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

**UNIVERSITY OF MUMBAI**



**Syllabus for F.Y.B.Sc.**

**Programme: B.Sc.**

**Subject : Information**

**Technology**

**Semester – I and II**

**(CBCS)**

(Choice Based Credit System with effect from the  
academic year 2022-2023)

(To introduce with effect from the academic year  
2022-2023)

**UNIVERSITY OF MUMBAI****Syllabus for Approval**

Sr. No.	Heading	Particulars
1	Title of the Programme	<b>F.Y.B.Sc. Sem. I &amp; II (Information Technology)</b>
2	Eligibility for Admission	<b>Ordinance no. O.5051 Circular no. UG/284 of 2007 dated 16th June 2007</b>
3	Passing Marks	40%
4	Ordinances / Regulations (if any)	As applicable for all B.Sc. Courses
5	No. of Years / Semesters	Three years – Six Semesters
6	Level	<b>P.G. / U.G./ Diploma / Certificate- ( Strike out which is not applicable)</b>
7	Pattern	<b>Yearly / Semester ( Strike out which is not applicable)</b>
8	Status	<b>Revised / New / Amended ( Strike out which is not applicable)</b>
9	To be implemented from Academic Year	From Academic Year <b><u>2022-2023</u></b>

Signature

Chairman Name Dr. R. Srivaramangai

BOS Chairman in Information Technology

Dr. Anuradha Majumdar

Dean, Science and Technology

## PREAMBLE

The B.Sc. Information Technology programme was started in 2001 with an aim to make the students employable and impart industry oriented training. The main objectives of the course are:

- To think analytically, creatively and critically in developing robust, extensible and highly maintainable technological solutions to simple and complex problems.
- To apply their knowledge and skills to be employed and excel in IT professional careers and/or to continue their education in IT and/or related post graduate programmes.
- To be capable of managing complex IT projects with consideration of the human, financial and environmental factors.
- To work effectively as a part of a team to achieve a common stated goal.
- To adhere to the highest standards of ethics, including relevant industry and organizational codes of conduct.
- To communicate effectively with a range of audiences both technical and non-technical.
- To develop an aptitude to engage in continuing professional development.

The new syllabus is aimed to achieve the objectives. The syllabus spanning three years covers the industry relevant courses. The students will be ready for the jobs available in different fields like:

- Software Development (Programming)
- Website Development
- Mobile app development
- Internet of Things
- Software Testing
- Networking
- Database Administration
- System Administration
- Cyber Law Consultant
- GIS (Geographic Information Systems)
- IT Service Desk
- Security
- Technical communication skills
- Green IT

And many others

# Annexure I

Name of Dean (Dean, Faculty of Science and Technology) : Dr. Anuradha Majumdar

Name of Associate Dean (Associate Dean, Faculty of Science and Technology) Prof. Shivram Garje

Name of Chairperson (BoS) : Dr. Mrs. R. Srivaramangai

Member(BoS) : Dr. Hiren Dand

Member(BoS) : Dr. Abhijeet Kale

Member(BoS) : Dr. Santosh Singh

Member(BoS) : Dr. Rajendra Patil

Member(BoS) : Dr. Mandar Bhave

## Annexure I

<b>Semester 1</b>			
<b>Course Code</b>	<b>Course Type</b>	<b>Course Title</b>	<b>Credits</b>
USIT101	Core Subject	Programming Principles with C	2
USIT102	Core Subject	Digital Logic and Applications	2
USIT103	Core Subject	Fundamentals of Database Management Systems	2
USIT104	Core Subject	Computational Logic and Discrete Structure	2
USIT105	Ability Enhancement Skill Course	Technical Communication Skills	2
USIT1P1	Core Subject Practical	Programming Principles with C Practical	2
USIT1P2	Core Subject Practical	Digital Logic and applications Practical	2
USIT1P3	Core Subject Practical	Fundamentals of Database Management Systems Practical	2
USIT1P4	Core Subject Practical	Computational Logic and Discrete structure Practical	2
USIT1P5	Ability Enhancement Skill Course Practical	Technical Communication Skills Practical	2
<b>Total Credits</b>			<b>20</b>

<b>Semester 2</b>			
<b>Course Code</b>	<b>Course Type</b>	<b>Course Title</b>	<b>Credits</b>
USIT201	Core Subject	Object Oriented Programming with C++	2
USIT202	Core Subject	Fundamentals of Micro Processor and Microcontrollers	2
USIT203	Core Subject	Web Applications Development	2
USIT204	Core Subject	Numerical Methods	2
USIT205	Ability Enhancement Skill Course	Green IT	2
USIT2P1	Core Subject Practical	Object Oriented Programming with C++ Practical	2
USIT2P2	Core Subject Practical	Fundamentals of Micro Processor and Microcontrollers Practical	2
USIT2P3	Core Subject Practical	Web Applications Development Practical	2
USIT2P4	Core Subject Practical	Numerical Methods Practical	2
USIT2P5	Ability Enhancement Skill Course Practical	PL/SQL Practical	2
<b>Total Credits</b>			<b>20</b>

# **SEMESTER I**

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<b>B. Sc (Information Technology)</b>		<b>Semester – I</b>	
<b>Course Name: Programming Principles with C</b>		<b>Course Code: USIT101</b>	
<b>Periods per week (1 Period is 50 minutes)</b>		<b>5</b>	
<b>Credits</b>		<b>2</b>	
		<b>Hours</b>	<b>Marks</b>
<b>Evaluation System</b>	<b>Theory Examination</b>	<b>2</b>	<b>75</b>
	<b>Internal</b>	<b>--</b>	<b>25</b>

- Course Objectives:**
- 1. To develop the logical ability of the student.**
  - 2. Basic concepts to be cleared using suitable examples.**
  - 3. Different approach towards the problem.**
  - 4. To handle the errors and find suitable solution.**
  - 5. Debugging the code.**

Unit	Details	Lectures
<b>I</b>	Introduction: 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	<b>12</b>
<b>II</b>	Type of operators: 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 Control Flow: Statements and Blocks, If-Else, Else-If, Switch, Loops- While and For Loops- Do-while, Break and Continue, Goto and Labels	<b>12</b>
<b>III</b>	Functions and Program Structure: 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	<b>12</b>
<b>IV</b>	Pointer and Arrays 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	<b>12</b>
<b>V</b>	Structures: Basics of structures, Structures and Functions, Arrays of Structures, Pointers to Structures, Unions, Bit-fields, File management in C: Defining and Opening file, Closing a file, Input / Output operations on file, Error handling in C, Random access to files, Command line arguments.	<b>12</b>

<b>Books and References:</b>					
Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Programming Language	Brian W. Kernighan and Denis M. Ritchie.	PHI	2 <sup>nd</sup>	1988
2.	Mastering C	K R Venugopal	Tata McGraw-Hill	6 <sup>th</sup>	2007
3.	Programming with C	Byron Gottfried	Tata McGRAW-Hill	2 <sup>nd</sup>	1996
4.	Let us C	Yashwant P. Kanetkar	BPB publication		
5.	Programming in ANSI C	E.Balagurusamy	Tata McGraw-Hill	7 <sup>th</sup>	1982

# Annexure I

## Course Outcomes:

Learners will be able to,

1. Learn the basic principles of programming.
2. Develop of logic using algorithm and flowchart.
3. Acquire the information about data types.
4. Understanding of input and output functions.
5. Enhance advanced concepts using program.

<b>B. Sc (Information Technology)</b>		<b>Semester – I</b>	
<b>Course Name: Programming Principles with C Practical</b>		<b>Course Code: USIT1P1</b>	
<b>Periods per week (1 Period is 50 minutes)</b>		<b>3</b>	
<b>Credits</b>		<b>2</b>	
		<b>Hours</b>	<b>Marks</b>
<b>Evaluation System</b>	<b>Practical Examination</b>	<b>2½</b>	<b>50</b>
	<b>Internal</b>	<b>--</b>	<b>--</b>

## Course Objectives:

1. **To develop the logic of the student.**
2. **Describe loops and decision making using programs.**
3. **Practical use of operators.**
4. **Illustration of the difficult concepts using programming examples.**
5. **Discussion of the relevant concepts using program.**

<b>List of Practical:</b>	
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 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 equation. 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 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 : <pre> * * * * * * * * * *           </pre> b. Write a program to print the pattern of asterisks as shown below : <pre> * * * * * * * * * * * * * * *           </pre> c. <b>Write a program to print Floyd's Triangle.</b>
5.	a. Write a program to print area of square using function.



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	<p>b. Write a program using recursive function.</p> <p><b>c. Write a program to square root, abs() value using function.</b></p> <p><b>d. Write a program using goto statement.</b></p>
6.	<p>a. Write a program to print rollno and names of 10 students using array.</p> <p>b. Write a program to read a matrix of size m*n.</p> <p><b>c. Write a program to sort the elements of array</b> in ascending or descending order.</p>
7.	<p>a. Write a program to extract the portion of a character string and print the extracted part.</p> <p>b. Write a program to find the given string is palindrome or not.</p> <p><b>c. Write a program to using strlen(), strcmp() function.</b></p>
8.	<p>a. Write a program to display the values using different data types and its address using pointer.</p> <p>b. Write a program to perform addition and subtraction using pointer.</p>
9.	<p>a. Write a program to copy the contents of the file from one file into other.</p> <p>b. Write a program to print the structure using</p> <ul style="list-style-type: none"><li>• Title</li><li>• Author</li><li>• Subject</li><li>• Book ID</li></ul> <p>Print the details of two students.</p>
10.	<p>a. Create a mini project on “Bank management system” . The program should be menu driven.</p>

### Course Outcomes:

#### Learners will be able to,

1. **Develop applications.**
2. **Work with textual information, characters and strings.**
3. **Understand of a functional hierarchical code organization**
4. **Debug the program**
5. **Understand the differences between syntax errors, runtime errors, and logic errors.**

## Annexure I

<b>B. Sc (Information Technology)</b>		<b>Semester – I</b>	
Course Name: Digital Logic and Applications		Course Code: USIT102	
Periods per week (1 Period is 50 minutes)		5	
Credits		2	
		<b>Hours</b>	<b>Marks</b>
Evaluation System	Theory Examination	2	75
	Internal	--	25

### Course Objectives:

1. To introduce the basics of logic in digital electronics as an entry level course.
2. To interpret and assess number systems and the conversions of number systems
3. To analyze the boolean expressions and reduce the expression to the minimum.
4. To design simple logic circuits using tools such as Boolean Algebra and Karnaugh Mapping.
5. To understand the state of a memory cell and its types using flip-flops.
6. To create simple digital systems using counters, registers etc.

Unit	Details	Lectures
<b>I</b>	<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 system. <b>Logic gates and Logic Circuits</b> Basic and Universal Gates	<b>12</b>
<b>II</b>	<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	<b>12</b>
<b>III</b>	<b>Combinational logic</b> Introduction, Analysis and Design Procedure for Combinational Logic Circuits, Types of Combinational Circuit, Review Questions	<b>12</b>
<b>IV</b>	<b>Sequential circuits</b> Introduction, Latch, Flip-Flops, Registers, Counters, Review Questions	<b>12</b>
<b>V</b>	<b>Applications</b> Bit Arithmetic and Logic unit, Carry lookahead generator, Binary Multiplication and Division algorithm, Booth's multiplication algorithm	<b>12</b>

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Digital Logic Design	Sonali Singh	BPB publications	1 <sup>st</sup>	2015
2.	Fundamentals of Digital Electronics and Logic Design	Subir Kumar Sarkar, Asish Kumar De, Souvil Sarkar	Pan Stanford Publishing	1 <sup>st</sup>	2014
3.	Digital Electronics Principles, Design and Applications	Anil K Maini	Wiley	1 <sup>st</sup>	2007
4.	Fundamentals of Logic	Charles H Roth, Jr. , Larry L	Cengage	7 <sup>th</sup>	2014

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	Design	Kinney	Learning		
5.	Digital Principles and Applications	Donald P Leach Albert Malvino Goutam Saha	TMH	8 <sup>th</sup>	2015

### Course Outcomes:

Learners will be able to,

1. Apply number conversion techniques in real digital systems
2. Solve boolean algebra expressions
3. Derive and design logic circuits by applying minimization in SOP and POS forms
4. Design and develop Combinational and Sequential circuits
5. Understand and develop digital applications

<b>B. Sc (Information Technology)</b>		<b>Semester – I</b>	
<b>Course Name: Digital Logic and Applications Practical</b>		<b>Course Code: USIT1P2</b>	
<b>Periods per week (1 Period is 50 minutes)</b>		<b>3</b>	
<b>Credits</b>		<b>2</b>	
		<b>Hours</b>	<b>Marks</b>
<b>Evaluation System</b>	<b>Practical Examination</b>	<b>2½</b>	<b>50</b>
	<b>Internal</b>	<b>--</b>	<b>--</b>

### Course Objectives:

1. To apply and test the gates learnt using various IC's .
2. To evaluate the Boolean expression to reduce and minimize the gates used

<b>1.</b>	<b>Study of basic gates and Universal gates</b>
a.	To verify the truth tables of OR, AND, NOR, NAND, EX-OR, EX-NOR gates
b.	To study IC 7400, 7402, 7404, 7408, 7432, 7486, 74266
c.	To implement and verify NAND and NOR as Universal gates
<b>2.</b>	<b>Study of Boolean expressions</b>
a.	To verify De Morgan's laws
b.	Implement the given expression using a minimum number of gates.
c.	Implement the given expression using a minimum number of ICs.
<b>3.</b>	<b>Design of Combinational Circuits using K-maps</b>
a.	Design and implement combinational circuits for the given problem/problems using minimization techniques of K-maps.
<b>4.</b>	<b>Design and implement code converters</b>
a.	Design the circuit and implement Binary to gray code converter
b.	Design the circuit and implement Gray to Binary code converter
c.	Design the circuit and implement Binary to BCD code converter
d.	Design the circuit and implement Binary to XS-3 code converter
<b>5.</b>	<b>Implement Adder and Subtractor circuits</b>
a.	Design the circuit and implement Half Adder and Full Adder
b.	Design the circuit and implement BCD Adder, XS-3 Adder , Binary Subtractor

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<b>6.</b>	<b>Design and implement Arithmetic circuits</b>
a.	Design and implement 2-by-2 bit multiplier
<b>7.</b>	<b>Implement Encoders and Decoders</b>
a.	Design and implement 8: 3 encoder
b.	Design and implement 3:8 decoder
<b>8.</b>	<b>Multiplexers and Demultiplexers</b>
a.	Design and Implement 4:1 multiplexer
b.	Design and Implement 1:4 demultiplexer
c.	Study IC 74151 8: 1 multiplexer and implement the expression
d.	Study IC 74138 3: 8 decoder and implement the expression
<b>9.</b>	<b>Study of Flipflops and Counters</b>
a.	Study of IC's 7473, 7474, and 7476
b.	Design a 3-bit ripple/ synchronous counter using IC 7473 and required gates
<b>10.</b>	<b>Design of Shift Registers</b>
a.	Design of Shift registers using IC 7474
b.	Implementation of digits using seven segment displays

### Course Outcomes:

#### Learners will be able to,

1. **Construct basic and universal logic circuits.**
2. **Verify the functionalities of various IC's.**
3. **Design circuits using K-maps minimization technique**
4. **Design and test Encoders, Decoders, Multiplexers and Demultiplexers**
5. **Design and develop logic for Registers, Counters and its applications.**

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<b>B. Sc (Information Technology)</b>		<b>Semester – I</b>	
<b>Course Name: Fundamentals of Database Management Systems</b>		<b>Course Code: USIT103</b>	
<b>Periods per week (1 Period is 50 minutes)</b>		<b>5</b>	
<b>Credits</b>		<b>2</b>	
		<b>Hours</b>	<b>Marks</b>
<b>Evaluation System</b>	<b>Theory Examination</b>	<b>2</b>	<b>75</b>
	<b>Internal</b>	<b>--</b>	<b>25</b>

### Course Objectives:

The objective of the course is to present an introduction to fundamentals of database management systems, with an emphasis on how to organize, maintain and retrieve - efficiently, and effectively - information from a DBMS.

Unit	Details	Lectures
<b>I</b>	Database system- concept and Architecture, Relational model and Relational database constraints. Relational Algebra.	<b>12</b>
<b>II</b>	Conceptual modelling and database design: 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.	<b>12</b>
<b>III</b>	Database Design theory and normalization: Basics of functional dependencies and normalization for relational databases. Relational database design and further dependencies.	<b>12</b>
<b>IV</b>	Introduction to SQL , Complex queries, triggers, views, joining database tables and schema modification. Query Processing and optimization. File structure, hashing and indexing	<b>12</b>
<b>V</b>	Transaction management and concurrency control and recovery: Introduction to transaction processing concepts and theory. Concurrency control technique. Database recovery technique.	<b>12</b>

Sr. No.	Title	Author/s	Publisher	Edition	Year
<b>1.</b>	<b>Fundamentals of Database systems.</b>	<b>Ramez Elmasri, Shamkant B Navathe</b>	Pearson.	<b>6<sup>th</sup> Edition</b>	
<b>2.</b>	<b>Database Systems: Design implementation and management.</b>	<b>Carlos Coronel, Steven Morris, Peter Rob</b>	Cengage Learning	<b>9<sup>th</sup> Edition</b>	2010

### Course Outcomes:

Learners will be able to

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1. Define and describe the fundamental elements of relational database management system.
2. To relate the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL.
3. Design ER-models to represent simple database application scenarios.
4. Transform the ER-model to relational tables, populate relational database and formulate SQL queries on data.
5. Improve the database design by normalization.
6. Understand basic database storage structures and access techniques: file and page organizations, indexing methods and hashing.

<b>B. Sc (Information Technology)</b>		<b>Semester – I</b>	
Course Name: Fundamentals of Database Management Systems Practical		Course Code: USIT1P3	
Periods per week (1 Period is 50 minutes)		3	
Credits		2	
		<b>Hours</b>	<b>Marks</b>
<b>Evaluation System</b>	<b>Practical Examination</b>	2½	<b>50</b>
	<b>Internal</b>	--	--

### Course Objectives:

- To introduce ER data model, database design and normalization.
- To Learn SQL basics for data definition and data manipulation.

1.	Draw E-R diagram and convert entities and relationships to relation table for a given scenario
a.	Bank
b.	College
<b>2.</b>	<b>Write relational algebra queries for a given set of relations</b>
<b>3.</b>	<b>Defining data</b>
a.	Using CREATE statement
b.	Using ALTER statement
c.	Using DROP statement
d.	Using TRUNCATE statement
e.	Using RENAME statement
<b>4.</b>	<b>Manipulating data</b>
a.	Using INSERT statement
b.	Using UPDATE statement
c.	Using DELETE statement
d.	Using SELECT statement
<b>5.</b>	<b>Creating and managing the tables</b>
a.	Creating table with constraints: NOTNULL, UNIQUE, PRIMARY KEY ,FOREIGN KEY
<b>6.</b>	<b>Restricting and sorting data</b>
a.	Using DISTINCT, IN, AS, SORT, LIKE, ISNULL, OR
b.	Using Group By, Having clause, Order By clause
<b>7.</b>	<b>Aggregate and Mathematical functions:</b>
a.	AVG, MIN, MAX, SUM, COUNT

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b.	ABS,SQRT,ROUND,TRUNCATE,SIGN,POWER,MOD,FLOOR,CEIL
<b>8.</b>	<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
<b>8.</b>	<b>Database trigger</b>
a.	Using CREATE OR REPLACE TRIGGER
<b>9.</b>	<b>Index</b>
a.	Create index
b.	Drop index

### Course Outcomes:

#### Learners will be able to:

1. Design database schema for a given application and apply normalization.
2. Acquire skills in using SQL Commands for data Definition and data manipulation.

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<b>B. Sc (Information Technology)</b>		<b>Semester – I</b>	
<b>Course Name: Computational Logic and Discrete Structures</b>		<b>Course Code: USIT104</b>	
<b>Periods per week (1 Period is 50 minutes)</b>		<b>5</b>	
<b>Credits</b>		<b>2</b>	
		<b>Hours</b>	<b>Marks</b>
<b>Evaluation System</b>	<b>Theory Examination</b>	<b>2</b>	<b>75</b>
	<b>Internal</b>	<b>--</b>	<b>25</b>

### Course Objectives:

- **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, tress and other important discrete math concepts.**

<b>Unit</b>	<b>Details</b>	<b>Lectures</b>
<b>I</b>	<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 Representatives of Relations, Composition of Relations, Types of Relations, Closure Properties, Equivalence Relations, Partial Ordering Relations</p>	<b>12</b>
<b>II</b>	<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>	<b>12</b>
<b>III</b>	<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>	<b>12</b>
<b>IV</b>	<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 andWeighted Graphs, Complete, Regular, and Bipartite</p>	<b>12</b>



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	<p>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>	
<b>V</b>	<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</p> <p>Bounded Lattices, Distributive Lattices, Complements, Complemented Lattices</p>	<b>12</b>

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Discrete Mathematics, Schaum's Outlines Series	Seymour Lipschutz, Marc Lipson	Tata McGraw Hill	3 <sup>rd</sup>	2007
2.	Discrete Mathematics with Applications	Sussana S. Epp	Cengage Learning	5 <sup>th</sup>	2018
3.	Discrete Mathematics and its Applications	Kenneth H. Rosen	Tata McGraw Hill	8 <sup>th</sup>	2019
4.	Discrete mathematical structures	B Kolman RC Busby, S Ross	PHI		
5.	Discrete structures	Liu	Tata McGraw Hill		

**Course Outcomes:**

**Learners will be able to:**

1. Use logical notation
2. Perform logical proofs
3. Apply recursive functions and solve recurrence relations
4. Use graphs and trees
5. Apply basic and advanced principles of counting
6. Define sets and Relations
7. Calculate discrete probabilities.

## Annexure I

<b>B. Sc (Information Technology)</b>		<b>Semester – I</b>	
Course Name: Computational Logic and Discrete Structures Practical		Course Code: USIT1P4	
Periods per week (1 Period is 50 minutes)		3	
Credits		2	
		<b>Hours</b>	<b>Marks</b>
<b>Evaluation System</b>	<b>Practical Examination</b>	2½	50
	<b>Internal</b>	--	--

### Course Objectives:

Course will make students understand different commands and functions of SCILAB. It will enable student to use these tools to compute solutions of various discrete mathematical structures.

<b>1.</b>	<b>Set Theory</b>
a.	Inclusion Exclusion principle.
b.	Power Sets
c.	Mathematical Induction
<b>2.</b>	<b>Functions and Algorithms</b>
a.	Recursively defined functions
b.	Cardinality
c.	Polynomial evaluation
d.	Greatest Common Divisor
<b>3.</b>	<b>Probability Theory 1</b>
a.	Sample space and events
b.	Finite probability spaces
c.	Equiprobable spaces
d.	Addition Principle
<b>4.</b>	<b>Probability Theory 2</b>
a.	Conditional Probability
b.	Multiplication theorem for conditional probability
c.	Independent events
d.	Repeated trials with two outcomes
<b>5.</b>	<b>Counting 1</b>
a.	Sum rule principle
b.	Product rule principle
c.	Factorial
d.	Binomial coefficients
<b>6.</b>	<b>Counting 2</b>
a.	Permutations
b.	Permutations with repetitions

## Annexure I

c.	Combinations
d.	Combinations with repetitions
<b>7.</b>	<b>Counting 3</b>
a.	Ordered partitions
b.	Unordered partitions
<b>8.</b>	<b>Graph Theory</b>
a.	Paths and connectivity
b.	Minimum spanning tree
c.	Isomorphism
<b>9.</b>	<b>Directed Graphs</b>
a.	Adjacency matrix
b.	Path matrix
<b>10</b>	<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

### Course Outcomes:

#### Learners will be able to:

1. To find computational solution to various discrete mathematical structures.

## Annexure I

<b>B. Sc (Information Technology)</b>		<b>Semester – I</b>	
<b>Course Name: Technical Communication Skills</b>		<b>Course Code: USIT105</b>	
<b>Periods per week (1 Period is 50 minutes)</b>		<b>5</b>	
<b>Credits</b>		<b>2</b>	
		<b>Hours</b>	<b>Marks</b>
<b>Evaluation System</b>	<b>Theory Examination</b>	<b>2</b>	<b>75</b>
	<b>Internal</b>	<b>--</b>	<b>25</b>

### Course Objectives:

- To recognize 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.

Unit	Details	Lectures
<b>I</b>	<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>	<b>12</b>
<b>II</b>	<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>	<b>12</b>
<b>III</b>	<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>	<b>12</b>
<b>IV</b>	<p><b>Business writing</b> Introduction, Importance of written Business, Five main strategies of writing business messages</p>	<b>12</b>

## Annexure I

	<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 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>	
<b>V</b>	<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>	<b>12</b>

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Technical communication : principles and practices	Meenakshi Raman & Sangeeta Sharma	Oxford Higher Education		
2.	Business Communication	Meenakshi Raman & Prakash Singh	Oxford- Higher Education	2 <sup>nd</sup> edition	2006
3.	Effective Business Communication	Herta Murphy, Herbert Hildebrandt, Jane Thomas	Tata McGraw Hill	7 <sup>th</sup> edition	2008
4.	Professional Communication	Aruna Koneru	McGraw Hill		2008
5.	Business and Professional Communication Plans, Processes and Performance	James R. DiSanza Nancy J..Legge	Pearson Education	4 <sup>th</sup> Edition	
6.	Storytelling with data-a data visualization guide for business professionals	Cole Nussbaumer knaflic	Wiley		

### Course Outcome:

Learners will be able to,

1. **Analyze, synthesize and utilize the process and strategies from delivery to solving communication problem.**
2. **Learn the communication methodologies at workplace and learning about importance of team collaboration.**
3. **Learn about different technical communication such as presentations and interviews.**
4. **Understand and apply the art of written communication in writing reports, proposals.**
5. **Ground rules of ethical communication and MIS.**
6. **Understand the functions of graphs, maps, charts.**

## Annexure I

<b>B. Sc (Information Technology)</b>		<b>Semester – I</b>	
Course Name: Technical Communication Skills Practical		Course Code: USIT1P5	
Periods per week (1 Period is 50 minutes)		3	
Credits		2	
		<b>Hours</b>	<b>Marks</b>
<b>Evaluation System</b>	<b>Practical Examination</b>	2½	50
	<b>Internal</b>	--	--

**Course Objectives:**

- To express thoughts feelings and ideas of learners by using features of MS Word.
- To articulate formal and informal reports.
- To analyze and interpret data and learn visualization of data.
- To learn effective tools of presentation.

1.	Use of word processing tools for communication.
a.	Use of various tools like spell checker, header, footer etc.
b.	Make formal and informal letters, creating resume.
c.	Designing brochures and flyers using templates in word.
2.	Writing reports, minutes of meeting, action plan.
3.	Use of spreadsheet for data interpretation and data analysis.
4.	Basic use of what if analysis using excel.
5.	Visual Representation of data using excel – pie chart ,line chart, bar chart etc.
6.	Summarization of data using of pivot tables and chart in excel.
7.	Use of presentation tools like PowerPoint for communication and presentation skills.
8.a.	Basic communication covering the following topics:- Meeting people, Asking Questions and Design of questionnaire.
8.b.	Using netiquettes in online mode of communication using Zoom / Google Meet / MS-Teams etc.
9.	Use of Mail etiquette for writing effective mails.
10.a.	Use of Mail merge and its features.
10.b.	Creating profile using LinkedIn.

**Course Outcome:**

**Learners will be able to:**

1. Use different forms of digital mediums for effective communication.
2. Create technical documents and format existing documents for effective communication.
3. Learn to use graphical tools for better visualization.
4. Create business presentation effectively.
5. Visualize the data from pictorial representations.