Course	Bachelor of Science in Information Technology (B.Sc. (IT))	**Semester - 1**
Type of Course	Core Courses	
Prerequisite	Basic knowledge of computer fundamentals	
Course Objective	1.Formulate algorithm/flowchart for given arithmetic and logical problem 2.Translate algorithm/flowchart into C program using correct syntax and execute it. 3.Write a program using branching, looping, iteration and recursion.	

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks			
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	**Total Marks**
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**	**20**	**25**

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	**Management Input and Output Operators, Loop and arrays**	**20**	**30**

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

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3	**Handling of Character strings**	**10**	**25**

Course Content

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

Sr.	**Topics**	**T**	**W**

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	**Structures , Unions and Pointer**	**10**	**20**

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

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1. **"Computer programming" (TextBook)**
   By Ashok N. Kamthane | Pearson Education
2. **ANSI C (TextBook) (TextBook)**
   By Balaguruswami | Wiley India Pvt Ltd
3. **Let Us C (TextBook)**
   By Yashwant Kanetker | BPB Publication

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.

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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. Learn basics about computer hardware, software and Operating system. 2. Learn about Networks and data communication. 3. Learn about Enterprise systems and functions.	

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks			
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	**Total Marks**
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	**Computer Hardware System**	10	15
	Concepts and generation of computer, CPU, Basic Logic Gates, Computer Memory and Mass Storage Devices, Computer Hierarchy, Input and Output Technologies		
2	**Operating Systems and Application, System Software Application and System Software**	25	35
	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)		
3	**Data Communication and Networks**	10	25
	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		
4	**Functional and Enterprise Systems**	15	25
	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.		
	Total	**60**	**100**

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy

Level	Remembrance	Understanding	Analyze	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 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.

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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 problem based on successive differentiation and Leibnitz rule. 2. Student will be able to understand basic concept of partial differential equation. 3. Student will be able to understand the application of partial differential equation. 4. Student will be able to explain Lagrange's Method of Undetermined Multipliers. 5. Student will be able to find the rank of matrix and able to solve system of equations	

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks			
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	**Total Marks**
3	1	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	**Set Theory**	17	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**	15	26
	Cartesian product of the sets, relations, Functions, Types of functions, algebra of functions, Examples		
3	**Matrix and determinants**	15	18
	Introduction of matrices, Definition of different matrices, Determinants of matrix, minors, cofactors, determinant of matrix. Adjoint of matrix, Inverse of the matrixIntroduction of matrices, Definition of different matrices, Determinants of matrix, minors, cofactors, determinant of matrix. 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 of derivative, rules of derivative, Standard formulae and examples based on standard forms		
	Total	**60**	**100**

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy

Level	Remembrance	Understanding	Application	Analyze	Evaluate
Weightage	15	20	25	15	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 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.

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CO4 Student will able to compute limits, derivatives, and integrals.

CO5 Student will Able to apply differential and Integral equations to significant applied problems.

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Reference Books

1. **Class XI Mathematics NCERT book (TextBook)**
   By NCERT | NCERT
2. **Basic mathematics (TextBook)**
   Atul Prakashan
3. **Business Mathematics**
   By V.K.Kapoor | S. Chand and sons, New Delhi

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Course	Bachelor of Science in Information Technology (B.Sc. (IT))
Type of Course	Core Courses
Prerequisite	
Course Objective	-

Semester - 1

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks			
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	**Total Marks**
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	**The multidisciplinary nature of environmental studies** Environmental Science 'definition, scope & importance, Evolution of the universe, origin of the earth; solar system; evolution of life; atmosphere of the primitive earth, abiotic component of environment, Environmental balance, balance in O2 and CO2 in air; thermal balance; balance in predator and prey population	15	25
2	**Ecology** 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; ecological niche; guild, Significance of ecological adaptation; ecological adaptation in plants and animals- Zeric adaptations in plants and animals; adaptations of plants and animals to aquatic habitat; arboreal adaptations in plants and animals	15	25
3	**Ecosystem** 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, Chemistry of decaying compounds, Case Studies. Earth - Its interior and surface, Layers of the earth, Earths Crust: Formation of Rocks Major land forms and their transformation, Denudation and its agents: Weathering ' Mechanical and chemical - Agents of weathering, Composition of soil, Formation and types of soils.	15	25
4	**Biogeochemical cycles and Environmental Pollution** Biogeochemical cycles, Carbon cycle, Nitrogen cycle, Phosphorus cycle, Oxygen cycle, Water cycle Environmental Pollution Types of Environmental Pollution, Water Pollution, Air Pollution, Land and Noise Pollution, Current Issues in environment sciences	15	25

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Total 60 100

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy

Level	Remembrance	Understanding	Application	Analyze	Evaluate	Create
Weightage	40	30	5	5	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 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 (TextBook)**
   By Daniel B Botkin & Edward A Keller | John Wiley & Sons.

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Course	Bachelor of Science in Information Technology (B.Sc. (IT)) **Semester - 1**
Type of Course	Core Courses
Prerequisite	Basic knowledge of English
Course Objective	1. Enhance reading, writing, listening, and speaking skills in English. 2. Develop an understanding of the cultural and historical context of English-speaking regions. 3. Foster analytical thinking and the ability to interpret and evaluate English texts. 4. Gain confidence in expressing ideas and opinions effectively in both written and oral forms. 5. Explore and appreciate various literary genres and styles in English literature.

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks			
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	**Total Marks**
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	**Fundamentals of grammar** Parts of Speech (Noun, Pronoun, Adjective, Verb, Adverb, Conjunction, Preposition, Interjection) Article Tense: Application of tenses with respect to time, All tenses & their	11	25
2	**Fundamentals of grammar** Forming of Sentences & Clauses, "WH's Concepts,Understanding, Sentences, Punctuation I, Degree of comparison I (Positive, Comparative & Superlative), Tenses (Introduction & Usage)	12	25
3	**Self improvement , Analyzing the body language** Self Confidence, Self Management Body gestures, Analyzing body languages, Do's and Don'ts, Impacts of body language	11	25
4	**Fundamentals of grammar** Modal Verbs, Auxilaries, Vocabulary (Roots, Prefix, Sufix, Homonyms, Synonyms & Antonyms)	11	25
	Total	45	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 Enhance reading, writing, listening, and speaking skills in English.

CO2 Develop an understanding of the cultural and historical context of English-speaking regions.

CO3 Foster analytical thinking and the ability to interpret and evaluate English texts.

CO4 Gain confidence in expressing ideas and opinions effectively in both written and oral forms.

CO5 Explore and appreciate various literary genres and styles in English literature.

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

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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			
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	**Total Marks**
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 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	20
	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**	**95**

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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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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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			
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	**Total Marks**
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**	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

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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.

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 (TextBook)**
   By Abraham Silberschatz, Henry F. Korth and S. Sudharshan | Sixth Edition, Tata Mc Graw Hill, 2011
3. **An Introduction to Database Systems**
   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 knowledge of Math's	
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			
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	**Total Marks**
3	1	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	**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

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Reference Books

1. **Discrete Mathematics**
   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**
   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.

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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			
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	**Total Marks**
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 soft skill**	15	25
	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	**Habits**	15	25
	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**	15	25
	Meaning of personality, elements of personality Determents of personality Personal development plan		
4	**Self-management skill**	15	25
	Time management (planning, scheduling and meeting) Emotion and stress management SWOT analysis Etiquettes and manners Personal grooming (Appearance, Dressing)		
	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

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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 - 2**
Type of Course	Skill Enhancement Courses
Prerequisite	Basic knowledge of emergency response procedures and an understanding of disaster risk concepts.
Course Objective	1. Explain disaster management theory (cycle, phases, risk, crisis, emergency, disasters, resilience) 2. Compare hazards, disasters and associated natural phenomena and their interrelationships, causes and their effects - developing humanitarian Assistance before and after disaster 3. Compare anthropogenic hazards, disasters and associated activities and their interrelationships of the subsystems - Green House Effect, Global warming, Causes and their effects and development of humanitarian assistance before and after disaster 4. Apply knowledge about existing global frameworks and existing agreements and role of community in successful Disaster Risk Reduction. 5. Remember the different laws and policies regarding disaster management.

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks			
Lecture	Tutorial	Lab	Credit	SEE	CIA	LAB	Total Marks
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	**Disasters in India - An Overview**	15	25
	Introduction, Definition, Disasters not new to Mankind, Disasters – Global Scenario, Vulnerability Profile of India, Climate Profile, Cause and Effect of Disasters, Types of Disasters		
2	**Institutional Framework**	20	35
	Evolution of Disaster Management in India, Disaster Management during British Administration and Post-Independence, Emergence of Institutional Arrangement in India, Organization and Structure of Disaster Management, Disaster Management Framework, Present Structure for Disaster Management in India, Disaster Management Act, 2005, Different committees and authority associated with disaster management.		
3	**Prevention and Mitigation; Preparedness and Response**	10	15
	Introduction, Prevention and Mitigation; Preparedness and Response regarding different disasters		
4	**Policy and Guidelines**	15	25
	Introduction, National Policy on Disaster Management (NPDM), National Plan on Disaster Management, Focus and Objectives of Guidelines, Management of Droughts, National Action Plan on Climate Change, Rules notified under the Disaster Management Act, 2005		

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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 Explain disaster management theory (cycle, phases, risk, crisis, emergency, disasters, resilience)

CO2 Compare hazards, disasters and associated natural phenomena and their interrelationships, causes and their effects - developing humanitarian Assistance before and after disaster.

CO3 Compare anthropogenic hazards, disasters and associated activities and their interrelationships of the subsystems - Green House Effect, Global warming, Causes and their effects and development of humanitarian assistance before and after disaster.

CO4 Apply knowledge about existing global frameworks and existing agreements and role of community in successful Disaster Risk Reduction.

CO5 Remember the different laws and policies regarding disaster management.

Reference Books

1. **Disaster Management (TextBook)**
   By Harsh K. Gupta | Universities Press, Pub. Year 2003
2. **Disaster Management**
   By K. Palanivel J. Saravanavel S. Gunasekaran | Allied Publishers Pvt. Ltd

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Course	Bachelor of Science in Information Technology (B.Sc. (IT)) **Semester - 3**
Type of Course	Core Courses
Prerequisite	Proficiency in the language of instruction (usually English) and a basic understanding of academic writing conventions.
Course Objective	1. Clarity and Precision: Develop the ability to express complex ideas clearly and concisely. 2. Research Proficiency: Acquire skills in conducting and citing academic research effectively. 3. Critical Thinking: Enhance critical analysis and argumentation skills in writing. 4. Citation and Referencing: Master proper citation and referencing formats, such as APA or MLA. 5. Academic Integrity: Promote ethical writing practices and avoid plagiarism in academic work.

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks			
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	**Total Marks**
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	**Academic & research writing**	10	25
	Introduction; Importance of academic writing; Basic rules of academic writing, English in academic writing I & II; Styles of research writing.		
2	**Plagiarism**	12	25
	Introduction: Tools for the detection of plagiarism; Avoiding plagiarism.		
	Literature review: Introduction, Source of literature; Process of literature review, Online literature databases; Literature management tools, referencing and citations		
3	**Report**	11	25
	Report writing for an event, CV writing, Job Application, Types of letters- Business letters, Cover letter.		
4	**E-Mails**	11	25
	Memo, Notice, Agenda, Minutes of Meeting, Business correspondence, How to write emails- do's and don'ts		
	Total	44	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 Clarity and Precision: Develop the ability to express complex ideas clearly and concisely.

CO2 Research Proficiency: Acquire skills in conducting and citing academic research effectively.

CO3 Critical Thinking: Enhance critical analysis and argumentation skills in writing.

CO4 Citation and Referencing: Master proper citation and referencing formats, such as APA or MLA.

CO5 Academic Integrity: Promote ethical writing practices and avoid plagiarism in academic work.

Reference Books

1. **Academic Writing, Anti- Plagiarism And Citations (TextBook)**
   By Vinod Kumar Kanvaria | Shipra Publications

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Course	Bachelor of Science in Information Technology (B.Sc. (IT))	**Semester - 3**
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			
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	**Total Marks**
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	**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 Security		
	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)**
   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 - 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			
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	**Total Marks**
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 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.

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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	The goal of this course is to provide students with an understanding of basic concepts in the theory of computation. At the end of this course students will: understand key mechanisms in design of operating systems modules understand process management, concurrent processes and threads, memory management, virtual memory concepts, deadlocks compare performance of processor scheduling algorithms produce algorithmic solutions to process synchronization problems use modern operating system calls such as Linux process and synchronization libraries practice with operating system concepts such as process management, synchronization, networked processes and file systems

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks			
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	**Total Marks**
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 OS**	10	25
	Introduction: What is an OS?, Evolution Of OS, OS Services, Types Of OS, Concepts of OS, Different Views Of OS, Process Management: Process, Process Control Block, Process States, Threads, Types of Threads, Multithreading		
2	**Deadlock**	10	25
	Inter-process Communication: Race Conditions, Critical Section, Mutual Exclusion, Hardware Solution, Strict Alternation , Peterson's Solution, Semaphores, Event Counters, Monitors, Message Passing, Classical IPC Problems: Reader's & Writer Problem, Dining Philosopher Problem etc, Scheduling, Scheduling Algorithms, Deadlock: Deadlock Problem, Deadlock Characterization, Deadlock Detection, Deadlock recovery, Deadlock avoidance: Banker's algorithm, Deadlock Prevention.		
3	**Memory Management**	10	25
	Paging: Principle Of Operation, Page Allocation, H/W Support For Paging, Multiprogramming With Fixed partitions, Segmentation, Swapping, Virtual Memory: Concept		
4	**Input Output Management**	10	25
	Principles Of Input / Output H/W : I/O Devices, Device Controllers, Direct Memory Access, Principles Of I/O S/W :Goals Of The I/O S/W, Interrupt Handler, Device Driver, Device Independent I/O Software Disks : RAID levels, Disks Arm ,Scheduling Algorithm, Error Handling.		

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Total	**40**	**100**

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy

Level	Remembrance	Understanding	Application	Analyze	Evaluate
Weightage	20	30	15	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.

Course Outcomes

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

CO1 Understand key mechanisms in design of operating systems modules

CO2 Understand process management, concurrent processes and threads, memory management, virtual memory concepts, deadlocks

CO3 Compare performance of processor scheduling algorithms.

CO4 Analyze different IPC problems and its solutions.

CO5 Implement shell script programming

Reference Books

1. **Operating System by Tanenbaum (TextBook)**
   By Tanenbaum | Pearson publication

List of Practical

1. WAP to find scheduling algorithms of :- FCFS, SJF,Priority,Round Robin
2. WAP to find scheduling fitted algorithms of :- First Fit,Netxt Fit, Best Fit, Worst Fit
3. Show any 10 Unix commands
4. Install Linux OS in your desktop and show commands that are used in Linux OS.
5. WAP to show page replacement algorithm.

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Course	Bachelor of Science in Information Technology (B.Sc. (IT))	**Semester - 3**
Type of Course	Core Courses	
Prerequisite	05070306-T - INTERNET AND WEB TECHNOLOGY(T)	
Course Objective	1. Develop dynamic web application using PHP and MySQL 2. Develop Web application with files and forms 3.Understand Joomla and can work with Joomla components	

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

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.

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.

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4	**Introduction to Object Oriented Programming With PHP and Error Handling**	**15**	**25**

Course Content

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

Sr.	Topics	T	W
	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**

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

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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	Discipline Specific Elective Courses	
Prerequisite	05070409-T - MACHINE LEARNING ALGORITHMS(T)	
Course Objective	1. Define the concepts of Artificial Intelligence and their uses. 2. Explain the importance of knowledge representation in AI systems. 3. Understand the basics of probabilistic reasoning, including probability and Bayes' theorem. 4.Understand the different stages of NLP, including syntactic and semantic analysis, discourse, and pragmatic processing. 5.Understand the different stages of NLP, including syntactic and semantic analysis, discourse, and pragmatic processing.	

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks			
Lecture	Tutorial	Lab	Credit	SEE	CIA	LAB	Total Marks
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.

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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.

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	Discipline Specific Elective Courses
Prerequisite	Basic knowledge of cyber security and their concepts.
Course Objective	1. Analyze fundamentals of Cyber Law. 2. Discuss IT Act & its Amendments. 3. Relate Cyber laws with security incidents. 4. Understand the legal and ethical responsibilities of security researchers. 5. Gain a comprehensive understanding of cyber laws, regulations, and legal frameworks at national and international levels.

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks			
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	**Total Marks**
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	35
	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**	**100**

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.

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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.

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.

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Course	Bachelor of Science in Information Technology (B.Sc. (IT)) **Semester - 3**
Type of Course	Discipline Specific Elective Courses
Prerequisite	13990503-T - PYTHON
Course Objective	1. To extract valuable insights, patterns, and knowledge from raw data 2. To learn from data and make predictions or decisions based on patterns and relationships discovered in that data

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks			
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	**Total Marks**
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.

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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

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.

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

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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			
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	**Total Marks**
4	0	2	5	70	30	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	**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			
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	**Total Marks**
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 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

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.

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).

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			
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	**Total Marks**
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** 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	15	25
2	**The Reference Model and Topology** 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	15	25
3	**Transmission Media & Network Components** Transmission Media: Guided Media and Unguided media Network Components: Hub ,Switches, Routers ,Bridge, NIC, Repeater, Gateway, Network software, Wired Network, Wireless Networks Network command	15	25
4	**IP Protocol and Network Applications** 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).	15	25
	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			
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	**Total Marks**
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	**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

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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			
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	**Total Marks**
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

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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			
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	**Total Marks**
3	0	2	4	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 Artificial Neural Networks** Biological Neurons; Neural Networks, Artificial Neural Networks, Activation Functions, Training Methods, Supervised and Unsupervised Learning	10	25
2	**Introduction to Machine Learning** Different types of Learning, Hypothesis Space, Inductive Bias, Evaluation, Cross-Validation, Linear Regression, Decision Trees, K-nearest Neighbour, Collaborative Filtering, Dimensionality Reduction Technique	15	25
3	**Logistic Regression and Support Vector Machine** Logistic Regression, Support Vector Machine, Maximum Margin with Noise, Nonlinear SVM and Kernel Function, SVM	15	25
4	**Advanced Learning methods and Clustering** Introduction to Clustering, K- means Clustering, Agglomerative Hierarchical Clustering, Semi-Supervised, Reinforcement Learning, Deep Learning	15	25
	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			
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	**Total Marks**
3	0	2	4	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 Penetration Testing and Pen Testing** 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	10	25
2	**Information Gathering and Reconnaissance** 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	15	25
3	**Scanning and Enumeration** 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	20	30
4	**Web Application Testing** 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	15	20
	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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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			
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	**Total Marks**
3	0	2	4	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 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

Course	Bachelor of Science in Information Technology (B.Sc. (IT))	**Semester - 5**
Type of Course	Core Courses	
Prerequisite	05070202-T - DATABASE MANAGEMENT SYSTEM	
Course Objective	1. Understand the development of applications using Programming Language of SQL. 2.Understand the uses the database file and need for create & manage files. 3.Use different types of physical implementation of database to manage transactions.	

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks			
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	**Total Marks**
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	**Basic Data base Management System Architecture**	15	25

History of Data base Systems DBMS structure, DBMS Applications, File System , View of Data ,Data Abstraction , Data base Users and Administrator, Transaction Management , Storage Manager the Query Processor,

Need of ER diagrams Database design and ER diagrams, Beyond ER Design Entities, Attributes and Entity sets, Additional features of ER Model, Concept Design with the ER Model ,Conceptual Design for Large enterprises

2	**Relational Database Management System**	10	25

Introduction to the Relational Model, Relationships and Relationship sets, Integrity Constraint Over relations, Enforcing Integrity constraints, Querying relational data, Logical data base Design, Introduction to Views, altering of Table, Relational Algebra, Selection and projection set operations, renaming, Joins, Division, Examples of Algebra overviews, Relational calculus, Tuple relational Calculus, Domain relational calculus, Expressive Power of Algebra and calculus

3	**Introduction to PL/SQL**	25	30

Form of Basic SQL Query, Examples of Basic SQL Queries, Introduction to Nested Queries, Correlated Nested Queries Set, Comparison Operators, Aggregative Operators, NULL values, Comparison using NULL values, Logical connectivity's Impact on SQL Constructs, Outer Joins, Disallowing NULL values, Complex Integrity Constraints in SQL Triggers and Active databases, Schema refinement , Problems Caused by redundancy, Decompositions, Problem related to decomposition, Reasoning about FDS, Dependency preserving Decomposition, Schema refinement in Data base Design, Multi valued Dependencies

4	**Transaction Processing**	10	20

Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for serializability, Lock Based Protocols, Timestamp Based Protocols, Validation Based Protocols Multiple Granularity, Recovery and Atomicity, Log Based Recovery, Recovery with Concurrent Transactions, Buffer Management, Failure with loss of nonvolatile storage, Advance Recovery systems, Remote Backup systems

Total	**60**	**100**

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy

Level	Remembrance	Understanding	Application	Analyze	Evaluate	Create
Weightage	20	20	20	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

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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 development of applications using Programming Language of SQL.

CO2 Understand the uses the database file and need for create & manage files.

CO3 Use different types of physical implementation of database to manage transactions

CO4 Use different types of physical implementation of database and understand ER diagram.

CO5 Exceute complex SQL queries

Reference Books

1. **SQL/PLSQL,The Programming Language of ORACLE (TextBook)**
   By Ivan Bayross | BPB Publication
2. **Database Systems using ORACLE**
   By Nilesh shah | PHI Publication
3. **SQL and Relational Theory (TextBook)**
   By C.J.Date | O'Reilly, 2009

List of Practical

1. Create PL/SQL block to perform arithmetic operations.
2. Implement PL/SQL programs using Control Structure.
3. Implement PL/SQL program using CURSOR.
4. Implement PL/SQL program using Exception Handling.
5. Implement user defined procedures and Function using PL/SQL blocks.
6. Implement various Triggers.
7. Practice on Functional Dependencies.
8. Create stored procedure
9. Practice on Normalization using various Normal Forms.
10. Practice on Transaction Processing.

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Course	Bachelor of Science in Information Technology (B.Sc. (IT)) **Semester - 3**
Type of Course	Core Courses
Prerequisite	05070307-T - OBJECT ORIENTED PROGRAMMING WITH C++(T)
Course Objective	This course covers the basics and advanced Python programming to harness its potential for modern computing requirements.

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks			
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	**Total Marks**
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 Python**	**15**	**35**
	The basic elements of python, Branching Programs, Control Structures, Strings and Input, Iteration		
	Functions, Scoping and Abstraction Functions and scoping, Specifications, Recursion, Global variables, Modules, Files, System Functions and Parameters		
2	**Structured Types, Mutability and Higher-Order Functions**	**10**	**25**
	Strings, Tuples, Lists and Dictionaries, Lists and Mutability, Functions as Objects		
	Testing, Debugging, Exceptions and Assertions Types of testing – Black-box and Glass-box, Debugging, Handling Exceptions, Assertions		
3	**Classes and Object-Oriented Programming**	**10**	**25**
	Abstract Data Types and Classes, Inheritance, Encapsulation and Information Hiding		
	Simple Algorithms and Data structures Search Algorithms, Sorting Algorithms, Hash Tables		
4	**Advanced Topics I**	**10**	**25**
	Regular Expressions – REs and Python, Plotting using PyLab, Networking and Multithreaded Programming – Sockets, Threads and Processes, Chat Application		
	Advance Topics II Security – Encryption and Decryption , Classical Cyphers, Graphics and GUI Programming – Drawing using Turtle, Tkinter and Python, Other GUIs		
	Total	**45**	**110**

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy

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

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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 Learn basic programming concepts such as function, control structures and Branching Statements in python.

CO2 Understand Object Oriented programming approaches.

CO3 Learn about various structured types.

CO4 Understand the use of Testing, Debugging, Exceptions and Assertions.

CO5 Compare different sorting and searching Algorithms. Develop, Test and deploy GUI based application using Python.

Reference Books

1. **Core Python Programming (TextBook)**
   By R. Nageswara Rao, | dreamtech
2. **Fundamentals of Python – First Programs**
   By Kenneth A. Lambert | CENGAGE Publication

List of Practical

1. Develop programs to understand the control structures of python
2. Develop programs to learn different types of structures (list, dictionary, tuples) in python
3. Develop programs to learn concept of functions scoping, recursion and list mutability.
4. Develop programs to understand working of exception handling and assertions
5. Develop programs for data structure algorithms using python – searching, sorting and hash tables.
6. Develop programs to learn regular expressions using python.
7. Develop chat room application using multithreading.
8. Learn to plot different types of graphs using PyPlot.
9. Implement classical ciphers using python.
10. Draw graphics using Turtle.
11. Develop programs to learn GUI programming using Tkinter.

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Course	Bachelor of Science in Information Technology (B.Sc. (IT)) **Semester - 5**
Type of Course	Core Courses
Prerequisite	02080401-T - SOFTWARE ENGG.
Course Objective	1. Discuss Software Devlopment Life Cycle and its importance 2. Develop some basic level of software architecture 3. Understanding the concept and Importance of Software Project Management. 4.Diffrerentiate between Various Testing Technique 5.Compare different Software Devlopment Process Models.

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks			
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	**Total Marks**
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 Object Oriented Analysis and Design**	10	25
	Object Oriented Fundamental, Objects, Classes, Object oriented design process, Importance of modeling, Principles of modeling, Object oriented modeling concepts, Analysis & Design		
2	**Introduction to UML**	10	10
	Concept of UML, Basic building blocks of UML, Mechanism in UML, Architecture, SDLC in UML		
3	**Structural Modeling**	15	30
	Notations, Terminology, Relationships, Common Mechanisms,Examples, Diagrams – "Class Diagram, Object Diagram, Package Diagram, Composite Structure Diagram, Sequence Diagram		
4	**Behavior Modeling, Architectural**	25	35
	Notations, Terminology, Relationships, Common Mechanism,Examples, Diagrams – "Activity Diagram, Interaction Diagram, Use case Diagram". Notations, Terminology, Relationships, Common Mechanism, Examples, Diagrams – "Component Diagram, Deployment, Diagram		
	Total	60	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 Outcomes

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

CO1 Discuss Software Devlopment Life Cycle and its importance

CO2 Develop some basic level of software architecture

CO3 Understanding the concept and Importance of Software Project Management.

CO4 Diffrerentiate between Various Testing Technique

CO5 Compare different Software Devlopment Process Models.

Reference Books

1. **Software Engineering (TextBook)**
   By RajibMall | Pearson
2. **Object Orient Modeling and Design with UML**
   By Blaha and James Rumbaugh. | Pearson

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Course	Bachelor of Science in Information Technology (B.Sc. (IT))	**Semester - 5**
Type of Course	Core Courses	
Prerequisite	05070303.-P - OPERATING SYSTEM(P)	
Course Objective	1. To provide an introduction to the fundamental principles of cryptography and network security. 2. To study various Encryption techniques. 3. To illustrate how to prevent, detect, and mitigate security threats against the network.	

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks			
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	**Total Marks**
3	0	2	4	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 cryptography and Network Security**	15	25
	What is security, Security Trends,Security Trends, OSI security Architecture ,Security Attacks, Security services, Security Mechanisms, A model for network Security, Security Attack and Security Threat, Malicious Software Hacking, Cryptography, Digital Signature, Firewall and its types, User identification and authentication, Other security measures		
2	**Encryption Techniques**	15	25
	Symmetric Cipher model, Substitution Techniques, Transposition Techniques Steganography,Block Cipher Principles, Feistel Cipher, DES (Data Encryption Standard), Strength of DES,Advance Encryption Standard(AES)More on Symmetric ciphers- Block cipher mode of operation.		
3	**Public Key Cryptography and RSA**	15	25
	Principles of public key cryptosystems, Applications for public key Cryptosystems, RSA Algorithm, Security of RSA, Key Management- Distribution of Public keys, Distribution of secret keys using public key cryptography, Diffie-Hellman Key Exchang		
4	**Message Authentication and E- Mail Security**	15	25
	Authentication Requirements, Authentication Functions, MAC (Message Authentication Codes), Hash Functions, Birthday attacks, Secure Hash Algorithm (SHA),PGP and its operation, S/MIME, MIME and its Functionality, IP Security, Applications, Architecture, Services, Security Association, AH, ESP, Web security threats		
	Total	**60**	**100**

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy

Level	Remembrance	Understanding	Application	Analyze	Evaluate	Create
Weightage	20	20	15	15	15	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 Understand different types of cryptographic algorithm.

CO2 Explain Basic concept of Message Authentication Codes

CO3 Enable the students to learn fundamental concepts of computer security and cryptography and utilize these techniques in computing systems.

CO4 Understand management issues and algorithm

CO5 Describe importance of RSA Algorithm and Asymmetric cryptography.

Reference Books

1. **Cryptography and Network Security (TextBook)**
   By William Stalling | Pearson
2. **"A Course in Number Theory and Cryptography" (TextBook)**
   By Neal Koblitz

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Course	Bachelor of Science in Information Technology (B.Sc. (IT))	**Semester - 5**
Type of Course	Discipline Specific Elective Courses	
Prerequisite	05070503-T - PYTHON(T)	
Course Objective	1. Understand the fundamental concepts of machine learning and its various types. 2. Understand the importance of model selection and validation techniques. 3. Understand linkage-based clustering algorithms and the k-means algorithm. 4. Understand Bayesian learning principles and their application in machine learning. 5. Evaluate and apply feature selection, transformation, and learning techniques for enhancing model performance	

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks			
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	**Total Marks**
3	0	2	4	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**	**15**	**30**
	Machine Learning, Different types of machine learning, Linear regression, Logistic regression, Gradient Descent: Introduction, Stochastic Gradient Descent, Subgradient, Stochastic Gradient Descent for risk minimization, Support Vector Machines: Hard SVM, Soft SVM, Optimality conditions, Duality, Kernel trick, Implementing Soft SVM with Kernels		
2	**Decision Trees**	**15**	**30**
	Decision Tree algorithms, Random forests, Neural Networks: Feedforward neural networks, Expressive power of neural networks, SGD and Backpropagation Model selection and validation: Validation for model selection, k-fold cross-validation, Training validation-Testing split, Regularized loss minimization		
3	**Unsupervised Learning and Generative Models**	**15**	**20**
	Nearest Neighbour : k-nearest neighbour, Curse of dimensionality Clustering: Linkage-based clustering algorithms, k-means algorithm, Spectral clustering, Dimensionality reduction: Principal Component Analysis, Random projections, Compressed sensing.		
4	**Generative Models**	**15**	**20**
	Maximum likelihood estimator, Naive Bayes, Linear Discriminant Analysis, Latent variables and Expectation-maximization algorithm, Bayesian learning, Feature Selection and Generation: Feature selection, Feature transformations, Feature learning.		
	Total	**60**	**100**

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy

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

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Course Outcomes

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

CO1 Understand the fundamental concepts of machine learning and its various types.

CO2 Understand the importance of model selection and validation techniques.

CO3 Understand linkage-based clustering algorithms and the k-means algorithm.

CO4 Understand Bayesian learning principles and their application in machine learning.

CO5 Evaluate and apply feature selection, transformation, and learning techniques for enhancing model performance

Reference Books

1. **"Machine Learning" (TextBook)**
   By Mitchell Tom | Tata Mcgraw- Hill

List of Practical

1. Predicting car fuel efficiency based on engine size using linear regression.
2. Classifying customer churn in a telecom dataset using logistic regression.
3. Identifying handwritten digits (0-9) using SVM on the MNIST dataset.
4. Predicting loan approval decisions using a decision tree.
5. Predicting loan approval decisions using a decision tree.
6. Clustering news articles into topics based on their content.
7. Reducing image dimensions for face recognition using PCA.
8. Categorizing sentiment of movie reviews using a Naive Bayes classifier
9. Segmenting an image into foreground and background using Gaussian Mixture Model (GMM).
10. Handwriting recognition using a feedforward neural network.

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Course	Bachelor of Science in Information Technology (B.Sc. (IT))	**Semester - 5**
Type of Course	Discipline Specific Elective Courses	
Prerequisite	149901308-T - CYBER LAW AND ETHICAL HACKING	
Course Objective	1. Explain cyber forensics, digital detective and various processes, policies and procedures. 2. Describe relevant legislation and codes of ethics. 3. Apply E-discovery, guidelines and standards, E-evidence, tools and environment.	

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks			
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	**Total Marks**
3	0	2	4	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 Cyber Security Tools** Overview of cyber security tools and their importance, Introduction to open source software and its role in cyber security	10	15
2	**Vulnerability Assessment and Scanning** Introduction to Nmap for network scanning,Identifying open ports, services, and potential vulnerabilities,Conducting vulnerability scans and interpreting results	15	35
3	**Penetration Testing** Introduction to Kali Linux and Metasploit,Conducting penetration tests on simulated environments,Reporting and documenting findings from penetration tests.	10	15
4	**Web Application & Endpoint Security** Introduction to OWASP ZAP for web application scanning,Identifying common web vulnerabilities (e.g., XSS, SQL injection),Exploring application security best practices,OWASP Zap, Wapiti, ClamAV, pfSense	15	15
5	**Exploring Google Hacking database and social engineering Toolkit** GHDB, a collection of search queries exploration and set tool usage discover potentially vulnerable web applications and services using Google's search engine.	10	20
	Total	**60**	**100**

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Course Outcomes

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

CO1 Learn how to identify and exploit security vulnerabilities ethically and responsibly.

CO2 Explore techniques for securing information systems against common threats and attacks.

CO3 Develop hands-on skills in ethical hacking, including penetration testing, vulnerability assessment, and network reconnaissance.

CO4 Explore the ethical implications of hacking and cybersecurity practices.

CO5 Understand security best practices and principles for protecting computer systems, networks, and data.

Reference Books

1. **Cyber security: Understanding cybercrimes, computer forensics and legal perspectives. (TextBook)**
   By Godbole, Nina, Belapure, Sunit (2011) | New Delhi: Wiley India
2. **Network forensics: Tracking hackers through cyberspace**
   By Davidoff, S. (2012) | New Delhi: Pearson education India
3. **Cyber Laws and IT Protection (TextBook)**
   By Chander, H. (2012) | New Delhi: Prentice Hall India Learning Private Limited

List of Practical

1. Installation and configuration of kali linux or RHEL
2. Working on information gathering tools
3. Working on social engineering toolkit.
4. Working on network and vulnerability scanning tools.
5. Working on htrack and website ripper copier.
6. VA assessment using openVas, Nexpose
7. VA assessment using Nessus Essentials.
8. Peneteration Testing using Metasploit.
9. Working on ghdb search query.
10. Owasp zap tool.

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Course	Bachelor of Science in Information Technology (B.Sc. (IT)) **Semester - 5**
Type of Course	Discipline Specific Elective Courses
Prerequisite	13990503-T - PYTHON
Course Objective	1. To extract valuable insights, patterns, and knowledge from raw data 2. To learn from data and make predictions or decisions based on patterns and relationships discovered in that data.

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks			
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	**Total Marks**
3	0	2	4	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 Data Analysis and Visualization** 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.	10	15
2	**Data Analysis Techniques** 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.	15	25
3	**Data Visualization Tools** Introduction to data visualization tools **Working on different library & tools -** 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	20	30
4	**Advanced Data Analysis and Visualization** 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	15	30
	Total	60	100

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy

Level	Remembrance	Understanding	Analyze	Evaluate	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 Explain the concept of visualization in the processing and analysis of data

CO2 Develop visualization methods and visualization systems using software applications

CO3 Perform creative work in the field of visualization

CO4 Evaluating the effectiveness of visualizations for specific data, task, and user types.

CO5 Apply different techniques of visulaization get results.

Reference Books

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

List of Practical

1. Write a program for data processing using pandas library of python to convert one dimensional array of tuple and dictionary to series.
2. Write a program for data processing using pandas library of python to convert two dimensional array to dataframe and exploring different commands of dataframe.
3. Creating dataframe, reading, writing, accessing, filtering, sorting, adding and modifying data in dataframe for data analysis.
4. Data processing for sorting, adding and modifying data in data frame for data analysis.
5. Grouping and aggregating, merging and joining, reshaping data, handling dates and times for data analysis.
6. Basic data visualization using matplotlib library of python library bar charts, line graphs, scatter plots.
7. Basic data visualization using plotly library of python library bar charts, line graphs, scatter plots.
8. Basic and Customised data visualizations: colors, labels, axes, and legends and Creating interactive visualizations (filters, tooltips, drill-downs) using different library of python
9. Time series analysis and forecasting.
10. Data exploration of real world projects.

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Course	Bachelor of Science in Information Technology (B.Sc. (IT))	**Semester - 5**
Type of Course	Discipline Specific Elective Courses	
Prerequisite	05070409-T - MACHINE LEARNING ALGORITHMS(T)	
Course Objective	1. To explain the fundamentals of deep learning, Convolution neural network. 2. Explore Convolutional Neural Networks (CNNs) in depth, including their architecture and applications. 3. Examine various problem domains in machine learning, such as classification, detection, segmentation, and generation. 4. Apply transfer learning methods to enhance model performance and efficiency. 5. Utilize hyperparameter optimization techniques to fine-tune models for improved results	

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks			
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	**Total Marks**
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 Deep Learning**	**10**	**20**
	Overview of machine learning and deep learning ,History and evolution of neural networks, Biological inspiration: the neuron and neural networks, Types of neural networks (Feedforward, Recurrent, Convolutional)		
2	**Neural Network Fundamentals**	**15**	**25**
	Perceptrons and activation functions, Backpropagation and gradient descent, Weight initialization and regularization, Loss functions for various tasks (classification, regression)		
3	**Deep Learning Frameworks**	**10**	**15**
	Introduction to deep learning libraries (TensorFlow, PyTorch), Setting up development environments, Building and training simple neural networks		
4	**Natural Language Processing (NLP) with Deep Learning, Advanced Topics in Deep Learning**	**25**	**40**
	Text data preprocessing, Word embeddings (Word2Vec, GloVe), Recurrent Neural Networks for NLP, Sequence-to-sequence models for machine translation Generative Adversarial Networks (GANs),Reinforcement Learning basics,Transfer learning and fine-tuning pre-trained models,Ethical considerations in deep learning		
	Total	**60**	**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 Outcomes

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

CO1 To explain the fundamentals of deep learning, Convolution neural network

CO2 Explore Convolutional Neural Networks (CNNs) in depth, including their architecture and applications.

CO3 Examine various problem domains in machine learning, such as classification, detection, segmentation, and generation.

CO4 Apply transfer learning methods to enhance model performance and efficiency.

CO5 Utilize hyperparameter optimization techniques to fine-tune models for improved results.

Reference Books

1. **"Deep Learning" (TextBook)**
   By Ian Goodfellow | Third Edit on, O'reily Media, 2012
2. **Dive into Deep Learning**
   By Yoshua Bengio | (1 ed.), Corwin, 2019

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Course	Bachelor of Science in Information Technology (B.Sc. (IT))	**Semester - 5**
Type of Course	Discipline Specific Elective Courses	
Prerequisite	05070311- T - CYBER CRIME AND CYBER LAW	
Course Objective	1. Explain cyber forensics, digital detective and various processes, policies and procedures. 2. Describe relevant legislation and codes of ethics. 3. Apply E-discovery, guidelines and standards, E-evidence, tools and environment	

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks			
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	**Total Marks**
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 Forensics Concepts**	10	15
	Cyber Forensics science, computer forensics, and digital forensics. Computer Crime: Criminalistics as it relates to the investigative process, analysis of cyber-criminalistics area, holistic approach to cyber-forensics. Legal Aspects of Digital Forensics: IT Act 2000, amendment of IT Act 2008.		
2	**Cyber Incident Response and Analysis**	15	35
	Incident- Response Methodology, Cyber Crime Scene Analysis: Discuss the various court orders etc., methods to search and seizure electronic evidence, retrieved and un-retrieved communications, Discuss the importance of understanding what court documents would be required for a criminal investigation.		
3	**Cyber Incident Handling**	25	30
	Image Capturing, Authenticating Evidence, Hidden Data Extraction, Data Storage, File Systems, Recovery of deleted files, Cracking Passwords, Internet Crime Investigations, Web Attack Investigations. **Network Forensics & Analysis -** Network Forensics: open-source security tools for network forensic analysis, requirements for preservation of network data. Mobile Forensics: mobile forensics techniques, mobile forensics tools.		
4	**Cyber Forensics Audit**	10	20
	Cyber Forensics: Prepare a case audit, begin an investigation, understand computer forensics workstations and software, conduct an investigation, complete a audit, Critique a case audit.		
	Total	**60**	**100**

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy

Level	Remembrance	Understanding	Analyze	Evaluate
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 Explain cyber forensics, digital detective and various processes, policies and procedures.

CO2 Describe relevant legislation and codes of ethics.

CO3 Apply E-discovery, guidelines and standards, E-evidence, tools and environment

CO4 Analyze logs and network traffic data to detect and respond to security incidents and breaches.

CO5 Provide expert testimony and reports in legal proceedings related to cybercrimes and data breaches.

Reference Books

1. **Network forensics: Tracking hackers through cyberspace. (TextBook)**
   By Davidoff, S. (2012). | New Delhi: Pearson education India
2. **Cyber security: Understanding cybercrimes, computer forensics and legal perspectives.**
   By Godbole, Nina, Belapure, Sunit (2011) | New Delhi: Wiley India
3. **Cyber Laws and IT Protection (TextBook)**
   By Chander, H. (2012) | New Delhi: Prentice Hall India Learning Private Limited

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Course	Bachelor of Science in Information Technology (B.Sc. (IT))	**Semester - 5**
Type of Course	Discipline Specific Elective Courses	
Prerequisite	05070411-T - DATA WAREHOUSING AND MINING TOOLS	
Course Objective	1. Identify Big Data and its Business Implications. 2. Manage Job Execution in Hadoop Environment. 3. Develop Big Data Solutions using Hadoop Eco System 4. Analyze Infosphere BigInsights Big Data Recommendations. 5. Apply Machine Learning Techniques using R.	

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks			
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	**Total Marks**
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 BIG DATA AND HADOOP**	15	25
	Types of Digital Data, Introduction to Big Data, Big Data Analytics, History of Hadoop, Apache Hadoop, Analysing Data with Unix tools, Analyzing Data with Hadoop, Hadoop Streaming, Hadoop Echo System, IBM Big Data Strategy, Introduction to Infosphere Big Insights and Big Sheets.		
2	**HDFS (Hadoop Distributed File System)**	17	30
	The Design of HDFS, HDFS Concepts, Command Line Interface, Hadoop file system interfaces, Data flow, Data Ingest with Flume and Scoop and Hadoop archives, Hadoop I/O: Compression, Serialization, Avro and File-Based Data structures.		
3	**Map Reduce**	15	25
	Anatomy of a Map Reduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution, Map Reduce Types and Formats, Map Reduce Features. Partitioning (Centroid) Clustering, K-Means Clustering, and Example of centroid-based clustering.		
4	**Data Analytics with R**	13	20
	Machine Learning: Introduction, Supervised Learning, Unsupervised Learning, Collaborative Filtering. Big Data Analytics with BigR.		
	Total	**60**	**100**

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy

Level	Remembrance	Understanding	Analyze	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 Identify Big Data and its Business Implications.

CO2 Manage Job Execution in Hadoop Environment.

CO3 Develop Big Data Solutions using Hadoop Eco System

CO4 Analyze Infosphere BigInsights Big Data Recommendations.

CO5 Apply Machine Learning Techniques using R.

Reference Books

1. **Hadoop: The Definitive Guide (TextBook)**
   By Tom White | Third Edit on, O'reily Media, 2012
2. **Big Data Analytics**
   By Seema Acharya, Subhasini Chellappan | Wiley 2015

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Course	Bachelor of Science in Information Technology (B.Sc. (IT)) **Semester - 6**
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			
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	**Total Marks**
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**	15	30

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

2	**ACTIVITY PLANNING**	15	25

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

3	**MONITORING AND CONTROL**	15	25

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

4	**MANAGING PEOPLE AND ORGANIZING TEAMS**	15	20

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

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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	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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