerchy 2. Understand pipeline and Parallel Processing Technique 3. Analysis How Central Processing Work 4. Understand Numbering systems and conversion of numbering systems 5. Comprehend the features and performance parameters of different types of computer architectures.	

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks			**Total Marks**
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	
3	0	0	4	70	30		100

SEE - Semester End Examination, **CIA** - *Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)*

Course Content

T - Teaching Hours | **W** - Weightage

Sr.	Topics	T	W
1	**Digital Logic Circuits, Digital Component and Data Representation**	10	15
	Digital Computers, Logic Gates, Boolean algebra. Combinational circuits, Flip-flops, Sequential Circuits. Integrated Circuits, Decoders, Multiplexers, Registers, Shift Registers, Binary Counters, Memory Unit. Number System, Fixed-Point Representation, Floating-Point Representation.		
2	**Overview of Register Transfer, Micro Operations, Basic Computer Organization and Design**	15	35
	Register Transfer and Register Transfer Language, Bus and Memory transfer Arithmetic Micro Operation, Logic Micro Operation, Shift Micro Operation, Arithmetic and Logic Shift Unit. Instruction Codes, Registers, Instruction, Time and Control, Instruction Cycle, Memory Reference Instruction, I/O and Interrupt, Design of Computer, Design of Accumulator Logic.		
3	**Basic Computer Programming , Micro Programmed Control**	10	25
	Introduction, Machine Language, Assembly Language, the Assembler, Program Loops, Programming Arithmetic and Logic Operation		
4	**Central Processing Unit and Pipeline.**	10	25
	Subroutines, I/O – Programming, Control Memory, Address sequencing, Micro Program Example, Design of Control Unit. Introduction to Central Processing Unit, General Register Organization Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, RICS. Parallel Processing, Pipelining		
	Total	**45**	**100**

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy

Level	Remembrance	Understanding	Application	Analyze	Evaluate
Weightage	30	20	10	20	20

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

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Course Outcomes

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

CO1 Identify various part Of System memory Hirerchy

CO2 Understand pipeline and Parallel Processing Technique

CO3 Analysis How Central Processing Work

CO4 Understand Numbering systems and conversion of numbering systems

CO5 Comprehend the features and performance parameters of different types of computer architectures.

Reference Books

1. **Computer System Architecture (TextBook)**
   By M. Morris Mano | Pearson

2. **Structured Computer Organization**
   By Andrew S. Tanenbaum and Todd Austin | PHI

Course	Bachelor of Science in Information Technology (B.Sc. (IT))	**Semester - 4**
Type of Course	Skill Enhancement Courses	
Prerequisite	Basic communication skills and a willingness to develop public speaking and corporate communication abilities.	
Course Objective	1.　　Confident Public Speaking: Develop the ability to speak confidently and persuasively in various public settings. 2.　　Effective Business Communication: Master skills for clear, concise, and impactful communication in corporate environments. 3.　　Presentation Skills: Create and deliver engaging and informative presentations for professional success. 4.Interpersonal Effectiveness: Enhance relationship-building, negotiation, and conflict resolution skills. 5.Crisis Communication: Learn to navigate and communicate effectively during challenging situations in the corporate world.	

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks		**LAB**	**Total Marks**
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**		
3	0	0	3	70	30		100

SEE - Semester End Examination, CIA - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)

Course Content		**T** - Teaching Hours | **W** - Weightage	

Sr.	Topics	T	W
1	**Interview & types**	10	25
	Preparation for interview-do's and don'ts-self introduction. How to handle rejections. Selection test-types		
2	**Presentation skills**	12	25
	know your audience guidelines for an effective presentation-common flaws and overcoming them-body language and tips for giving presentation, Group discussion, Debate, telephone and email etiquettes		
3	**Skills**	11	25
	Essential corporate communication skills, Interpersonal Skills , Life management skills, Negotiation & Conflict management, Leadership skills, Teamwork		
4	**Types of business meetings**	11	25
	Fundamentals of oral communication, Ethics in corporate communication, role of culture in national/international communication, persuasive communication		
	Total	**44**	**100**

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Course Outcomes

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

CO1 Confident Public Speaking: Develop the ability to speak confidently and persuasively in various public settings.

CO2 Effective Business Communication: Master skills for clear, concise, and impactful communication in corporate environments.

CO3 Presentation Skills: Create and deliver engaging and informative presentations for professional success.

CO4 Interpersonal Effectiveness: Enhance relationship-building, negotiation, and conflict resolution skills.

CO5 Crisis Communication: Learn to navigate and communicate effectively during challenging situations in the corporate world.

Reference Books

1. **Corporate Governance (TextBook)**
   By C.V. Baxi | Excel Books

Course	Bachelor of Science in Information Technology (B.Sc. (IT))	**Semester - 4**
Type of Course	Discipline Specific Elective Courses	
Prerequisite	05070310-T - INTRODUCTION TO ARTIFICIAL INTELLIGENCE	
Course Objective	1. Understand the fundamental concept of biological neurons and their relation to artificial neural networks. 2. Categorize different types of learning in machine learning. 3. Understand the concept of maximum margin and its role in support vector machines. 4. Explain the principles and applications of agglomerative hierarchical clustering. 5. Explain the challenges and solutions associated with noise in maximum margin classification.	

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks			**Total Marks**
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	
3	0	0	3	70	30		100

SEE - Semester End Examination, **CIA** - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)

Course Content

T - Teaching Hours | **W** - Weightage

Sr.	Topics	T	W
1	**Introduction to Artificial Neural Networks**	10	25
	Biological Neurons; Neural Networks, Artificial Neural Networks, Activation Functions, Training Methods, Supervised and Unsupervised Learning		
2	**Introduction to Machine Learning**	15	25
	Different types of Learning, Hypothesis Space, Inductive Bias, Evaluation, Cross-Validation, Linear Regression, Decision Trees, K-nearest Neighbour, Collaborative Filtering, Dimensionality Reduction Technique		
3	**Logistic Regression and Support Vector Machine**	15	25
	Logistic Regression, Support Vector Machine, Maximum Margin with Noise, Nonlinear SVM and Kernel Function, SVM		
4	**Advanced Learning methods and Clustering**	15	25
	Introduction to Clustering, K- means Clustering, Agglomerative Hierarchical Clustering, Semi-Supervised, Reinforcement Learning, Deep Learning		
	Total	**55**	**100**

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy

Level	Remembrance	Understanding	Application	Analyze	Create
Weightage	20	20	20	20	20

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

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Course Outcomes

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

CO1 Understand the fundamental concept of biological neurons and their relation to artificial neural networks.

CO2 Categorize different types of learning in machine learning.

CO3 Understand the concept of maximum margin and its role in support vector machines.

CO4 Explain the principles and applications of agglomerative hierarchical clustering.

CO5 Explain the challenges and solutions associated with noise in maximum margin classification.

Reference Books

1. **Machine Learning for Hackers (TextBook)**
   By Drew Conway & John Myles | Oreilly

List of Practical

1. Write a Python program to implement Simple Linear Regression.

2. Using Python develop Polynomial Regression Model for a given dataset.

3. Using Python develop Logistic Regression Model for a given dataset.

4. Predicting loan approval decisions using a decision tree.

5. Use scikit-learn to create a linear SVM classifier. Visualize the decision boundary and support vectors for different kernels (linear and polynomial).

6. Apply the k-means clustering algorithm using scikit-learn on a synthetic dataset. Explore the number of clusters and visualize the clustered data.

7. Implement a basic convolutional neural network (CNN) using Tensor Flow or Py Torch for image classification.

8. Implement Q-learning to solve a simple environment like the "Frozen Lake" problem from Open AI Gym.

9. Build a simple neural network using a library like Tensor Flow or Py Torch to classify images from a standard dataset like MNIST.

10. Implement hierarchical agglomerative clustering to create a dendrogram and understand the process of hierarchical clustering.

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Course	Bachelor of Science in Information Technology (B.Sc. (IT))	**Semester - 4**
Type of Course	Core Courses	
Prerequisite	05070303-T - OPERATING SYSTEM	
Course Objective	1.　　　Explain the concept and significance of penetration testing in cybersecurity. 2.　　　Apply foot-printing and reconnaissance techniques to collect critical information about target systems. 3.　　　Utilize various port scanning techniques to identify open ports and services on target systems. 4.Demonstrate the ability to exploit vulnerabilities present in target systems. 5.Identify the OWASP Top Ten web application security risks.	

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks			**Total Marks**
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	
3	0	0	3	70	30		100

SEE - Semester End Examination, **CIA** *- Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)*

Course Content		**T** - Teaching Hours | **W** - Weightage

Sr.	Topics	T	W
1	**Introduction to Penetration Testing and Pen Testing**	10	25
	Introduction to Penetration Testing, Advantages and Disadvantages of Penetration Testing, Introduction to pen testing, types of pen tests, Definition and importance of penetration testing, Legal and ethical considerations, Penetration testing methodologies, Setting up a penetration testing lab		
2	**Information Gathering and Reconnaissance**	15	25
	Information Gathering and Reconnaissance, Foot printing and reconnaissance techniques, OSINT (Open-Source Intelligence) gathering, Tools: N-map, Recon-ng, Shodan, Practical exercises: Network scanning and reconnaissance		
3	**Scanning and Enumeration**	20	30
	Port scanning techniques, Service enumeration, Vulnerability scanning, Tools: Nessus, OpenVAS, Practical exercises: Scanning and enumeration **Exploitation and Post-Exploitation** Exploiting vulnerabilities, Privilege escalation, Maintaining access, Tools: Metasploit, Meterpreter, Practical exercises: Exploitation and post-exploitation		
4	**Web Application Testing**	15	20
	OWASP Top Ten, Web application scanning and testing, Common web vulnerabilities (SQL injection, XSS, CSRF), Tools: Burp Suite, OWASP ZAP Practical exercises: Web application penetration testing		
	Total	60	100

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy						
Level	Remembrance	Understanding	Application	Analyze	Evaluate	Create
Weightage	10	20	20	15	30	15

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

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Course Outcomes

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

CO1 Explain the concept and significance of penetration testing in cybersecurity.

CO2 Apply foot-printing and reconnaissance techniques to collect critical information about target systems.

CO3 Utilize various port scanning techniques to identify open ports and services on target systems.

CO4 Demonstrate the ability to exploit vulnerabilities present in target systems.

CO5 Identify the OWASP Top Ten web application security risks.

Reference Books

1. **Metasploit: The Penetration Tester's Guide (TextBook)**
   By David Kennedy | Jim O'Gorman, et al

List of Practical

1. Setting up a virtual lab environment for penetration testing.

2. Exploring Kali Linux and its tools.

3. Conducting basic reconnaissance and information gathering.

4. Scanning a network using N-map.

5. Enumerating services using Netcat.

6. Banner grabbing with Wireshark.

7. Exploiting a known vulnerability with Metasploit.

8. Privilege escalation on a target system.

9. Post-exploitation activities, including data extraction.

10. Web application scanning using Burp Suite.

11. Identifying and ex

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EVOLVING THINKING MINDS

Course	Bachelor of Science in Information Technology (B.Sc. (IT))	**Semester - 4**
Type of Course	Discipline Specific Elective Courses	
Prerequisite	13990102-T - COMPUTER FUNDAMENTAL AND EMERGING TECHNOLOGY	
Course Objective	1. Students will grasp the basics of data warehousing and its importance. 2. Students will design data warehouses using appropriate data modeling techniques. 3. Students will apply data mining algorithms to solve real-world problems. 4. Students will optimize data warehouses for improved performance. 5. Students will implement data security measures and adhere to data governance practices.	

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks			**Total Marks**
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	
3	0	0	3	70	30		100

SEE - Semester End Examination, *CIA* - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)

Course Content

T - Teaching Hours | **W** - Weightage

Sr.	Topics	T	W
1	**Introduction to Data Warehousing**	10	20

What is Data Warehousing?, Importance and Benefits of Data Warehousing, Data Warehousing Architecture and Components

Data Warehouse Design - Data Modeling: Dimensional Modeling vs. Entity-Relationship Modeling, Fact and Dimension Tables, ETL (Extract, Transform, Load) Processes

Data Warehouse Implementation - Data Warehouse Tools and Technologies, Data Warehouse Deployment: On-Premises vs. Cloud, Case Study: Building a Simple Data Warehouse

2	**Data Warehousing Tools and Technologies Data Warehouse Management Systems (DWMS)**	20	25

Overview of DWMS, Popular DWMS: Oracle, Microsoft SQL Server, Snowflake, etc.

Data Warehousing Best Practices

Data Warehouse Optimization - Indexing and Query Performance Tuning, Data Compression and Storage Optimization Monitoring and Maintenance of Data Warehouses

Data Warehouse Security and Governance - Data Security in Data Warehouses, Data Privacy and Compliance, Data Governance Frameworks

3	**Introduction to Data Mining**	15	25

What is Data Mining?, Data Mining Process, Types of Data Mining: Supervised vs. Unsupervised Learning

Data Mining Algorithms - Decision Trees, Clustering Algorithms, Association Rule Mining,

Data Preprocessing for Data Mining - Data Cleaning and Transformation, Feature Selection and Engineering, Handling Imbalanced Data

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| 4 | Data Mining Tools and Applications Data Mining Tools and Software | 15 | 30 |

Course Content

T - Teaching Hours | **W** - Weightage

Sr.	Topics	T	W

Introduction to Data Mining Tools (e.g., Python, R, Weka), Practical Data Mining with Tools

Data Mining Applications - Recommender Systems, Fraud Detection, Sentiment Analysis

Final Projects and Presentations -Students work on data mining projects, Final project presentations and evaluations

Total 60 100

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy

Level	Remembrance	Understanding	Application	Analyze	Create
Weightage	20	20	25	25	10

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes

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

CO1 Students will grasp the basics of data warehousing and its importance.

CO2 Students will design data warehouses using appropriate data modeling techniques.

CO3 Students will apply data mining algorithms to solve real-world problems.

CO4 Students will optimize data warehouses for improved performance.

CO5 Students will implement data security measures and adhere to data governance practices.

Reference Books

1. **Data Warehousing Fundamentals: A Comprehensive Guide for IT Professionals (TextBook)**
   By Paulraj Ponniah | Wiley; 2nd edition (2008)
2. **The Data Warehouse Toolkit: The Definitive Guide to Dimensional Modeling**
   By Ralph Kimball | Wiley; 3rd edition (2013)

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List of Practical

1. Analyze a real-world case study of a company that has implemented a data warehousing solution. Discuss the challenges faced and the benefits gained.

2. Create data models for a hypothetical business scenario using both dimensional modeling and entity-relationship modeling approaches.

3. Install and configure a data warehousing tool or platform (e.g., SQL Server, Snowflake) and create a basic data warehouse.

4. Explore and interact with Data Warehouse Management Systems (DWMS) such as Oracle, Microsoft SQL Server, or Snowflake through practical exercises.

5. Optimize SQL queries by identifying and resolving performance bottlenecks, implementing indexing, and using query optimization techniques.

6. Configure user roles, permissions, and security measures in a data warehouse environment. Emphasize data access control and encryption.

7. Assist students in installing popular data mining tools like Python, R, or Weka on their machines.

8. Guide students in constructing decision trees manually from a sample dataset and using data mining software.

9. Students clean and transform a noisy dataset, addressing missing values and outliers.

10. Assign data mining projects to students, providing them with real or simulated datasets and guiding them through the data mining process.

11. Students present their final data mining projects, showcasing their data analysis, modeling, and interpretation skills

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