

**AC: DATE**

**Item No. \_\_\_\_\_**



**Chikitsak Samuha's**



**Sir Sitaram and Lady Shantabai Patkar College of Arts and Science and V.P. Varde  
College of Commerce and Economics, S. V. Road, Goregaon (West), Mumbai – 400104.**

**AUTONOMOUS**

Reaccredited with 'A+ Grade' by NAAC (3rd Cycle), with an institutional score of 3.53, ISO 9001-2015, Best College 2016-17, DBT STAR COLLEGE SCHEME Awardee, RUSA 2.0 Awardee, India's Education Excellence Award 2018: Berkshire Media LLC, USA, Ranked 45<sup>th</sup> in the EW India Private Autonomous College Rankings 2020-21

**SYLLABUS FOR**

**PROGRAMME – B.Sc. Information Technology (PUSIT)**

**YEAR –FIRST YEAR**

**SEMESTERS – I AND II**

**Choice based Credit System (CBCS)**

**Syllabus to be implemented with effect from the academic year 2022 – 2023**

## PROGRAMME SPECIFIC CODE: PUSIT

### Programme Specific Outcomes

<b>PSO</b>	A Student completing Bachelor's Degree in Science Programme with information technology subject will be able to learn the principles of algorithms, flowcharts and pseudo code, implement the modules and build logic of problem definitions, analyze ways to design a complete program and give the solution to the respective problem by forming the base of programming in imperative programming and learn essentials of mathematics needed for information technology. Students will get well worded with the basic knowledge of the Information technology domain and will be able to enable confident communication.
PSO 1	To make students think analytically, creatively and critically in developing robust, extensible and highly maintainable technological solutions to simple and complex problems
PSO 2	To make them apply their knowledge and skills to be employed and excel in the field of Information Technology as a professional and/or to continue their education in the massive field of Information Technology and/or related postgraduate programmes.
PSO 3	To make them capable of managing complex and real time industrial projects with consideration of the human, financial and environmental factors.
PSO 4	To make them work effectively as a part of a team to achieve a common stated goal.
PSO5	To adhere to the highest standards of ethics, including relevant industry and organizational codes of conduct.

## **PEDAGOGY**

1. Teachers impart their knowledge to the students using different mediums such as Blackboard, PowerPoint presentations, Videos, Audios, and Animations, to give the students an insight and to extend their horizons of understanding through better visualizations of the concepts.
2. Our teachers propose and discuss questions in the classrooms, to engage the students into actively participating in the interactions and helping the students groom their communication skills and gain confidence to put forth their views, ideas and to share their knowledge with other peers.
3. Students are given Case Studies to expand their area of interests and knowledge in the field of research and analysis with respect to different topics. Case Studies help inculcate research culture and motivate students into further selecting their domain of interest.
4. Presentation of Case Studies and Research Papers is included to provide them a platform to showcase skills and mannerisms to present their research work.
5. Regular Assignments and Mini Projects are given to the students helping them summarize and revise the topics being covered in the curriculum.

## INDEX

Semester I			Semester II		
Course No.	Course Title	Credits	Course No.	Course Title	Credits
PUSIT101T	Programming Principles with C	2	PUSIT206T	Object Oriented Programming with C++	2
PUSIT101P	Programming Principles with C Practical	2	PUSIT206P	Object Oriented Programming with C++ Practical	2
PUSIT102T	Digital Logic and Applications	2	PUSIT207T	Fundamentals of Micro Processor and Microcontrollers	2
PUSIT102P	Digital Logic and applications Practical	2	PUSIT207P	Fundamentals of Micro Processor and Microcontrollers Practical	2
PUSIT103T	Fundamentals of Database Management Systems	2	PUSIT208T	Web Applications Development	2
PUSIT103P	Fundamentals of Database Management Systems Practical	2	PUSIT208P	Web Applications Development Practical	2
PUSIT104T	Computational Logic and Discrete Structure	2	PUSIT209T	Numerical Methods	2
PUSIT104P	Computational Logic and Discrete structure Practical	2	PUSIT209P	Numerical Methods Practical	2
PUSIT105T	Technical Communication Skills	2	PUSIT210T	Green IT	2
PUSIT105P	Technical Communication Skills Practical	2	PUSIT210P	PL/SQL Practical	2

**Semester I**  
**Programming Principles with C**

Course Title	Programming Principles with C
Course Code	PUSIT101T
Total Number of Lectures	60
Credits	2
Introduction	<ul style="list-style-type: none"><li>• This course focuses on helping students to develop the logical ability of the student.</li><li>• Basic concepts to be cleared using suitable examples.</li><li>• Different approach towards the problem.</li><li>• To handle the errors and find suitable solutions.</li><li>• Debugging the code.</li></ul>
Course Outcomes	<p>At end of the course, students will be able to:</p> <ul style="list-style-type: none"><li>• Learn the basic principles of programming.</li><li>• Develop logic using algorithms and flowchart.</li><li>• Acquire the information about data types.</li><li>• Understanding of input and output functions.</li><li>• Enhance advanced concepts using programs.</li></ul>
Units	Given Below

## UNITS

Unit Number	CONTENT	NUMBER OF LECTURES
I	<b>Introduction:</b> Algorithms, History of C, Structure of C Program. Program Characteristics, Compiler, Linker and preprocessor, pseudo code statements and flowchart symbols, Desirable program characteristics. Program structure. Compilation and Execution of a Program, C Character Set, identifiers and keywords, data types and sizes , constants and its types, variables, Character and character strings, typedef, typecasting	12L
II	<b>Type of operators:</b> Arithmetic operators, relational and logical operators, Increment and Decrement operators, assignment operators, the conditional operator, Assignment operators and expression, Precedence and order of Evaluation Block Structure, Initialization, C Preprocessor <b>Control Flow:</b> Statements and Blocks, If-Else, Else-If, Switch, Loops- While and For Loops- Do-while, Break and Continue, Goto and Labels	12L
III	<b>Functions and Program Structure:</b> Basics of functions. User defined and Library functions, Function parameters, Return values, Recursion External variables, Scope Rules, Standard Input and Output, Formatted Output-printf() and Formatted Input- scanf(), Line Input and Output, Error Handling- StdErr and Exit, Header Files.	12L
IV	<b>Pointer and Arrays</b> Pointer and Addresses, Pointer and Function Arguments, Pointer and Arrays, Address Arithmetic, Character Pointers and Functions, Pointer Arrays: Pointers and Functions, Multidimensional Array, Command-line Arguments, Pointers to Functions, Dynamic memory allocation.	12L
V	<b>Structures:</b> Basics of structures, Structures and Functions, Arrays of Structures, Pointers to Structures, Unions, Bit-fields, <b>File management in C:</b> Defining and Opening file, Closing a file, Input / Output operations on file, Error handling in C, Random access to files, Command line arguments.	12L

## Programming Principles with C Practical

### Practical code PUSIT101P and No. of Credits 2

Sr. No.	Title of the Practical
1	a. Write an algorithm and draw flowchart for Area of circle. b. Write an algorithm and draw flowchart to print the given no. is even or odd. c. Write an algorithm and draw flowchart to print 1 to 10 numbers. d. Write an algorithm and draw flowchart for sum of 1 to 5 numbers. e. Write an algorithm and draw flowchart to compute the addition of digits of a given number.
2	a. Write a program using a while loop to reverse the digits of a number. b. Write a program to calculate the factorial of a given number. c. Write a program to find the roots of quadratic equations. d. Write a program to print the Fibonacci series..
3	a. Write a program in C to check entered character vowel or consonant b. Write a program to C program to print day name of week using switch-case. c. Write a program to read three values from the keyboard and print out the largest of them without using if statement.
4	a. Write a program to print the pattern of asterisks as shown below : * * * * * * * * * * b. Write a program to print the pattern of asterisks as shown below : * * * * * * * * * * * * * * * c. Write a program to print Floyd's Triangle.
5	a. Write a program to print the area of the square using a function. b. Write a program using a recursive function. c. Write a program to square root, abs() value using function. d. Write a program using a goto statement.
6	a. Write a program to print roll no and names of 10 students using an array. b. Write a program to read a matrix of size m*n. c. Write a program to sort the elements of an array in ascending or descending order.
7	a. Write a program to extract the portion of a character string and print the extracted part. b. Write a program to find if the given string is palindrome or not. c. Write a program using strlen(), strcmp() function.
8	a. Write a program to display the values using different data types and its address using a pointer. b. Write a program to perform addition and subtraction using a pointer.

9	a. Write a program to copy the contents of the file from one file into other. b. Write a program to print the structure using <ul style="list-style-type: none"> <li>• Title</li> <li>• Author</li> <li>• Subject</li> <li>• Book ID</li> </ul> Print the details of two students.
10	a. Create a mini project on “Bank management system” . The program should be menu driven.

### Reading List (Books)

1. Brian W.Kernighan and Denis M. Ritchie. *Programming Language* .2<sup>nd</sup> Edition. PHI,1988.
2. K R Venugopal. *Mastering C*. 6<sup>th</sup> Edition. TataMcGRAWHill,2007.
3. Byron Gottfried. *Programming with C* . 2<sup>nd</sup> Edition. TataMcGRAWHill,1996.
4. Yashwant P. Kanetkar. *Let us C* .BPP publication.
5. E.Balagurusamy. *Programming in ANSI C*. 7<sup>th</sup> Edition. TataMcGRAWHill, 1982.

### List of Weblink Resources

1. C Programming Tutorial

<https://www.javatpoint.com/c-programming-language-tutorial>



## Digital Logic and Applications

Course Title	Digital Logic and Applications
Course Code	PUSIT102T
Total Number of Lectures	60
Credits	2
Introduction	<ul style="list-style-type: none"><li>• This course focuses on introducing the basics of logic in digital electronics as an entry level course.</li><li>• To interpret and assess number systems and the conversions of number systems</li><li>• To analyze the boolean expressions and reduce the expression to the minimum.</li><li>• To design simple logic circuits using tools such as Boolean Algebra and Karnaugh Mapping.</li><li>• To understand the state of a memory cell and its types using flip-flops.</li><li>• To create simple digital systems using counters, registers etc.</li></ul>
Course Outcomes	<p>At end of the course, students will be able to:</p> <ul style="list-style-type: none"><li>• Apply number conversion techniques in real digital systems</li><li>• Solve boolean algebra expressions</li><li>• Derive and design logic circuits by applying minimization in SOP and POS forms</li><li>• Design and develop Combinational and Sequential circuits</li><li>• Understand and develop digital applications.</li></ul>
Units	Given Below

## UNITS

Unit Number	CONTENT	NUMBER OF LECTURES
I	<b>Digital Systems and Binary numbers</b> Introduction to Number systems, Positional Number systems, Conversions (converting between bases), Non positional number systems, Unsigned and Signed binary numbers, Binary Codes, Number representation and storage in computer systems. <b>Logic gates and Logic Circuits</b> Basic and Universal Gates	12L
II	<b>Boolean algebra and Gate level minimization</b> Introduction, Postulates of Boolean Algebra, Two Valued Boolean Algebra, Principle of Duality, Basic Theorems of Boolean Algebra, Boolean Functions and their Representation, Gate-Level Minimization (Simplification of Boolean Function), Quine-McCluskey Method, Review questions.	12L
III	<b>Combinational logic</b> Introduction, Analysis and Design Procedure for Combinational Logic Circuits, Types of Combinational Circuit, Review Questions	12L
IV	<b>Sequential circuits</b> Introduction, Latch, Flip-Flops, Registers, Counters, Review Questions	12L
V	<b>Applications</b> Bit Arithmetic and Logic unit, Carry lookahead generator, Binary Multiplication and Division algorithm, Booth's multiplication algorithm	12L

## Digital Logic and Applications Practical

### Practical code PUSIT102P and No. of Credits 2

Sr. No.	Title of the Practical
1	<b>Study of basic gates and Universal gates</b> <ul style="list-style-type: none"><li>a. To verify the truth tables of OR, AND, NOR, NAND, EX-OR, EX-NOR gates</li><li>b. To study IC 7400, 7402, 7404, 7408, 7432, 7486, 74266</li><li>c. To implement and verify NAND and NOR as Universal gates</li></ul>
2	<b>Study of Boolean expressions</b> <ul style="list-style-type: none"><li>a. To verify De Morgan's laws</li><li>b. Implement the given expression using a minimum number of gates.</li><li>c. Implement the given expression using a minimum number of ICs.</li></ul>
3	<b>Design of Combinational Circuits using K-maps</b> <ul style="list-style-type: none"><li>a. Design and implement combinational circuits for the given problem/problems using minimization techniques of K-maps.</li></ul>
4	<b>Design and implement code converters</b> <ul style="list-style-type: none"><li>a. Design the circuit and implement Binary to gray code converter</li><li>b. Design the circuit and implement Gray to Binary code converter</li><li>c. Design the circuit and implement Binary to BCD code converter</li><li>d. Design the circuit and implement Binary to XS-3 code converter</li></ul>
5	<b>Implement Adder and Subtractor circuits</b> <ul style="list-style-type: none"><li>a. Design the circuit and implement Half Adder and Full Adder</li><li>b. Design the circuit and implement BCD Adder, XS-3 Adder , Binary Subtractor</li></ul>
6	<b>Design and implement Arithmetic circuits</b> <ul style="list-style-type: none"><li>a. Design and implement 2-by-2 bit multiplier</li></ul>
7	<b>Implement Encoders and Decoders</b> <ul style="list-style-type: none"><li>a. Design and implement 8: 3 encoder</li><li>b. Design and implement 3:8 decoder</li></ul>
8	<b>Multiplexers and Demultiplexers</b> <ul style="list-style-type: none"><li>a. Design and Implement 4:1 multiplexer</li><li>b. Design and Implement 1:4 demultiplexer</li><li>c. Study IC 74151 8: 1 multiplexer and implement the expression</li><li>d. Study IC 74138 3: 8 decoder and implement the expression</li></ul>

9	<b>Study of Flipflops and Counters</b> <ol style="list-style-type: none"> <li>Study of IC's 7473, 7474, and 7476</li> <li>Design a 3-bit ripple/ synchronous counter using IC 7473 and required gates</li> </ol>
10	<b>Design of Shift Registers</b> <ol style="list-style-type: none"> <li>Design of Shift registers using IC 7474</li> <li>Implementation of digits using seven segment displays</li> </ol>

### Reading List (Books)

1. Sonali Singh. *Digital Logic Design*. 1<sup>st</sup> Edition. BPB publications, 2015.
2. Subir Kumar Sarkar, Asish Kumar De, Souvil Sarkar. *Fundamentals of Digital Electronics and Logic Design*. 1<sup>st</sup> Edition. Pan Stanford Publishing, 2014.
3. Anil K Maini. *Digital Electronics Principles, Design and Applications*. 1<sup>st</sup> Edition. Wiley, 2007.
4. Charles H Roth, Jr. , Larry L. *Fundamentals of Logic Design*. 7<sup>th</sup> Edition. Cengage Learning, 2014.
5. Donald P Leach, Albert Malvino, Goutam Saha, *Digital Principles and Applications*. 8<sup>th</sup> Edition. TMH, 2015.

### List of Weblink Resources

1. Digital Logic and Applications tutorial :  
<https://www.javatpoint.com/digital-electronics>

## Fundamentals of Database Management Systems

Course Title	Fundamentals of Database Management Systems
Course Code	PUSIT103T
Total Number of Lectures	60
Credits	2
Introduction	<ul style="list-style-type: none"><li>• This course focuses on introduction to fundamentals of database management systems, with an emphasis on how to organize, maintain and retrieve - efficiently, and effectively - information from a DBMS.</li></ul>
Course Outcomes	<p>At end of the course, students will be able to:</p> <ul style="list-style-type: none"><li>• Define and describe the fundamental elements of relational database management systems.</li><li>• To relate the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL.</li><li>• Design ER-models to represent simple database application scenarios.</li><li>• Transform the ER-model to relational tables, populate relational database and formulate SQL queries on data.</li><li>• Improve the database design by normalization.</li><li>• Understand basic database storage structures and access techniques: file and page organizations, indexing methods and hashing.</li></ul>
Units	Given Below

## UNITS

Unit Number	CONTENT	NUMBER OF LECTURES
I	<b>Database system-</b> concept and Architecture, Relational model and Relational database constraints. Relational Algebra.	12L
II	<b>Conceptual modelling and database design:</b> Data modelling using the Entity Relationship model (ER).The enhanced entity relationship model. Relational database design by ER and EER model. Practical database design methodology and use of UML diagrams.	12L
III	<b>Database Design theory and normalization:</b> Basics of functional dependencies and normalization for relational databases. Relational database design and further dependencies.	12L
IV	Introduction to SQL , Complex queries, triggers, views, joining database tables and schema modification. Query Processing and optimization. File structure, hashing and indexing	12L
V	<b>Transaction management and concurrency control and recovery:</b> Introduction to transaction processing concepts and theory. Concurrency control technique. Database recovery technique.	12L

## Fundamentals of Database Management Systems

### Practical code PUSIT103P and No. of Credits 2

Sr. No.	Title of the Practical
1	<b>Draw E-R diagram and convert entities and relationships to relation table for a given scenario</b> a. Bank b. College
2	<b>Write relational algebra queries for a given set of relations</b>
3	<b>Defining data</b> a. Using CREATE statement b. Using ALTER statement c. Using DROP statement d. Using TRUNCATE statement e. Using RENAME statement
4	<b>Manipulating data</b> a. Using INSERT statement b. Using UPDATE statement c. Using DELETE statement d. Using SELECT statement
5	<b>Creating and managing the tables</b> a. Creating table with constraints : NOTNULL, UNIQUE, PRIMARY KEY , FOREIGN KEY
6	<b>Restricting and sorting data</b> a. Using DISTINCT, IN, AS, SORT, LIKE, ISNULL, OR b. Using Group By, Having clause, Order By clause
7	<b>Aggregate and Mathematical functions:</b> a. AVG, MIN, MAX, SUM, COUNT b. ABS, SQRT, ROUND, TRUNCATE, SIGN, POWER, MOD, FLOOR, CEIL
8	<b>Views and Joins: For a given set of relation tables perform the following</b> a. Creating view b. Dropping view c. Selecting from a view
9	<b>Database trigger</b> a. Using CREATE OR REPLACE TRIGGER
10	<b>Index</b> a. Create index b. Drop index

### Reading List (Books)

1. Ramez Elmasri, Shamkant B Navathe. *Fundamentals of Database systems*. 6th Edition. Pearson.
2. Carlos Coronel, Steven Morris, Peter Rob. *Database Systems: Design implementation and management*. 9<sup>th</sup> Edition. Cengage Learning, 2010.

### List of Weblink Resources

## Computational Logic and Discrete Structures

Course Title	Computational Logic and Discrete Structures
Course Code	PUSIT104T
Total Number of Lectures	60
Credits	2
Introduction	<ul style="list-style-type: none"><li>• This Course will provide students with an overview of discrete mathematics. Students will learn about topics such as logic and proofs, sets and functions, recursion, graph theory, trees and other important discrete math concepts.</li></ul>
Course Outcomes	<p>At end of the course, students will be able to:</p> <ul style="list-style-type: none"><li>• Use logical notation</li><li>• Perform logical proofs</li><li>• Apply recursive functions and solve recurrence relations</li><li>• Use graphs and trees</li><li>• Apply basic and advanced principles of counting</li><li>• Define sets and Relations</li><li>• Calculate discrete probabilities.</li></ul>
Units	Given Below



## UNITS

Unit Number	CONTENT	NUMBER OF LECTURES
I	<p><b>Set Theory</b>            Introduction, Sets and Elements, Subsets, Venn Diagrams, Set Operations, Algebra of Sets, Duality, Finite Sets, Counting Principle, Classes of Sets, Power Sets, Partitions, Mathematical Induction</p> <p><b>Relations</b>            Introduction, Product Sets, Relations, Pictorial Representations of Relations, Composition of Relations, Types of Relations, Closure Properties, Equivalence Relations, Partial Ordering Relations</p>	12L
II	<p><b>Functions and Algorithms</b>            Introduction, Functions, One-to-One, Onto, and Invertible Functions, Mathematical Functions, Exponential and Logarithmic Functions, Sequences, Indexed Classes of Sets, Recursively Defined Functions, Cardinality, Algorithms and Functions, Complexity of Algorithms</p> <p><b>Probability</b>            Introduction, Sample Space and Events, Finite Probability Spaces, Conditional Probability, Independent Events, Independent Repeated Trials, Binomial Distribution, Random Variables, Chebyshev's Inequality, Law of Large Numbers</p>	12L
III	<p><b>Techniques of Counting</b>            Introduction, Basic Counting Principles, Mathematical Functions, Permutations, Combinations, the Pigeonhole Principle, The Inclusion–Exclusion Principle, Tree Diagrams</p> <p><b>Advanced Counting Techniques, Recursion</b>            Introduction, Combinations with Repetitions, Ordered and Unordered Partitions, Inclusion–Exclusion Principle Revisited, Pigeonhole Principle Revisited, Recurrence Relations, Linear Recurrence Relations with Constant Coefficients, Solving Second-Order Homogeneous Linear Recurrence Relations, Solving General Homogeneous Linear Recurrence Relations</p>	12L

IV	<p><b>Graph Theory</b>  Introduction, Data Structures,,Graphs and Multigraphs, Subgraphs, Isomorphic and Homeomorphic Graphs, Paths, Connectivity, Traversable and Eulerian Graphs, Bridges of Königsberg, Labeled and Weighted Graphs, Complete, Regular, and Bipartite. Graphs, Tree Graphs, Planar Graphs, Graph Colorings, Representing Graphs in Computer Memory, Graph Algorithms, Traveling-Salesman Problem, Solved Problems</p> <p><b>Directed Graphs</b>  Introduction, Directed Graphs, Basic Definitions, Rooted Trees, Sequential Representation of Directed Graphs, Warshall's Algorithm, Shortest Paths, Linked Representation of Directed Graphs, Graph Algorithms: Depth-First and Breadth-First Searches, Directed Cycle-Free Graphs, Topological Sort, Pruning Algorithm for Shortest Path</p>	12L
V	<p><b>Binary Trees</b>  Introduction, Binary Trees,, Complete and Extended Binary Trees, Representing Binary Trees in Memory, Traversing Binary Trees, Binary Search Trees, Priority Queues, Heaps, Path Lengths, Huffman's Algorithm, General (Ordered Rooted) Trees Revisited</p> <p><b>Ordered Sets and Lattices</b>  Introduction, Ordered Sets, Hasse Diagrams of Partially Ordered Sets, Consistent Enumeration, Supremum and Infimum, Isomorphic (Similar) Ordered Sets, Well-Ordered Sets, Lattices 346 Bounded Lattices, Distributive Lattices, Complements, Complemented Lattices</p>	12L

## Computational Logic and Discrete Structures Practical

Practical code PUSIT104P and No. of Credits 2

Sr. No.	Title of the Practical
1	<b>Set Theory</b> a. Inclusion Exclusion principle. b. Power Sets c. Mathematical Induction
2	<b>Functions and Algorithms</b> a. Recursively defined functions b. Cardinality c. Polynomial evaluation d. Greatest Common Divisor
3	<b>Probability Theory 1</b> a. Sample space and events b. Finite probability spaces c. Equiprobable spaces d. Addition Principle
4	<b>Probability Theory 2</b> a. Conditional Probability b. Multiplication theorem for conditional probability c. Independent events d. Repeated trials with two outcomes
5	<b>Counting 1</b> a. Sum rule principle b. Product rule principle c. Factorial d. Binomial coefficients
6	<b>Counting 2</b> a. Permutations b. Permutations with repetitions c. Combinations d. Combinations with repetitions
7	<b>Counting 3</b> a. Ordered partitions b. Unordered partitions
8	<b>Graph Theory</b> a. Paths and connectivity b. Minimum spanning tree c. Isomorphism
9	<b>Directed Graphs</b> a. Adjacency matrix b. Path matrix
10	<b>Recurrence relations</b> a. Linear homogeneous recurrence relations with constant coefficients b. Solving linear homogeneous recurrence relations with constant coefficients c. Solving general homogeneous linear recurrence relations

## Reading List (Books)

1. Seymour Lipschutz, Marc Lipson. *Discrete Mathematics, Schaum's Outlines Series*. 3<sup>rd</sup> Edition. Tata McGraw Hill, 2007.
2. Sussana S. Epp. *Discrete Mathematics with Applications*. 5<sup>th</sup> Edition. Cengage Learning, 2018.
3. Kenneth H. Rosen. *Discrete Mathematics and its Applications*. 8<sup>th</sup> Edition. Tata McGraw Hill, 2019
4. B Kolman, RC Busby, S Ross. *Discrete mathematical structures*. PHI.
5. Liu. *Discrete structures*. Tata McGraw Hill.

## List of Weblink Resources

Computational Logic and Discrete Structures Tutorials

<https://vulms.vu.edu.pk/Courses/MTH202/Downloads/2Discrete%20Mathematics%20with%20Applications%20by%20Susanna%20S.%20Epp%20-%204th%20Edition.pdf> (Reference Book)

<https://www.javatpoint.com/discrete-mathematics-tutorial>

[https://www.tutorialspoint.com/discrete\\_mathematics/index.htm](https://www.tutorialspoint.com/discrete_mathematics/index.htm)

<https://www.geeksforgeeks.org/discrete-mathematics-tutorial/>

## Technical Communication Skills

Course Title	Technical Communication Skills
Course Code	PUSIT105T
Total Number of Lectures	60
Credits	2
Introduction	<ul style="list-style-type: none"><li>• This course focuses on recognizing the importance of various types of communication in technical set up. To understand the dynamics in different forms of formal communication. To learn about active listening and the art of giving presentations and interviews. To learn the art of business writing and ethics in business communication across functional areas. To evaluate, analyze and interpret technical data.</li></ul>
Course Outcomes	<p>By the end of this course, students would be able to:</p> <ul style="list-style-type: none"><li>• Analyze, synthesize and utilize the process and strategies from delivery to solving communication problems.</li><li>• Learn the communication methodologies at workplace and learning about importance of team collaboration.</li><li>• Learn about different technical communication such as presentations and interviews.</li><li>• Understand and apply the art of written communication in writing reports, proposals.</li><li>• Ground rules of ethical communication and MIS.</li><li>• Understand the functions of graphs, maps, charts.</li></ul>
Units	Given Below

## UNITS

Unit Number	CONTENT	NUMBER OF LECTURES
I	<p><b>Fundamentals of Technical Communication</b>            Introduction, The process of communication, Language as tool of communication, levels of communication, The flow of communication, Communication Networks, The importance of technical communication</p> <p><b>Barriers to communication</b>            Definition of Noise, classification of Barriers</p> <p><b>Non-verbal Communication</b>            Introduction, Definition, significance of nonverbal, forms of non -verbal communication, types of non-verbal communication.</p>	12L
II	<p><b>The Seven Cs of Effective Communication:</b>            Completeness, Conciseness, Consideration, Concreteness, Clarity, Courtesy, Correctness</p> <p><b>Conversations</b>            Introduction, Importance of Business conversion, Essential of Business conversion, Conversation Management</p> <p><b>Meeting and conferences</b>            Introduction, Purpose of Meeting, planning a meeting, Meeting Process, Leading effective meeting, Evaluating meeting, planning conference, teleconferencing</p> <p><b>Group Discussion and team presentation</b>            Introduction, Benefits of GD, Workplace GD guidelines, Functional and non functional roles in GD, Improving group performance, Assessment of group discussion ,Team presentation</p> <p><b>Email communication</b>            Introduction, Advantages of email, problems in email communication, Email etiquettes, Techniques of writing Effective Email</p>	12L
III	<p><b>Active Listening</b>            Introduction, Type of listening, Traits of good listener, Active vs Passive listening, Implication of effective listening</p> <p><b>Effective presentation Strategies</b>            Introduction, Defining purpose, Analyzing audience and Locale, Organizing contents, preparing outline, Visual Aids, Understanding Nuances of delivery, Kinesics</p> <p><b>Interview</b>            Introduction, objectives, types of interview, job interviews</p>	12L

IV	<p><b>Business writing</b> Introduction, Importance of written Business, Five main strategies of writing business messages</p> <p><b>Business correspondence</b> Business letter writing, common component of Business letter, Strategies for writing body of a letter, Types of Business letter, writing memos</p> <p><b>Business reports and proposal</b> What is a report? Steps in writing routine Business report, parts of report, corporate reports and Business proposals</p> <p><b>Careers and Resume</b> Introduction to career building, resume format, traditional, electronic and video resumes, sending resume, follow up letters and online recruitment process</p>	12L
V	<p><b>Communication across Functional areas</b> Financial communication, MIS</p> <p><b>Ethics in Business Communication</b> Ethical communication, Values, ethics and communication, ethical dilemmas facing manager, strategic approaches to corporate ethics</p> <p><b>Creating and Using Visual Aids</b> Object, Models, Handouts, Charts and Graphs, Text Visuals , Formatting Computer generated charts, graphs and visuals</p>	12L

## Communication Skills practical

Practical code PUSIT105P and No. of Credits 2

Sr. No.	Title of the Practical
1	<b>Use of word processing tools for communication.</b> a. Use of various tools like spell checker, header, footer etc. b. Make formal and informal letters, creating resumes. c. Designing brochures and flyers using templates in word.
2	<b>Designing brochures and flyers using templates in word.</b>
3	<b>Use of spreadsheet for data interpretation and data analysis.</b>
4	<b>Basic use of what if analysis using excel.</b>
5	<b>Visual Representation of data using excel – pie chart ,line chart, bar chart etc.</b>
6	<b>Summarization of data using pivot tables and charts in excel.</b>
7	<b>Use of presentation tools like PowerPoint for communication and presentation skills.</b>
8	a. Basic communication covering the following topics:- Meeting people, Asking Questions and Design of questionnaire. b. Using netiquettes in online mode of communication using Zoom / Google Meet / MS-Teams etc.
9	<b>Use of Mail etiquette for writing effective mails.</b>
10	a. Use of Mail merge and its features. b. Creating a profile using LinkedIn.

### Reading List (Books)

1. Meenakshi Raman and Prakash Singh. *Technical communication: principles and practices*. Oxford Higher Education.
2. Meenakshi Raman and Prakash Singh. *Business Communication*. 2<sup>nd</sup> Edition. Oxford Higher Education, 2006.
3. Herta Murphy, Herbert Hildebrandt, Jane Thomas. *Effective Business Communication*. 7<sup>th</sup> Edition. Tata McGraw Hill, 2008.
4. Aruna Koneru. "*Professional Communication*". Tata McGraw Hill. 2008.
5. James R. DiSanza Nancy J. Legge. *Business and Professional Communication Plans, Processes and Performance*. 4<sup>th</sup> Edition. Pearson Education.
6. Cole Nussbaumer Knaflic. *Storytelling with data-a data visualization guide for business professionals*. Wiley.



## **List of Weblink Resources**

1. Workplace communication : [https://en.wikipedia.org/wiki/Workplace\\_communication](https://en.wikipedia.org/wiki/Workplace_communication)
2. VerbalCommunication: <https://www.indeed.com/career-advice/career-development/how-to-improve-verbal-communication-skills>
3. Microsoft Word skills for Manager: <https://courses.lumenlearning.com/wm-businesscommunicationmgrs/chapter/microsoft-word/>
4. Microsoft Excel skills for business: <https://excelchamps.com/excel-skills/>
5. Video Training on Excel <https://support.microsoft.com/en-us/office/excel-video-training-9bc05390-e94c-46afa5b3-d7c22f6990bb>
6. Microsoft Powerpoint skills for Business: <https://business.tutsplus.com/articles/37-effective-powerpoint-presentation-tips--cms-25421>

## **Semester II**

## Object Oriented Programming with C++

Course Title	Object Oriented Programming
Course Code	PUSIT206T
Total Number of Lectures	60
Credits	2
Introduction	<ul style="list-style-type: none"><li>• The objective of introducing this course is to make students able to explain the difference between object oriented programming and procedural programming.</li><li>• This will also make students able to program using more advanced C++ features such as composition of objects, operator overloads, dynamic memory allocation, inheritance and polymorphism, file I/O, exception handling, etc.</li><li>• This will focus to build C++ classes using appropriate encapsulation and design principles</li><li>• This will help students to apply object oriented or non-object oriented techniques to solve bigger computing problems</li></ul>
Course Outcomes	<p>At end of the course, students will be able to:</p> <ul style="list-style-type: none"><li>• Understand the concept of OOPs, a feature of C++ language.</li><li>• Understand and apply various types of Data Types, Operators, Conversions while designing the program.</li><li>• Understand and apply the concepts of Classes &amp; Objects, friend function, constructors &amp; destructors in program design.</li><li>• Design &amp; implement various forms of inheritance, String class, calling base class constructors.</li><li>• Apply &amp; Analyze operator overloading, runtime polymorphism, Generic Programming.</li><li>• Analyze and explore various Stream classes, I/O operations and exception handling.</li></ul>
Units	Given Below

## UNITS

Unit Number	CONTENT	NUMBER OF LECTURES
I	<p><b>INTRODUCTION OF OBJECT-ORIENTED DESIGN:</b> Introduction, Objects, Class and Instance, Polymorphism, Inheritance, Object-Oriented Analysis , Finding the Objects ,Conceptual Modeling Requirements Model , Analysis Model, The Design Model, The Implementation Model , Test Model, Object Oriented Analysis and Design, The Evolution of Object Model, Object-Oriented Programming, Object-Oriented Design, Object-Oriented Analysis, Elements of Object Model ,The Role of OOAD in the Software Life Cycle, OOAD Methodologies, Grady Booch Approach,</p> <p><b>STARTING WITH C++:</b> C++ Overview, C++ Character Set, C++ Tokens, Variables, Counting Tokens, Data Types, Qualifiers, Range of Data Types, Your First C++ Program, Structure of a C++ Program, Styles of, Writing C++ Programs, Programming Examples</p> <p><b>FEATURES OF C++:</b> Introduction, Operators and Expressions, Declaring Constants, Type Conversion, Decision Making: An Introduction, Unconditional Branching Using Goto , Introduction to Looping</p> <p><b>OPERATORS AND REFERENCES IN C++:</b> Introduction, Scope Resolution Operator, Reference Variables, The Bool Data Type, The Operator New and Delete, Malloc Vs. New ,Pointer Member Operators</p>	12L
II	<p><b>FUNCTION IN C++:</b> Introduction ,Function Declaration/Prototyping ,The Main Function in C++,Recursion ,Call by Reference ,Call by Reference Vs Call by Address , Return by Reference ,Inline Function ,Function Overloading ,Function with Default Arguments</p> <p><b>CLASS AND OBJECTS IN C++ :</b> Working with Class, Structure in C++ ,Accessing Private Data Passing and Returning Object ,Array of Object ,Friend Function ,Static Class Members ,Constant Member Function</p> <p><b>WORKING WITH CONSTRUCTOR AND DESTRUCTOR:</b> Introduction, Constructor with Parameters, Implicit and Explicit Call to Constructor, Copy Constructor, Dynamic Initialization of Objects, Dynamic Constructor, Destructor</p> <p><b>WORKING WITH OPERATOR OVERLOADING:</b> Introduction, Operator Overloading with Binary Operator Overloading Assignment (=) Operator, Overloading Unary Operators, Overloading Using Friend Function, Rules of Operator Overloading, Type Conversion</p>	12L

III	<p><b>WORKING WITH INHERITANCE IN C++:</b> Introduction, Types of Inheritance, Public, Private and Protected Inheritance, Multiple Inheritance, Hierarchical Inheritance, Virtual Base Class, Constructor and Destructor in Inheritance, Containership</p> <p><b>POINTERS TO OBJECTS AND VIRTUAL FUNCTIONS:</b> Pointer to Objects, The This Pointer, What is Binding in C++? , Virtual Functions ,Working of a Virtual Function ,Rules for Virtual Function ,Pure Virtual Function and Abstract Class ,Object Slicing ,Some Facts about Virtual Function ,Virtual Destructor</p> <p><b>INPUT-OUTPUT AND MANIPULATORS IN C++:</b> Introduction, C++ Stream Classes, Unformatted Input/Output, Formatted Input /Output Operations, Manipulators</p>	12L
IV	<p><b>FILE HANDLING IN C++:</b> Introduction, File Streams, Opening and Closing a File, File Opening Modes Checking End of File, Random Access in File, Command Line Arguments, Working with Binary Mode Error Handling</p> <p><b>TEMPLATE PROGRAMMING:</b> Introduction , Function Template , Class Template</p> <p><b>EXCEPTION HANDLING IN C++ :</b> Introduction , Basics of Exception Handling , Exception Handling Mechanism , Programming Examples ,Exception Handling with Class Catching all Exceptions , Specifying Exception for a Function</p>	12L
V	<p><b>INTRODUCTION TO THE STANDARD TEMPLATE LIBRARY :</b> Introduction , Components of STL , Containers , Algorithms , Iterators ,Application of Container Classes Function Objects</p> <p><b>MANIPULATING STRINGS :</b>Introduction , Creating (string) Objects , Manipulating String Objects , Relational Operations, String Characteristics , Accessing Characters in Strings , Comparing and Swapping</p> <p><b>NEW FEATURES OF ANSI C++ STANDARD :</b> Introduction ,New Data Types , New Operators , Class Implementation , Namespace Scope , Operator Keywords ,New Keywords , New Headers</p>	12L

## Object Oriented Programming with C++ Practical

Practical code PUSIT206P and No. of Credits 2

Sr. No.	Title of the Practical
1	<p>a. Write a C++ program to create a simple calculator.</p> <p>b. Write a C++ program to convert seconds into hours, minutes and seconds.</p> <p>c. Write a C++ program to find the volume of a square, cone, and rectangle.</p>
2	<p>a. Write a C++ program to find the greatest of three numbers.</p> <p>b. Write a C++ program to find the sum of even and odd n natural numbers</p> <p>c. Write a C++ program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.</p>
3	<p>a. Write a C++ program using classes and object Student to print the name of the student, roll_no. Display the same.</p> <p>b. Write a C++ program for Structure bank employee to print name of the employee, account_no. &amp; balance. Display the same also display the balance after withdraw and deposit</p> <p>c. Write a C++ Program to design a class having a static member function named showcount() which has the property of displaying the number of objects created of the class.</p> <p>d. Write a Program to find Maximum out of Two Numbers using friend function. Note: Here one number is a member of one class and the other number is member of some other class.</p> <p>e. Write a C++ Program using copy constructor to copy data of an object to another object.</p> <p>f. Write a C++ Program to allocate memory dynamically for an object of a given class using class's constructor.</p>
4	<p>a. Write a C++ program to design a class representing complex numbers and having the functionality of performing addition &amp; multiplication of two complex numbers using operator overloading.</p> <p>b. Write a C++ program to overload new/delete operators in a class.</p> <p>c. Write a C++ program to access members of a STUDENT class using pointer to object members</p> <p>d. Write a C++ Program to generate Fibonacci Series by using Constructor to initialize the Data Members.</p> <p>e. Write a C++ Program to generate Fibonacci Series by using Constructor to initialize the Data Members.</p> <p>f. Write a C++ Program that illustrates single inheritance.</p> <p>g. Write a C++ Program that illustrates multiple inheritance.</p> <p>h. Write a C++ Program that illustrates multilevel inheritance.</p> <p>i. Write a C++ Program that illustrates Hierarchical inheritance.</p> <p>j. Write a C++ Program illustrating how the constructors are implemented and the order in which they are called when the classes are inherited. Use three classes named alpha, beta, gamma such that alpha, beta are base class and gamma is derived class inheriting alpha &amp; beta</p>

5	a. Write a C++ Program to design a student class representing student roll no. and a test class (derived class of student) representing the scores of the student in various subjects and sports class representing the score in sports. The sports and test class should be inherited by a result class having the functionality to add the scores and display the final result for a student.
6	a. Write a C++ program to maintain the records of a person with details (Name and Age) and find the eldest among them. The program must use this pointer to return the result.
7	a. Write a C++ program illustrating the use of virtual functions in class. b. Write a C++ program to design a class representing the information regarding digital library (books, tape: book & tape should be separate classes having the base class as media). The class should have the functionality for adding new item, issuing, deposit etc. the program should use the runtime polymorphism.
8	a. Write a C++ program to show conversion from string to int and vice-versa. b. Write a C++ program implementing basic operation of class ios i.e. setf, unsetf, precision etc. c. Write a C++ program to implement I/O operations on characters. I/O operations include inputting a string, Calculating length of the string, Storing the String in a file, fetching the stored characters from it, etc. d. Write a C++ program to copy the contents of one file to another. e. Write a C++ program to perform read/write binary I/O operation on a file (i.e. write the object of a structure/class to file).
9	a. Write a C++ program to implement the exception handling with multiple catch statements. b. Write a C++ program to implement the exception handling with rethrowing in Exception.
10	a. Write a C++ Program to create Simple calculator using a Class template. b. Write a C++ Program to get a maximum of two numbers using the Class template.

### Reading List (Books)

1. Hari Mohan Pandey. *Object-oriented Programming C++ Simplified* 1 st Edition. University Science Press, 2017.
2. E Balagurusamy. *Object Oriented Programming in C++*. 5 th Edition. Tata McGraw Hill, 2011.
3. Robert Lafore. *Object-Oriented Programming in C++*. 4 th Edition. ams, 2002
4. Bhushan Trivedi. *Programming with ANSI C++*. 2 nd Edition. Oxford University Press, 2012
5. Dorothy R. Kirk. *Demystified ObjectOriented Programming with C++*. 1 st Edition. Packt Publishing Lt, 2021
6. Behrouz A. Forouzan. Richard F. Gilberg. *C++ Programming: An Object-Oriented Approach*. 1 st edition. McGraw-Hill Education, 2020
7. Paul Deitel. Harvey Deitel. *C++ How to Program*. 10th Edition. Pearson Education, 2017

## **List of Weblink Resources**

1.Object Oriented Programming with C++:

<http://www.microlinkcolleges.net/elib/files/undergraduate/Information%20System/Object%20Oriented%20Programming%20with%20C++.pdf> (Reference Book)



## Fundamentals of Micro Processor and Microcontrollers

Course Title	Fundamentals of Micro Processor and Microcontrollers
Course Code	PUSIT207T
Total Number of Lectures	60
Credits	2
Introduction	<ul style="list-style-type: none"><li>● The objective of this course is to understand the basic concept of Micro Computer Systems</li><li>● To develop background knowledge in 8085 Microprocessor</li><li>● To write Assembly language Programs of 8085</li><li>● To understand the peripheral devices and interfacing to 8051 Micro Controller and design aspects of Micro Controller</li></ul>
Course Outcomes	<p>At end of the course, students will be able to:</p> <ul style="list-style-type: none"><li>● Understand the basic concepts of Micro Computer Systems</li><li>● Understand the architecture and hardware aspects of 8085</li><li>● Write assembly language programs in 8085</li><li>● Design elementary aspects of Micro Controller based systems</li><li>● Interfacing peripherals using Micro Controller</li></ul>
Units	Given Below

## UNITS

Unit Number	CONTENT	NUMBER OF LECTURES
I	<p><b>Microprocessor, microcomputers, and Assembly Language:</b> Microprocessor, Microprocessor Instruction Set and Computer Languages, From Large Computers to Single-Chip Microcontrollers, Applications.</p> <p><b>Microprocessor Architecture and Microcomputer System:</b> Microprocessor Architecture and its operation's, Memory, I/O Devices, Microcomputer System, Logic Devices and Interfacing, Microprocessor-Based System Application.</p> <p><b>8085 Microprocessor Architecture and Memory Interface:</b> Introduction, 8085 Microprocessor unit, 8085-Based Microcomputer, Memory Interfacing, Interfacing the 8085 Memory Segment.</p>	12L
II	<p><b>Interfacing of I/O Devices</b> Basic Interfacing concepts, Interfacing Output Displays, Interfacing Input Devices, Memory Mapped I/O, Testing and Troubleshooting I/O Interfacing Circuits.</p> <p><b>Introduction to 8085 Assembly Language Programming:</b> The 8085 Programming Model, Instruction Classification, Instruction, Data and Storage, Writing assembling and Execution of a simple program, Overview of 8085 Instruction Set, Writing and Assembling Program.</p> <p><b>Introduction to 8085 Instructions:</b> Data Transfer Operations, Arithmetic Operations, Logic Operation, Branch Operation, Writing Assembly Languages Programs, Debugging a Program.</p>	12L
III	<p><b>Programming Techniques With Additional Instructions:</b> Programming Techniques: Looping, Counting and Indexing, Additional Data Transfer and 16-Bit Arithmetic Instructions, Arithmetic Instruction Related to Memory, Logic Operations: Rotate, Logic Operations: Compare, Dynamic Debugging.</p> <p><b>Counters and Time Delays:</b> Counters and Time Delays, Illustrative Program: Hexadecimal Counter, Illustrative Program: zero-to-nine (Modulo Ten) Counter, Generating Pulse Waveforms, Debugging Counter and Time-Delay Programs.</p> <p><b>Stacks and Sub-Routines:</b> Stack, Subroutine, Restart, Conditional Call, Return Instructions, Advanced Subroutine concepts.</p> <p><b>Interrupts:</b> The 8085 Interrupt, 8085 Vectored and Non vectored Interrupts, Restart as S/W Instructions.</p>	12L

IV	<p><b>Micro Controllers:</b>  Embedded Systems and general purpose computer systems, history, classifications, applications and purpose of embedded systems.</p> <p><b>Embedded Hardware:</b>  Memory map, i/o map, interrupt map, processor family, external peripherals, memory – RAM , ROM, types of RAM and ROM, memory testing, CRC ,Flash memory.</p> <p><b>Peripherals:</b>  Control and Status Registers, Device Driver, Timer watch Timer</p> <p><b>The 8051 Microcontrollers:</b>  Microcontrollers and Embedded processors, Overview of 8051 family.8051 Microcontroller hardware, Input/output pins, Ports, and Circuits, External Memory.</p> <p><b>8051 Programming in C:</b>  Data Types and time delay in 8051 C, I/O Programming, Logic operations, Data conversion Programs.</p>	12L
V	<p><b>Designing Embedded System with 8051 Microcontroller:</b>  Factors to be considered in selecting a controller, why 8051 Microcontroller, Designing with 8051.</p> <p><b>Programming embedded systems:</b>  structure of embedded program, infinite loop, compiling, linking and debugging.</p> <p><b>Design And Development:</b>  Embedded system, development Environment – IDE, types of file generated on cross compilation, Embedded Product Development cycle and Trends in embedded Industry</p>	12L

**Fundamentals of Micro Processor and Microcontrollers Practical**  
**Practical code PUSIT207P and No. of Credits 2**

Sr. No.	Title of the Practical
1	<b>Perform the following Operations related to memory locations.</b> a. Store the data byte 32H into memory location 4000H. b. Exchange the contents of memory locations 2000H and 4000H
2	<b>Simple assembly language programs.</b> a. Subtract two 8-bit numbers. b. Subtract the 16-bit number in memory locations 4002H and 4003H from the 16-bit number in memory locations 4000H and 4001H. The most significant eight bits of the two numbers are in memory locations 4001H and 4003H. Store the result in memory locations 4004H and 4005H with the most significant byte in memory location 4005H. c. Find the 1's complement of the number stored at memory location 4400H and store the complemented number at memory location 4300H. d. Find the 2's complement of the number stored at memory location 4200H and store the complemented number at memory location 4300H.
3	<b>Packing and unpacking operations.</b> a. Pack the two unpacked BCD numbers stored in memory locations 4200H and 4201H and store result in memory location 4300H. Assume the least significant digit is stored at 4200H. b. Two digit BCD number is stored in memory location 4200H. Unpack the BCD number and store the two digits in memory locations 4300H and 4301H such that memory location 4300H will have lower BCD digit.
4	<b>Register Operations.</b> a. Write a program to shift an eight bit data four bits right. Assume that data is in register C. b. Program to shift a 16-bit data 1 bit left. Assume data is in the HL register pair c. Write a set of instructions to alter the contents of flag register in 8085. d. Write a program to count number of 1's in the contents of D register and store the count in the B register.

5	<p><b>Multiple memory locations.</b></p> <p>a. Calculate the sum of series of numbers. The length of the series is in memory location 4200H and the series begins from memory location 4201H.</p> <p>a. Consider the sum to be 8 bit number. So, ignore carries. Store the sum at memory location 4300H.</p> <p>b. Consider the sum to be 16 bit number. Store the sum at memory locations 4300H and 4301H</p> <p>b. Multiply two 8-bit numbers stored in memory locations 2200H and 2201H by repetitive addition and store the result in memory locations 2300H and 2301H.</p> <p>c. Divide 16 bit number stored in memory locations 2200H and 2201H by the 8 bit number stored at memory location 2202H. Store the quotient in memory locations 2300H and 2301H and remainder in memory locations 2302H and 2303H.</p>
6	<p><b>Calculations with respect to memory locations.</b></p> <p>a. Write a program to sort given 10 numbers from memory location 2200H in the ascending order.</p> <p>b. Calculate the sum of series of even numbers from the list of numbers. The length of the list is in memory location 2200H and the series itself begins from memory location 2201H. Assume the sum to be 8 bit number so you can ignore carries and store the sum at memory location 2 Sample problem:</p>
7	<p><b>Assembly programs on memory locations</b></p> <p>a. A list of 50 numbers is stored in memory, starting at 6000H. Find number of negative, zero and positive numbers from this list and store these results in memory locations 7000H, 7001H, and 7002H respectively</p> <p>b. Write an assembly language program to generate fibonacci number.</p> <p>c. Program to calculate the factorial of a number between 0 to 8.</p>
8	<p>Design and develop a reprogrammable embedded computer using 8051 microcontrollers and to show the following aspects.</p> <p>a. Programming</p> <p>b. Execution</p> <p>c. Debugging</p>
9	<p>a. Configure timer control registers of 8051 and develop a program to generate a given time delay.</p> <p>b. Port I / O: Use one of the four ports of 8051 for O/P interfaced to eight LED's. Simulate binary counter (8 bit) on LED's</p> <p>c. To interface 8 LEDs at Input-output port and create different patterns.</p> <p>d. To demonstrate timer working in timer mode and blink LED without using any loop delay routine.</p>

10	<b>Using FlashMagic</b> a. To demonstrate the procedure for flash programming for reprogrammable embedded system board using Flash Magic b. To demonstrate the procedure and connections for multiple controllers programming of same type of controller with same source code in one go, using flash magic.
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### Reading List (Books)

1. Ramesh Gaonkar. *Microprocessors Architecture, Programming and Applications with the 8085*. 5<sup>th</sup> edition. PENRAM,2012
2. Lance A. Leventhel. *8080A/8085 Assembly Language Programming*. Osborne, 1978.
3. Rajkamal. *Embedded Systems*. Tata McgrawHill.
4. Shibu K V. *Introduction to embedded systems*. 1 st edition.Tata McgrawHill,2012

### List of Weblink Resources

1. Instruction Set of 8085  
<https://www.javatpoint.com/instruction-set-of-8085>
2. Pentium and Pentium Pro microprocessors:  
<https://www.geeksforgeeks.org/pentium-pro-architecture/#:~:text=The%20Pentium%20Pro%20microprocessor%20belongs,common%20architecture%20and%20instruction%20set.>

## Web Applications Development

Course Title	Web Applications Development
Course Code	PUSIT208T
Total Number of Lectures	60
Credits	2
Introduction	<ul style="list-style-type: none"><li>• The objective of this course is to understand basic concepts of the Internet and World Wide Web.</li><li>• To comprehend different HTML elements that can be used to develop static web pages.</li><li>• To become familiar with the concept of stylesheets and various CSS effects.</li><li>• To pursue JavaScript as a tool to add dynamism to static HTML pages.</li><li>• To explore how server-side script works on the web.</li><li>• To learn how PHP can be connected to a database to store and retrieve data.</li></ul>
Course Outcomes	<p>At end of the course, students will be able to:</p> <ul style="list-style-type: none"><li>• Analyze the working of the Internet.</li><li>• Gain an insight into designing web pages.</li><li>• Use different ways of styling web pages using CSS.</li><li>• Implement basic and complex functionalities of JavaScript in a web page.</li><li>• Employ PHP Scripts to execute dynamic tasks in a web page.</li><li>• Perform various database tasks using PHP.</li></ul>
Units	Given Below

## UNITS

Unit Number	CONTENT	NUMBER OF LECTURES
<b>I</b>	<p><b>Internet and the World Wide Web:</b>            What is Internet? Applications of Internet, E-mail, Telnet, FTP, E-commerce and E business. Internet Service Providers, Domain Name Server, Internet Address, World Wide Web (WWW): World Wide Web and its Evolution, Uniform Resource Locator (URL), Browsers, Common Features of Browsers, Search Engine, Web Server, HTTP Protocol.</p> <p><b>HTML5:</b>            Introduction, Formatting Text by using Tags, Using Lists, Creating Hyperlinks and Bookmarks, Defining Metadata about an HTML Document, Redirecting to another URL.</p> <p><b>CSS:</b>            Implementing Styles using CSS – Stylesheets, Formatting Text and Links using CSS, CSS Selectors, Changing Background, Adding Border, Margin and Padding, Setting Dimensions, Using Inline Container to mark up a part of a text.</p>	12L
<b>II</b>	<p><b>HTML Page Layout:</b>            Using Layout Elements, Semantic Elements, Creating, Positioning and Formatting Divisions, Floating Divisions next to each other, Responsive Web Design, Inline Frames.</p> <p><b>HTML Media, Tables and Forms:</b>            Embedding Images, Creating Client-side and Server-side Image Map, adding Favicon, Embedding audio and video on web page. Creating Simple Table, Table Dimension, Merging Table Cells, Formatting Tables: Applying Borders, Background and Foreground fills, Changing Cell Padding, Spacing and Alignment Collecting user input with HTML Forms, Additional Input Types in HTML5.</p>	12L



III	<p><b>JavaScript:</b>  Introduction, Difference between Client-side and Server-side Scripting, JavaScript Variables and Constants, Data Types, Statements, Comments, Functions, Variable Scope, Hoisting, Strict Mode, JavaScript Objects, Dialog Boxes, void Keyword</p> <p><b>Operators:</b> Arithmetic Operators, Assignment Operators, Comparison Operators, Logical Operators, Bitwise Operators</p> <p><b>Statements:</b>  Conditional Statements – if else, switch, Loops – while, do while, for, for in, for of, Loop Control – break, continue, labels</p> <p><b>JavaScript Objects:</b> User-defined Objects, with Keyword, Native Objects – Array, String, Date, Math, Number, RegExp</p> <p><b>DOM:</b> Introduction, DOM Properties and Methods.</p> <p><b>Browser BOM:</b> Moving back and forward with History, Cookies</p> <p><b>Events and Event Handlers:</b> HTML Events, DOM Events, DOM Event Listener, onAbort, onBlur, onChange, onClick, onDbClick, onError, onFocus, onKeyDown, onKeyPress, onKeyUp, onLoad, onMouseDown, onMouseMove, onMouseOut, onMouseOver, onMouseUp, onReset, onResize, onSelect, onSubmit, onUnload</p>	12L
IV	<p><b>PHP:</b>  Introduction, Server-side Scripting, PHP Syntax and Comments, Variables and Constants, Data Types, Control Structures, Looping, Loop Termination, Functions, PHP Form Handling, PHP Form Validation, Superglobals, PHP Arrays, PHP Strings, PHP RegEx, PHP Numbers, PHP Math, Basic PHP Errors</p>	12L
V	<p><b>Advanced PHP:</b>  PHP Date and Time, PHP Include, PHP Cookies, PHP Sessions, Validating and Sanitizing Data with PHP Filters</p> <p><b>PHP and MySQL:</b>  Why PHP and MySQL? Connect to MySQL, Creating Database and Tables, Inserting Single and Multiple Rows, Retrieving Last ID, MySQL Prepared, Selecting Data, Updating Data, Deleting Data, Limiting Data.</p>	12L

**Web Application Development Practical**  
**Practical code PUSIT208P and No. of Credits 2**

Sr. No.	Title of the Practical
1	<b>Use of Basic Tags</b> a.Design a web page using different text formatting tags. b.Design a web page with links to different pages and allow navigation between web pages. c.Design a web page that automatically redirects the user to another page.
2	<b>Use of CSS</b> a.Design a web page demonstrating different stylesheet types. b.Design a web page demonstrating grouping selectors.
3	<b>Layout and Media</b> a.Design a web page demonstrating different semantics. b.Design a web page embedding image, audio and video. c.Design a web page with Imagemaps.
4	<b>Tables and Forms</b> a.Design a web page with different tables. b.Design a web page with a form that uses all types of controls.
5	<b>JavaScript</b> a.Using JavaScript, design a web page to accept a number from the user and print its Factorial. b.Using JavaScript, a web page that prints Fibonacci series/any given series. c. Write a JavaScript program to display all the prime numbers between 1 and 100. d. Write a JavaScript program to accept a number from the user and display the sum of its digits.
6	<b>JavaScript Objects</b> a. Using JavaScript, design a web page demonstrating different native objects of JavaScript. b. Write a program in JavaScript to accept a sentence from the user and display the number of words in it. (Do not use split () function).
7	<b>JavaScript Events</b> a. Write a JavaScript program to design simple calculator. b. Design a form and validate all the controls placed on the form using JavaScript.
8	Basic PHP a. Write a PHP code to find the greater of 2 numbers. Accept the no. from the user. b. Write a PHP Program to accept a number from the user and print it factorial. c. Write a PHP program to accept a number from the user and print whether it is prime or not. d. Write a PHP program to display the following Binary Pyramid: 1 0 1 1 0 1 0 1 0 1 1 0 1 0 1 e. Write a PHP program to demonstrate different string functions. f. Write a PHP program to demonstrate different array functions.

9	<b>Advanced PHP</b> a. Write a PHP program to demonstrate use of sessions and cookies. b. Write a PHP program to demonstrate use of filters.
10	<b>PHP and MySQL</b> a. Write a PHP program to create: Create a database College Create a table Department (Dname, Dno, Number_of_faculty) b. Write a PHP program to create a database named “College”. Create a table named “Student” with following fields (sno, sname, percentage). Insert 3 records of your choice. Display the names of the students whose percentage is between 35 to 75 in a tabular format. c. Write a PHP program to Update rows in a table Delete rows from a table d. Design a PHP page for authenticating a user

### Reading List (Books)

1. Thomas A. Powell. *The Complete Reference HTML & CSS*. 5 th edition. Tata McGraw Hill.
2. Faithe Wempen. *Step by Step HTML 5*. Microsoft press, 2011.
3. Robin Nixon. *Learning PHP, MySQL, JavaScript, CSS & HTML5*. 3rd edition. O'Reilly, 2018.
4. Jennifer Niederst Robbins . *Learning Web Design A Beginner's Guide to Html, CSS, JavaScript, And Web Graphics*. 5th edition . O'Reilly, 2018.
5. Thomas A. Powell & Fritz Schneider. *The Complete Reference JavaScript*. 3rd edition. Tata McGrawHill, 2012.
6. Tom Butler. *PHP & MySQL Novice to Ninja*. 7th edition. SPD, 2022.

### List of Weblink Resources

1. A Web development tutorial students  
<https://www.geeksforgeeks.org/web-development/?ref=shm>  
(Notes, Quizzes, Articles, IDE for web development available)

## Numerical Methods

Course Title	Numerical and Statistical Methods
Course Code	PUSIT209T
Total Number of Lectures	60
Credits	2
Introduction	<ul style="list-style-type: none"><li>• The objective of this course is to enhance the problem solving skills of students using extremely powerful numerical methods.</li></ul>
Course Outcomes	<p>At end of the course, students will be able to:</p> <ul style="list-style-type: none"><li>• Understand numerical techniques to find the roots of non-linear equations and solution of system of linear equations.</li><li>• Understand the difference operators and the use of interpolation.</li><li>• Understand numerical differentiation and integration and numerical solutions of ordinary and partial differential equations.</li></ul>
Units	Given Below

## UNITS

Unit Number	CONTENT	NUMBER OF LECTURES
I	<b>Mathematical Modeling and Engineering Problem Solving:</b> A Simple Mathematical Model, Conservation Laws and Engineering Problems <b>Approximations and Round-Off Errors:</b> Significant Figures, Accuracy and Precision, Error Definitions, Round-Off Errors <b>Truncation Errors and the Taylor Series:</b> The Taylor Series, Error Propagation, Total Numerical Errors, Formulation Errors and Data Uncertainty	12L
II	<b>Solutions of Algebraic and Transcendental Equations:</b> The Bisection Method, The Newton-Raphson Method, The Regula-falsi method, The Secant Method. <b>Interpolation:</b> Forward Difference, Backward Difference, Newton's Forward Difference Interpolation, Newton's Backward Difference Interpolation, Lagrange's Interpolation	12L
III	<b>Solution of simultaneous algebraic equations (linear) using iterative methods:</b> Gauss-Jordan Method, Gauss-Seidel Method. <b>Numerical differentiation and Integration:</b> Numerical differentiation, Numerical integration using Trapezoidal Rule, Simpson's 1/3 <sup>rd</sup> and 3/8 <sup>th</sup> rules.	12L
IV	<b>Numerical solution of 1st and 2nd order differential equations:</b> Taylor series, Euler's Method, Modified Euler's Method, Runge-Kutta Method for 1 <sup>st</sup> and 2 <sup>nd</sup> Order Differential Equations. <b>Least-Squares Regression:</b> Linear Regression, Polynomial Regression, Multiple Linear Regression, General Linear Least Squares, Nonlinear Regression	12L
V	<b>Linear Programming:</b> Linear optimization problem, Formulation and Graphical solution, Basic solution and Feasible solution. <b>Numerical Solutions of Partial Differential Equations:</b> Classification of Partial Differential Equations of the second order, Difference equation corresponding to Laplace Equation, Liebmann's Iteration Process, Bender-Schmidt's Difference Equation corresponding to the parabolic equation, Crank Nicolson's difference equations corresponding to the parabolic equation, Difference equation corresponding to the Hyperbolic equation.	12L

## Numerical and Statistical Methods Practical

### Practical code PUSIT209P and No. of Credits 2

Sr. No.	Title of the Practical
1	<b>Iterative Calculation</b> a. Program for iterative calculation. b. Program to calculate the roots of a quadratic equation using the formula. c. Program to evaluate $e^x$ using infinite series.
2	<b>Solution of algebraic and transcendental equations:</b> a. Program to solve algebraic and transcendental equation by bisection method. b. Program to solve algebraic and transcendental equation by false position method. c. Program to solve algebraic and transcendental equation by Secant method. d. Program to solve algebraic and transcendental equation by Newton Raphson method.
3	<b>Interpolation</b> a. Program for Newton's forward interpolation. b. Program for Newton's backward interpolation. c. Program for Lagrange's interpolation.
4	<b>Solving linear system of equations by iterative methods</b> a. Program for solving linear system of equations using Gauss Jordan method. b. Program for solving linear system of equations using Gauss Seidel method.
5	<b>Numerical Differentiation</b> Programming to obtain derivatives numerically.
6	<b>Numerical Integration</b> a. Program for numerical integration using Trapezoidal rule. b. Program for numerical integration using Simpson's 1/3rd rule. c. Program for numerical integration using Simpson's 3/8th rule.
7	<b>Solution of differential equations</b> a. Program to solve differential equation using Euler's method b. Program to solve differential equation using modified Euler's method. c. Program to solve differential equation using Runge-kutta 2nd order and 4th order methods.
8	<b>Regression 1</b> a. Program for Linear regression. b. Program for Polynomial Regression.
9	<b>Regression 2</b> a. Program for multiple linear regression. b. Program for non-linear regression.
10	<b>Numerical solution of partial differential equations</b> a. Program to find solution of Laplace's equation.

### **Reading List (Books)**

1. S. S. Sastry. *Introductory Methods of Numerical Methods*. 5th Edition. PHI, 2012
2. Steven C. Chapra. Raymond P. Canale. *Numerical Methods for Engineers*. 6<sup>th</sup> Edition. Tata Mc Graw Hill, 2010.
3. Richard L. Burden. J. Douglas Faires. *Numerical Analysis*. 9th edition. Cengage Learning, 2011.
4. T Veerarajan. T Ramachandran. *Numerical Methods*. 7th edition. Tata Mc Graw Hill, 2011.

### **List of Weblink Resources**

Numerical and Statistical Methods

<https://rahulpatel121.files.wordpress.com/2018/07/s-s-sastry-introductory-methods-of-numerical-analysis-2012-phi-learning-pvt-ltd.pdf> (Reference Book)

## Green IT

Course Title	Green IT
Course Code	PUSIT210T
Total Number of Lectures	60
Credits	2
Introduction	<ul style="list-style-type: none"><li>● The objective of introducing this course is to understand the concept of Green Technology.</li><li>● To learn Green IT regulating Green IT and different standards.</li><li>● To understand the concept of minimizing power utilization in technology.</li><li>● To know about Green PCs, Green notebooks and servers and Green data centers.</li><li>● To know how the way of work is changing and understand implementation of Paperless work.</li><li>● To know the concept of Recycling.</li><li>● To understand Metrics for Green IT.</li></ul>
Course Outcomes	<p>At end of the course, students will be able to:</p> <ul style="list-style-type: none"><li>● Understand the concept of Green IT and problems related to it.</li><li>● Know different standards for Green IT.</li><li>● Understand how power usage can be minimized in Technology.</li><li>● Learn about how the way of work is changing.</li><li>● Understand the concept of recycling.</li><li>● Know how information system can stay Green Information system.</li><li>●</li></ul>
Units	Given Below



## UNITS

Unit Number	CONTENT	NUMBER OF LECTURES
I	<p><b>Overview to Green IT:</b> Problems: Toxins, Power Consumption, Equipment Disposal, Company's Carbon Footprint: Measuring, Details, reasons to bother, Plan for the Future, Cost Savings: Hardware, Power.</p> <p><b>Regulating Green IT: Laws, Standards and Protocols</b> Introduction, The Regulatory Environment and IT Manufacturers RoHS, REACH, WEEE, Legislating for GHG Emissions and Energy Use of IT Equipment. Nonregulatory Government Initiatives, Industry Associations and Standards Bodies, Green Building Standards, Green Data Centres , Social Movements and Greenpeace.</p>	12L
II	<p><b>Minimizing Power Usage:</b> Power Problems, Monitoring Power Usage, Servers, Low-CostOptions, Reducing Power Use, Data De-Duplication, Virtualization, Management, Bigger Drives, Involving the Utility Company, LowPower Computers, PCs, Linux, Components, Servers, ComputerSettings,Storage, Monitors, Power Supplies, Wireless Devices, Software.</p> <p><b>Cooling:</b> Cooling Costs, Power Cost, Causes of Cost, Calculating CoolingNeeds, Reducing Cooling Costs, Economizers, On-Demand Cooling, HP's Solution, Optimizing Airflow, Hot Aisle/Cold Aisle, Raised, Floors, Cable Management, Vapour Seal, Prevent Recirculation of Equipment Exhaust, Supply Air Directly to Heat Sources, Fans, Humidity, Adding Cooling, Fluid Considerations, System Design, Datacentre Design, Centralized Control, Design for Your Needs, Put Everything Together.</p>	12L
III	<p><b>Greening IT:</b> Green PCs, Notebooks and Servers, Green Data Centres , Green Cloud Computing, Green Data Storage , Green Software, Green Networking and Communications.</p> <p><b>Changing the Way of Work:</b> Old Behaviours, starting at the Top, Process Reengineering with Green in Mind, Analysing the Global Impact of Local Actions, Steps: Water, Recycling, Energy, Pollutants, Teleworkers and Outsourcing, Telecommuting, Outsourcing, how to Outsource.</p> <p><b>Going Paperless:</b> Paper Problems, The Environment, Costs: Paper and Office, Practicality, Storage, Destruction, Going Paperless, Organizational Realities, Changing Over, Paperless Billing, Handheld Computers vs. the Clipboard, Unified Communications, Intranets, What to Include, Building an Intranet, Microsoft Office SharePoint Server 2007, Electronic Data Interchange (EDI), Nuts and Bolts, Value Added Networks, Advantages, Obstacles.</p>	12L

IV	<p><b>Recycling:</b> Means of Disposal, Recycling, Refurbishing, Make the Decision, Life Cycle, from beginning to end, Life, Cost, Green Design, Recycling Companies, Finding the Best One, Checklist, Certifications, Hard Drive Recycling, Consequences, cleaning a Hard Drive, Pros and cons of each method, CDs and DVDs, good and bad about CD and DVDs disposal, Change the mind- set, David vs. America Online.</p> <p><b>Hardware Considerations:</b> Certification Programs, EPEAT, RoHS, Energy Star, Computers, Monitors, Printers, Scanners, All-in-Ones, Thin Clients, Servers, Blade Servers, Consolidation, Products, Hardware Considerations, Planned Obsolescence, Packaging, Toxins, Other Factors, Remote Desktop, Using Remote Desktop, Establishing a Connection.</p>	12L
V	<p><b>Greening Your Information Systems:</b> Initial Improvement Calculations, Selecting Metrics, Tracking Progress, Change Business Processes, Customer Interaction, Paper Reduction, Green Supply Chain, Improve Technology Infrastructure, Reduce PCs and Servers, Shared Services, Hardware Costs, Cooling.</p> <p><b>Staying Green:</b> Organizational Check-ups, Chief Green Officer, Evolution, Sell the CEO, SMART Goals, Equipment Check-ups, Gather Data, Tracking the data, Baseline Data, Benchmarking, Analyse Data, Conduct Audits, Certifications, Benefits, Realities, Helpful Organizations.</p>	12L

## PL/SQL Practical

Practical code PUSIT210P and No. of Credits 2

Sr. No.	Title of the Practical
1	<b>PL/SQL Basics</b> a. Use of variables. b. Write an executable statement. c. Interacting with Oracle Server. d. Create anonymous PL/SQL block
2	<b>Control Structure in PL/SQL .</b> a. Using while loop b. Do loop c. For loop d. Use of GOTO statement
3	<b>Create conditional statement using PL/SQL</b> a. Using if statement b. Using if else statement c. Using else if ladder d. Using case expressions.
4	<b>Creation of Sequence in PL/SQL</b>
5	<b>Create cursor in PL/SQL</b> a. Implicit cursor b. Explicit c. Parameterized cursor d. Cursor for loop
6	<b>Creation of Procedures in PL/SQL</b>
7	<b>Functions in PL/SQL</b> a. Compute and returns the maximum value b. Compute factorial of given number.
8	<b>Creation of Trigger</b> a. Create Row level trigger b. Create Statement level trigger c. Create instead of trigger
9	<b>Handling exceptions</b> a. Creation of user defined exception b. Creation of system defined exception.
10	<b>Creation of Package in PL/SQL</b>

### **Reading List (Books)**

1. Toby Velt. Anthony Velte. Robert Elsenpeter. *Green IT*. McGraw Hill, 2008.
2. San Murugesan.G. R. Ganadharan. *Harnessing Green IT: Principles and Practices*. Wiley & IEEE.
3. Alvin Galea. Michael Schaefer. Mike Ebbers. *Green Data Center: Steps For the Journey*. Shroff Publishers and Distributors, 2011.
4. Deepak Shikarpur.*Green IT*. Vishwkarma Publications,2014.
5. Bud E. Smith. *Green Computing Tools and Techniques for Saving Energy, Money and Resources*. CRC Press, 2014.
6. Jason Harris. *Green Computing and Green IT Best Practice*.Emereo

### **List of Weblink Resources**

## Evaluation Pattern for Semester I & II

### Semester-end Examination (60 Marks)

<b>All Questions are compulsory</b>		
Question No.	Unit No. Based on and Pattern (All questions are compulsory)	Total Marks
Q. 1.	(Unit-I) Attempt any 3 out of 6 (Marks: 4+4+4)	12 Marks
Q. 2.	(Unit-II) Attempt any 3 out of 6 (Marks: 4+4+4)	12 Marks
Q. 3.	(Unit-III) Attempt any 3 out of 6 (Marks: 4+4+4)	12 Marks
Q. 4.	(Unit-IV) Attempt any 3 out of 6 (Marks: 4+4+4)	12 Marks
Q. 5.	(Unit-V) Attempt any 3 out of 6 (Marks: 4+4+4)	12 Marks

### Continuous Internal Evaluation (40 Marks)

Sr. No.	Particulars	Marks
1	One class test to be conducted in each semester	10 marks
2	Overall conduct as a responsible student, mannerism and articulation and exhibit of leadership qualities in organizing related academic activities	05 marks
3	Research Project/ Book Review/ Research Paper Review/ Survey/ Field Work Project/etc.	25 marks

**For Departments of Science Faculty:**

Practical Examination will be of 50 marks per paper.

The particulars of the external examination for each practical course of Semester- I and Semester – II are given below:

- Each core subject carries 50 Marks: 40 marks + 05 marks (journal) + 05 marks (viva)
- Minimum 75 % practical from each core subject are required to be completed and written in the journal.
- A Certified copy journal is essential to appear for the practical examination.
- Related theories/algorithms need to be explained in a journal.

1.	Practical Question 1	20 Marks
2.	Practical Question 2	20 Marks
3.	Journal	05 Marks
4.	Viva Voice	05 Marks

OR

1.	Practical Question 1	40 Marks
2.	Journal	05 Marks
3.	Viva Voice	05 Marks

This Syllabus is prepared by:

Members of Syllabus committee	Designation
Mrs. Namrata Kawale	Chairperson
Dr. Mrs. Mala Kharkar	Faculty of Specialization
Mr. Chayan Bhattacharjee	Faculty of Specialization