**The Kelkar Education Trust's**

**V. G. Vaze College of Arts, Science and Commerce**

**(Autonomous)**

# Syllabus for F. Y B.Sc. – I.T.

(June 2023 Onwards)

## Programme: B.Sc.

## Subject : Information Technology

## Semester I & II



| Semester I | | | |
|---|---|---|---|
| **Code** | **Course Type** | **Course Title** | **Credits** |
| VGVUSTMPP101 | Major Subject | Principles of Programming Languages using C | 2 |
| VGVUSTMMA101 | Major Subject | Microprocessor Architecture with 8085 | 2 |
| VGVUSTMP101 | Major Subject Practical | Principles of Programming Languages using C and Microprocessor Architecture with 8085 Practical | 2 |
| VGVUOE112 | Open Elective Subject | Basic Accounting and Practices | 4 |
| VGVUOE115 | | Financial Markets | |
| VGVUOE119 | | History of Media | |
| VGVUOE120 | | Indian Financial System | |
| VGVUOE121 | | Introduction to Managerial Practices | |
| VGVUOE122 | | Organizational Behaviour | |
| VGVUOE123 | | The India Story | |
| VGVUOE124 | | Visual Communication | |
| VGVUSTVSE101 | Vocational Skill Enhancement Course | Discrete Mathematics | 2 |
| VGVUSTVSEP101 | Vocational Skill Enhancement Course Pr | Numerical Computations using Scilab Practical | 2 |
| VGVUFAE103 | Ability Enhancement Course | Effective Communication Skills | 2 |
| VGVUVE108 | Value Education Course | Environmental study for sustainable IT - I | 2 |
| VGVUIKS106 | Indian Knowledge System | Evolution of IT | 2 |
| VGVUCC101 | Co-Curricular Courses | Community Engagement Activities | 2 |
| VGVUCC102 | | Cultural Activities | |
| VGVUCC103 | | National Service Scheme (NSS) | |
| VGVUCC104 | | Sports Activities | |
| VGVUCC105 | | Yoga | |
| | | **Total Credits** | **22** |

| Semester II | | | |
|---|---|---|---|
| **Code** | **Course Type** | **Course Title** | **Credits** |
| VGVUSTMOP201 | Major Subject | Object Oriented Programming using C++ | 2 |
| VGVUSTMDS201 | Major Subject | Database Management Systems | 2 |
| VGVUSTMP201 | Major Subject Practical | Object Oriented Programming using C++ and Database Management Systems Practical | 2 |
| VGVUSTNDS201 | Minor Subject | Basics of Data Science | 2 |
| VGVUOE212 | Open Elective Subject | Basic Accounting and Practices | 4 |
| VGVUOE215 | | Financial Markets | |
| VGVUOE219 | | History of Media | |
| VGVUOE220 | | Indian Financial System | |
| VGVUOE221 | | Introduction to Managerial Practices | |
| VGVUOE222 | | Organizational Behaviour | |
| VGVUOE223 | | The India Story | |
| VGVUOE224 | | Visual Communication | |
| VGVUSTVSE201 | Vocational Skill Enhancement Course | Fundamentals of Digital Electronics | 2 |
| VGVUSTVSEP201 | Vocational Skill Enhancement Course Pr | Fundamentals of Digital Electronics Practical | 2 |
| VGVUFAE204 | Ability Enhancement Course | Web Programming | 2 |
| VGVUVE206 | Value Education Course | Environmental study for sustainable IT - II | 2 |
| VGVUCC201 | Co-Curricular Courses | Community Engagement Activities | 2 |
| VGVUCC202 | | Cultural Activities | |
| VGVUCC203 | | National Service Scheme (NSS) | |
| VGVUCC204 | | Sports Activities | |
| VGVUCC205 | | Yoga | |
| | | **Total Credits** | **22** |

# SEMESTER I

| B. Sc (Information Technology) | | Semester – I | |
|---|---|---|---|
| Course Name: Principles of Programming Languages using C | | Course Code: VGVUSTMPP101 | |
| Periods per week (1 Period is 60 minutes) | | 2 | |
| Credits | | 2 | |
| | | Hours | Marks |
| Evaluation System | Theory Examination | 2 | 60 |
| | Internal | -- | 40 |

| Course Objective |
|---|
| To make learners understand and use |
| 1. Concept of programming language. |
| 2. Concept of operators, data input and output, Conditional statements and loops in C. |
| 3. Concept of Arrays and Functions in C. |
| 4. Concept of structure in C. |
| 5. Concept of pointers in C. |

| Unit | Details | Lectures |
|---|---|---|
| I | **Introduction :** Types of programming language, Introduction to C programming language, importance of C, sample C program, basic structure of C program, programming style, Compilation and execution of a C program<br>**Fundamentals :** Character set, C tokens, Keywords and identifiers, Constants, Variables, Data types, Declaration of variables, assigning values to variables, Defining symbolic constants.<br>**Operators and Expression :** Introduction, Arithmetic of Operators, Relational operators, Logical operators, Assignments operators, Increment and Decrement operators, Conditional operator, Bitwise operators, Special operators, Arithmetic expressions, Precedence of arithmetic operators, Type conversion in expression, operator precedence and associativity, Mathematical functions.<br>**Managing Input and Output :** Reading a character, Writing a character, formatted input, formatted output | 10 |
| II | **Decision Making and branching :** Introduction, Simple if statement, The if else statement, nesting of if else statement, The else if ladder, The switch statement, The goto statement<br>**Decision Making and looping :** Introduction, The while statement, The do while statement, The for statement, Jumps in loops | 10 |

| | | |
|---|---|---|
| | **Arrays :** Introduction, One Dimensional arrays, Two Dimensional arrays, initializing Two Dimensional arrays, Multidimensional arrays.<br>**User-Defined Functions :** Introduction, Need for user defined functions, Defining function, Declaring function, Calling function, Category of functions, Nesting of functions, Recursion, functions with arrays, Scope and lifetime of variables in functions. | |
| III | **Structures :** Introduction, Structure definition, Declaring structure variables, Accessing structure members, Structure initialization, Arrays of structures, Arrays within structures.<br>**Pointers :** Introduction, Declaring and initializing pointers, pointer expression, pointers and arrays. | 10 |

| **Course Outcome** | |
|---|---|
| **Learner will be able to** | |
| **CO1** | Understand various concepts of C language. |
| **CO2** | Understand the use of input, output statements of C. |
| **CO3** | Understand the concept and write the C language program using various looping statements and decision making statements., structures and pointers. |
| **CO4** | Understand the concept and write the C language program using arrays. |
| **CO5** | Understand the concept and write the C language program structures and pointers. |

**Books and References:**

| Sr. No. | Title | Author/s | Publisher | Edition | Year |
|---|---|---|---|---|---|
| 1. | Programming in ANSI | E. Balagurusamy | Tata McGRAW-Hill | | |
| 2. | Programming with C | Byron Gottfried | Tata McGRAW-Hill | 2nd | 1996 |
| 3 | Programming Logic and Design | Joyce Farell | Cengage Learning | 8th | 2014 |
| 4 | Let us C | Yashwant P. Kanetkar | BPB publication | | |
| 5 | "C" Programming" | Brian W. Kernighan and Denis M. Ritchie. | PHI | 2nd | |

| B. Sc (Information Technology) | | Semester – I | |
|---|---|---|---|
| **Course Name: Principles of Programming Languages using C Practical** | | **Course Code: VGVUSTMP101** | |
| **Periods per week (1 Period is 120 minutes)** | | **1** | |
| **Credits** | | **1** | |
| | | **Hours** | **Marks** |
| **Evaluation System** | **Practical Examination** | **2** | **50** |
| | **Internal** | **--** | **--** |

| **Course Objective** |
|---|
| To make learners able to develop programs |
| 1. Using variables, operators |
| 2. To demonstrate use of decision making and looping statements using C. |
| 3. To implement the concept of Arrays and Functions in C. |
| 4. To demonstrate use of structure in C. |
| 5. To demonstrate the concept of pointers in C. |

| **List of Practical:** | |
|---|---|
| **1.** | **Basic Programs:** |
| a. | Write a program to find the addition, subtraction, multiplication and division of two numbers. |
| b. | Write a program to swap two numbers without using a third variable. |
| | |
| **2.** | **Programs on variables:** |
| a. | Write a program to find the area of rectangle, square and circle. |
| b. | Write a program to find the volume of a cube, sphere, and cylinder. |
| c. | Write a program to find the largest of three numbers. |
| | |
| **3.** | **Conditional statements and loops(basic):** |
| a. | Write a program to enter a number from the user and display the month name. If number >13 then display invalid input using switch case. |
| b. | Write a program to check whether the number is even or odd. |
| c. | Write a program to check whether the number is positive, negative or zero. |
| d. | Write a program to find the factorial of a number. |
| e. | Write a program to check whether the entered number is prime or not. |

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| **4.** | **Conditional statements and loops(advanced):** |
| a. | Write a program to find the sum of squares of digits of a number. |
| b. | Write a program to reverse the digits of an integer. |
| c. | Write a program to print the Fibbonacci series. |
| d. | Write a program to find whether a given number is palindrome or not. |
| e. | Write a program to count the digit in a number. |
| | |
| **5.** | **Functions:** |
| a. | Programs on Functions. |
| | |
| **6.** | **Recursive Functions:** |
| a. | Write a program to find the factorial of a number using a recursive function. |
| b. | Write a program to find the sum of natural numbers using a recursive function. |
| | |
| **7.** | **Arrays:** |
| a. | Write a program to find the largest value that is stored in the array. |
| b. | Write a program to arrange the 'n' numbers stored in the array in ascending and/or descending order. |
| c. | Write a program that performs addition, subtraction and multiplication of matrices. |
| | |
| **8.** | **Pointers and Structures:** |
| a. | Write a program to perform addition and subtraction of two pointer variables. |
| b. | Define a structure named Learner that stores the roll number, name, class, marks of five subjects. Write a C program that will take the Information of Learner from user and display marksheet. |

| **Course Outcome** |
|---|
| **Learner will be able to** |
| **CO1** Write a simple program using C language. |
| **CO2** Implement the C language Concepts like variables, operators. |
| **CO3** Implement the C language program using arrays, structures and pointers. |
| **CO4** Implement the C language program with user defined functions. |
| **CO5** Motivate them to develop projects / applications using C language. |

| B. Sc. (Information Technology) | | Semester – I | |
|---|---|---|---|
| **Course Name: Microprocessor Architecture** | | **Course Code: VGVUSTMMA101** | |
| **Periods per week (1 Period is 60 minutes)** | | **2** | |
| **Credits** | | **2** | |
| | | **Hours** | **Marks** |
| **Evaluation System** | **Theory Examination** | **2** | **60** |
| | **Internal** | **--** | **40** |

| **Course Objective** |
|---|
| To make learner understand |
| 1. The microprocessor architecture and memory interface. |
| 2. I/O interfacing with microprocessor and 8085 basic instructions. |
| 3. The assembly programs using 8085. |
| 4. The concept of looping, counters, and time delays in 8085 with instructions. |
| 5. The concept of stack and subroutine. |

| Unit | Details | Lectures |
|---|---|---|
| **I** | **Microprocessor, microcomputers, and Assembly Language:** Microprocessor, Microprocessor Instruction Set and Computer Languages, From Large Computers to Single-Chip Microcontrollers, Applications.<br>**Microprocessor Architecture and Microcomputer System:** Microprocessor Architecture and its operations, Memory, I/O Devices, Microcomputer System, Logic Devices and Interfacing, Microprocessor-Based System Application.<br>**8085 Microprocessor Architecture and Memory Interface:** Introduction, 8085 Microprocessor unit, 8085-Based Microcomputer, Memory Interfacing, Interfacing the 8155 Memory Segment, Illustrative Example: Designing Memory for the MCTS Project,<br>Testing and Troubleshooting Memory Interfacing Circuit,8085-Based Single-Board microcomputer. | **10** |

| | | |
|---|---|---|
| **II** | **Interfacing of I/O Devices :** Basic Interfacing Concepts, Interfacing Output Displays, Interfacing Input Devices, Memory Mapped I/O, Testing and Troubleshooting I/O Interfacing Circuits.<br>**Introduction to 8085 Assembly Language Programming:** 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.<br>**Introduction to 8085 Instructions:** Data Transfer Operations, Arithmetic Operations, Logic Operation, Branch Operation, Writing Assembly Languages Programs, Debugging a Program. | **10** |
| **III** | **Programming Techniques With Additional Instructions:** Programming Techniques: Looping, Counting and Indexing, Additional Data Transfer and 16-Bit Arithmetic Instructions Arithmetic Instruction Related to Memory, Logic Operations: Rotate, Logics Operations: Compare, Dynamic Debugging.<br>**Counters and Time Delays:** 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<br>**Stacks and Sub-Routines:** Stack, Subroutine, Restart, Conditional Call, Return Instructions, Advanced Subroutine concepts. | **10** |

| **Course Outcome** | |
|---|---|
| **Learners should be able to** | |
| **CO1** | Understand basic knowledge of microprocessors. |
| **CO2** | Understand the architecture of a microprocessor 8085. |
| **CO3** | Map memory with processor. |
| **CO4** | Understand the instruction set of 8085. |
| **CO5** | Understand the concepts of timers, delays, counters, stacks, and subroutines in relation to the 8085. |

| **Books and References:** | | | | | |
|---|---|---|---|---|---|
| **Sr. No.** | **Title** | **Author/s** | **Publisher** | **Edition** | **Year** |
| 1. | Microprocessors Architecture, Programming and Applications with the 8085. | Ramesh Gaonkar | PENRAM | Fifth | 2012 |
| 2. | Computer System Architecture | M. Morris Mano | PHI | | 1998 |
| 3. | Structured Computer Organization | Andrew C. Tanenbaum | PHI | | |

| B. Sc. (Information Technology) | | Semester – I | |
|---|---|---|---|
| **Course Name: Microprocessor Architecture Practical** | | **Course Code: VGVUSTMP101** | |
| **Periods per week (1 Period is 120 minutes)** | | **1** | |
| **Credits** | | **1** | |
| | | **Hours** | **Marks** |
| **Evaluation System** | **Practical Examination** | **2** | **50** |
| | **Internal** | **--** | **--** |

| **Course Objective** |
|---|
| To make learner implement 8085-based programs to |
| 1. Perform memory operations. |
| 2. Carry out operations like addition, subtraction, 1's complement, 2's complement. |
| 3. Perform Register based operations. |
| 4. Carry out operations with multiple memory locations. |
| 5. Perform operations with respect to memory locations. |

| **List of Practical** | |
|---|---|
| **1.** | **Perform the following Operations related to memory locations:** |
| a. | Exchange the contents of memory locations C200H and C201H. |
| b. | Add the contents of memory locations C200H and C201H and place the result in the memory locations C202H and C203H.<br>Subtract the contents of memory location C201H from the memory location C200H and place the result in memory location C004H. |
| **2.** | **Simple assembly language programs I:** |
| a. | Add the 16-bit number in memory locations C200H and C201H to the 16-bit number in memory locations C202H and C203H. The most significant eight bits of the two numbers to be added are in memory locations C200H and C202H. Store the result in memory locations C204H and C205H with the most significant byte in memory location 4005H. |
| b. | Subtract the 16-bit number in memory locations C202H and C203H from the 16- bit number in memory locations C200H and C201H. The most significant eight bits of the two numbers are in memory locations C201H and C203H. Store the result in memory locations C204H and C205H with the most significant byte in memory location C205H. |
| **3.** | **Simple assembly language programs II :** |
| a. | Find the l's complement of the number stored at memory location C200H and store the complemented number at memory location C300H. |

| | |
|---|---|
| b. | Find the 2's complement of the number stored at memory location C200H and store the complemented number at memory location C300H. |
| **4.** | **Register Operations I:** |
| a. | Write a program to shift 8-bit data four bits right. Assume that data is in register C. |
| b. | Program to shift 16-bit data 1 bit left. Assume data is in the HL register pair |
| c. | Write a program to count the number of l's in the contents of D register and store the count in the B register. |
| **5.** | **Multiple memory locations I:** |
| a. | Multiply two 8-bit numbers stored in memory locations C200H and C201H by repetitive addition and store the result in memory locations C300H and C301H. |
| b. | Divide the 16-bit number stored in memory locations C200H and C201H by the 8 bit number stored at memory location C202H. Store the quotient in memory locations C300H and C301H and remainder in memory locations C302H and C303H. |
| **6.** | **Multiple memory locations II:** |
| a. | Find the number of negative elements (most significant bit 1) in a block of data. The length of the block is in memory location C200H and the block itself begins in memory location C201H. Store the number of negative elements in memory location C300H. |
| b. | Find the largest number in a block of data. The length of the block is in memory location C200H and the block itself starts from memory location C201H. Store the Maximum number in memory location C300H. Assume that the numbers in the block are all 8-bit unsigned binary numbers. |
| **7.** | **Calculations with respect to memory locations:** |
| a. | Write a program to sort given 10 numbers from memory location C200H in the ascending order. |
| b. | Calculate the sum of a series of even / odd numbers from the list of numbers. The length of the list is in memory location C200H and the series itself begins from memory location C201H. Assume the sum to be an 8 bit number so you can ignore carries and store the sum at memory location C250H. |
| **8.** | **Calculations with respect to memory locations:** |
| d. | Find the square of the given numbers from memory location C100H and store the result from memory location C200H. |
| e. | A list of 50 numbers is stored in memory, starting at C200H. Find the number of negative, zero and positive numbers from this list and store these results in memory locations C300H, C301H, and C302H respectively. |

| Course Outcome | |
|---|---|
| **Learners should be able** | |
| **CO1** | To write 8085 based simple assembly language programs. |
| **CO2** | To implement 8085 programs for handling memory. |
| **CO3** | To write a program for handling 8085 registers. |
| **CO4** | To carry out various arithmetic operations using 8085 instructions. |
| **CO5** | To write an 8085 program to carry out calculations with respect to memory. |

**Books and References:**

| Sr. No. | Title | Author/s | Publisher | Edition | Year |
|---|---|---|---|---|---|
| 1. | Microprocessors Architecture, Programming and Applications with the 8085. | Ramesh Gaonkar | PENRAM | Fifth | 2012 |
| 2. | 8080A/8085 Assembly Language Programming | Lance A. Leventhel | Osborne | | 1978 |

| B. Sc. (Information Technology) | | Semester – I | |
|---|---|---|---|
| **Course Name: Discrete Mathematics** | | **Course Code: VGVUSTVSE101** | |
| **Periods per week (1 Period is 60 minutes)** | | **2** | |
| **Credits** | | **2** | |
| | | **Hours** | **Marks** |
| **Evaluation System** | **Theory Examination** | **2** | **60** |
| | **Internal** | **--** | **40** |

| **Course Objective** |
|---|
| To make learner understand / implement |
| 1. Concept of set theory |
| 2. Elementary Number Theory and Methods of Proof. |
| 3. Use of Addition Rule and probability concepts. |
| 4. Concept of Relations, graphs and trees. |
| 5. Sequences, Mathematical Induction, and Recursion. |

| Unit | Details | Lectures |
|---|---|---|
| **I** | **Introduction**: Variables, The Language of Sets, The Language of Relations and function. **Functions**: Functions Defined on General Sets, One-to-One and Onto, Inverse Functions, Composition of Functions, and Cardinality with Applications to Computability.<br>**Relations**: Relations on Sets, Reflexivity, Symmetry, and Transitivity, Equivalence Relations, Partial Order Relations.<br>**Set Theory**: Definitions and the Element Method of Proof, Properties of Sets, Disproof's, Algebraic Proofs, Boolean Algebras, Russell's Paradox and the Halting Problem. | **10** |
| **II** | **The Logic of Compound Statements**: Logical form and Logical Equivalence, Conditional Statements, Valid and Invalid Arguments.<br>**Quantified Statements**: Predicates and Quantified Statements, Statements with Multiple Quantifiers, Arguments with Quantified Statements.<br>**Elementary Number Theory and Methods of Proof**: Introduction to Direct Proofs, Rational Numbers, Divisibility, Division into Cases and the Quotient-Remainder Theorem, floor and Ceiling, Indirect ArgumentContradiction and Contraposition, Two Classical Theorems, Applications in algorithms.<br>**Probability** : Basics of Probability, Addition rule | **10** |

| | | |
|---|---|---|
| **III** | **Sequences, Mathematical Induction, and Recursion**: Sequences, Mathematical Induction, Strong Mathematical Induction and the Well-Ordering Principle or the Integers, Correctness of algorithms, defining sequences recursively, solving recurrence relations by iteration, Second order linear homogeneous recurrence relations with constant coefficients. General recursive definitions and structural induction.<br>**Graphs and Trees**: Definitions and Basic Properties, Trails, Paths, and Circuits, Matrix Representations of Graphs, Isomorphism of Graphs, Trees, Rooted Trees, Isomorphism of Graphs, Spanning trees and shortest paths | **10** |

| **Course Outcome** | |
|---|---|
| **Learners should be able to** | |
| **CO1** | Understand the basic principles of sets and operations in sets. |
| **CO2** | Understand the working with relations and investigate their properties. |
| **CO3** | Analyse mathematical properties using mathematical induction methods, study functions, spaces, and other mathematical structures using sequences and use of recursion. |
| **CO4** | Understand relation, graphs and trees in various applications. |
| **CO5** | Understand the use of the SCILAB tool to solve mathematical problems. |

**Books and References:**

| Sr. No. | Title | Author/s | Publisher | Edition | Year |
|---|---|---|---|---|---|
| 1. | Discrete Mathematics with Applications | Sussana S. Epp | Cengage Learning | 4th | 2010 |
| 2. | Discrete Mathematics, Schaum's Outlines Series | Seymour Lipschutz, Marc Lipson | Tata MCGraw Hill | | 2007 |
| 3. | Discrete Mathematics and its Applications | Kenneth H. Rosen | Tata MCGraw Hill | | |
| 4. | Discrete mathematical structures | B KolmanRC Busby, SRoss | PHI | | |
| 5. | Discrete structures | Liu | Tata MCGraw Hill | | |

| B. Sc. (Information Technology) | | Semester – I | |
|---|---|---|---|
| **Course Name: Numerical Computation using Scilab Practical** | | **Course Code: VGVUSTVSEP101** | |
| **Periods per week (1 Period is 60 minutes)** | | **2** | |
| **Credits** | | **2** | |
| | | **Hours** | **Marks** |
| **Evaluation System** | **Practical Examination** | 3 | **100** |
| | **Internal** | -- | -- |

| **Course Objective** |
|---|
| To make learner understand / implement |
| 1. To be able execute programs of discrete mathematics concepts in Scilab software easily. |
| 2. To implement programs on Set theory, functions and algorithms. |
| 3. To execute different topics related to probability using the Scilab software. |
| 4. To represent concepts of graph theory, directed graphs, and their subtopics in the form of a program. |
| 5. To implement topics like Algebraic systems, Boolean algebra, Recurrence relations in a practical manner. |

| **List of Practical: Write the programs or the following using SCILAB** | |
|---|---|
| **1.** | **Set Theory :** |
| a. | Inclusion Exclusion principle. |
| b. | Power Sets |
| | |
| **2.** | **Functions and Algorithms :** |
| a. | Recursively defined Functions |
| b. | Cardinality |
| c. | Polynomial evaluation |
| d. | Greatest Common Divisor |
| | |
| **3.** | **Sequences :** |
| a. | Summation Notation, Product Notation |
| b. | Mathematical Induction |
| | |

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|---|---|
| **4.** | **Probability Theory :** |
| a. | Sample space and events |
| b. | Finite probability spaces |
| | |
| **5.** | **Counting Elements Of Disjoints Sets :** |
| a. | Addition Principle |
| b. | Conditional Probability |
| c. | Independent events |
| d. | Repeated trials with two outcomes |
| | |
| **6.** | **Directed Graphs :** |
| a. | Adjacency matrix |
| b. | Path matrix |
| | |
| **7.** | **Undirected Graphs :** |
| a. | Adjacency matrix |
| b. | Path matrix |
| | |
| **8.** | **Graph Theory :** |
| a. | Paths and connectivity |
| b. | Minimum spanning tree |
| c. | Isomorphism |
| | |
| **9.** | **Tree :** |
| a. | Minimum spanning tree |
| b. | Shortest path algorithm Kruskal or Prims |
| | |
| **10.** | **Recurrence relations :** |
| 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 Outcome |
| --- |
| To make learner understand / implement |
| 1. Learner will be able to become familiar with the Scilab environment |
| 2. Implement programs on Inclusion Exclusion principle, power sets, recursively defined functions, Mathematical Induction Cardinality in Scilab |
| 3. Execute programs like Sum principle, Product principle, Factorial, Permutations and Combinations, Sample space and events, Conditional Probability, Finite probability spaces |
| 4. Implement concepts in Scilab like paths and connectivity, minimum spanning tree, isomorphism, adjacency matrix, path matrix. |
| 5. Implement recurrence relations by iteration, Second order linear homogenous recurrence relations with constant coefficients |

| B. Sc (Information Technology) | | Semester – I | |
|---|---|---|---|
| Course Name: Effective Communication Skills | | Course Code: VGVUFAE103 | |
| Periods per week (1 Period is 60 minutes) | | 2 | |
| Credits | | 2 | |
| | | Hours | Marks |
| Evaluation System | Theory Examination | 2 | 60 |
| | Internal | | 40 |

| Course Objective |
|---|
| To make learner understand |
| 1. Recognized seven C's of communication. |
| 2. Importance of nonverbal communication. |
| 3. Oral as well as written communication skills. |
| 4. The importance of voice tone and body language in effective communication. |
| 5. Communicate the message in businesses in an effective and engaging way. |

| Unit | Details | Lectures |
|---|---|---|
| I | **The Seven Cs of Effective Communication:** Completeness, Conciseness, Consideration, Concreteness, Clarity, Courtesy, Correctness. **Understanding Business Communication:** Nature and Scope of Communication, Non-verbal Communication, Technology-enabled Business Communication. | 10 |
| II | **Writing Business Messages and Documents:** Business writing, Business Correspondence, Instructions Business Reports and Proposals, Career building and Resume writing. **Developing Oral Communication Skills or Business:** Effective Listening, Business Presentations and Public Speaking, Conversations, Interviews | 10 |
| III | **Developing Oral Communication Skills or Business:** Meetings. Group Discussions and Team Presentations and team Briefing. **Understanding Specific Communication Needs:** Communication across functional Areas, Corporate Communication, Persuasive Strategies in Business Communication, Ethics in Business Communication. | 10 |

| Course Outcome |
|---|
| **Learners should be able to** |
| **CO1** Understand and apply communication theory. |
| **CO2** Develop and enhance understanding, and create reports with others. |
| **CO3** Participate effectively in small group interactions. |
| **CO4** Prepare and deliver effective oral presentations. |
| **CO5** Improve and broaden your writing abilities for business messages and documents. |

**Books and References:**

| Sr. No. | Title | Author/s | Publisher | Edition | Year |
|---|---|---|---|---|---|
| 1. | Business Communication | Edited by Meenakshi Raman and Prakash Singh | Oxford University Press | Second | |
| 2. | Professional Communication | Aruna Koneru | Tata McGraw Hill | | |
| 3. | Strategies for improving your business communication | Pro. M. S. Rao | Shroff publishers and distributors | | 2016 |
| 4. | Business Communication | Dr. Rishipal and Dr. Jyoti Sheoran | SPD | | 2014 |

| B. Sc (Information Technology) | | Semester – I | |
|---|---|---|---|
| Course Name: Environmental Study for Sustainable IT I | | Course Code: VGVUVE108 | |
| Periods per week (1 Period is 60 minutes) | | 2 | |
| Credits | | 2 | |
| | | Hours | Marks |
| Evaluation System | Theory Examination | 2 | 60 |
| | Internal | | 40 |

| Course Objective |
|---|
| To aid learner to |
| 1. Understand the concept of Green IT , green IT's hardware and software aspects, |
| 2. Understand how software characteristics impact the sustainability or greenness of computing applications, and outlines the notion of sustainable software engineering. |
| 3. Understand Key sustainability challenges associated with data centers and strategies to minimize data center's energy consumption and carbon footprint. |
| 4. Understand regulatory, non regulatory and other influences affecting business and the IT industry to make them more environmentally sustainable. |
| 5. Get in-depth coverage of energy-efficient storage technologies and data storage systems. |

| Unit | Details | Lectures |
|---|---|---|
| I | **Green IT An Overview :** Introduction, Environmental Concerns and Sustainable Development, Environmental Impacts of IT, Green IT, Holistic Approach to Greening IT, Greening IT, Applying IT for Enhancing Environmental Sustainability, Green IT Standards and Eco-Labelling of IT.<br>**Green Devices and Hardware :** Introduction, Life Cycle of a Device or Hardware, Reuse, Recycle and Dispose<br>**Green Software :** Introduction, Energy-Saving Software Techniques, Evaluating and Measuring Software Impact to Platform Power. | 10 |
| II | **Sustainable Software Development :** Introduction, Current Practices, Sustainable Software, Software Sustainability Attributes, Software Sustainability Metrics,Sustainable Software Methodology, Defining Actions.<br>**Regulating Green IT: Laws, Standards and Protocols :** Introduction, Introduction, Nonregulatory Government Initiatives, Industry Associations and Standards Bodies, Green Building Standards, Green Data Centres, Social Movements and Greenpeace. | 10 |

| | | |
|---|---|---|
| III | **Green Data Storage :** Introduction, Storage Media Power Characteristics, Energy Management Techniques for Hard Disks, System-Level Energy Management.<br>**Green Data Centres :** Data Centres and Associated Energy Challenges, Data Centre IT Infrastructure, Data Centre Facility Infrastructure: Implications for Energy Efficiency, IT Infrastructure Management, Green Data Centre Metrics | 10 |

| **Course Outcome** | |
|---|---|
| **Learners should be able to** | |
| **CO1** | Discusses the scope of emerging green IT regulations and public policy. |
| **CO2** | Identify the energy management techniques. |
| **CO3** | Know laws, standards and regulations related to Green IT. |
| **CO4** | Discuss how the choice of hardware and software can facilitate a more sustainable operation. |
| **CO5** | Develop knowledge about green data storage and data centers. |

**Books and References:**

| Sr. No. | Title | Author/s | Publisher | Edition | Year |
|---|---|---|---|---|---|
| 1. | Green IT | Toby Velte, Anthony Velte, & Robert Elsenpeter | McGraw Hill | | 2008 |
| 2. | Harnessing Green It Principles And Practices | San Murugesan, G.R. Gangadharan | WILEY | | - |
| 3. | Green Data Center: Steps for the Journey | Alvin Galea, Michael Schaefer,Mike Ebbers | Shroff Publishers And Distributors | | 2011 |
| 4. | Green Computing and Green IT Best Practice | Jason Harris | Emereo | | |
| 5. | Green Computing Tools and Techniques for Saving Energy, Money and Resources | Bud E. Smith | CRC Press | | 2014 |

| B. Sc (Information Technology) | | Semester – I | |
|---|---|---|---|
| Course Name: Evolution of Information Technology | | Course Code: VGVUIKS106 | |
| Periods per week (1 Period is 60 minutes) | | 2 | |
| Credits | | 2 | |
| | | Hours | Marks |
| Evaluation System | Theory Examination | 02 | 60 |
| | Internal | | 40 |

| Course Objective |
|---|
| To make learner understand |
| 1. Basics of Computer. |
| 2. Various storage devices. |
| 3. Applications of IT |
| 4. Concept of Hardware, Software and Networking devices. |
| 5. Concepts of IT and IT Act 2000 |

| Unit | Details | Lectures |
|---|---|---|
| I | **Computer Generation and its classification:** Introduction, What is Computer, Characteristics of computer, Evolution of Computer, Block Diagram of a computer, Generations of Computers. **Computer Organization:** Input Units: Keyboard, Terminals and its types. Pointing Devices, Scanners and its types, Voice Recognition Systems, Vision Input System, Touch Screen, Output Units: Monitors and its types. Printers: Impact Printers and its types. Non Impact Printers and its types, Plotters, types of plotters, Sound cards, Speakers. **Storage Devices**: Primary Vs Secondary Storage, Data storage & retrieval methods. Primary Storage: RAM ROM, PROM, EPROM, EEPROM. Secondary Storage: Magnetic Tapes, Magnetic Disks. Cartridge tape, hard disks, Floppy disks Optical Disks, Compact Disks, Zip Drive, Flash Drives. | 10 |
| II | **Software:** Software and its needs, Types of S/W. System Software: Operating System, Utility Programs Programming Language: Machine Language, Assembly Language, High Level Language, advantages & disadvantages of programming language. Application S/W and its types Operating systems and its purpose, Examples of operating systems **Data Communication**: Introduction, Communication Types (modes), Data | 10 |

| | | |
|---|---|---|
| | Transmission Medias, Modem and its working, characteristics, Types of Networks, Topologies, Computer Protocols.<br>**Internet and the World Wide Web:**<br>What is Internet? Evolution of Internet, Internet service providers, Internet and its applications, E-mail, Telnet, FTP, domain name server, Internet address, World Wide Web (WWW): World Wide Web uniform resource locator (URL), Browsers–Internet Explorer, Netscape Navigator, Opera, Firefox, Chrome, Mozilla. | |
| **III** | **Information Technology(IT) and Applications of IT:**<br>Information Technology, Evolution of IT, Trends in IT. Web Application, Mobile-based Application, Its use in Health Industry, Pharmaceutical and other areas.<br>**I.T. Act 2000:**<br>Introduction of IT Act 2000, Offences in IT Act 2000, Various provisions of IT Act 2000. | **10** |

| Course Outcome | |
|---|---|
| Learners should be able to | |
| CO1 | Understand Computers, generations of Computers and Information Technology. |
| CO2 | Develop basics of Internet and it applications |
| CO3 | Know the basics of Hardware and Networking devices |
| CO4 | Understand various software and its types. |
| CO5 | Basics of I.T. Act 2000. |

**Books and References:**

| Sr. No. | Title | Author/s | Publisher | Edition | Year |
|---|---|---|---|---|---|
| 1. | Fundamentals of Computers | V. Rajaraman and Neeharika A. | PHI Learning | Sixth | 2015 |
| 2. | Data communication and networking | Behrouz. Forouzan | Tata McGraw Hill | 5th edition | 2013 |
| 3. | Cyber law simplified | Vivek Sood | Tata McGraw Hill | | |

# SEMESTER II

| B. Sc. (Information Technology) | | Semester – II | |
|---|---|---|---|
| Course Name: Object Oriented Programming using C++ | | Course Code: VGVUSTMOP201 | |
| Periods per week (1 Period is 60 minutes) | | 2 | |
| Credits | | 2 | |
| | | Hours | Marks |
| Evaluation System | Theory Examination | 2 | 60 |
| | Internal | -- | 40 |
| | | | |

| Course Objective |
|---|
| To make learner understand / implement |
| 1. Basic Object Oriented Methodology and principles. |
| 2. Concept of classes and objects, constructors and destructors. |
| 3. Polymorphism and virtual functions. |
| 4. Inheritance and exception handling. |
| 5. File handling and OOPs concepts using C++. |

| Unit | Details | Lectures |
|---|---|---|
| I | **Object Oriented Methodology**: Introduction, Advantages and Disadvantages of Procedure Oriented Languages, Application of OOPS, Principles of OOPS: Objects, Classes, Data Abstraction and Data Encapsulation, Inheritance, Polymorphism, Dynamic Binding, Message Passing.<br>**Classes and Objects:** Simple classes (Class specification, class members accessing), Defining member functions, passing object as an argument, Returning object from functions, friend classes, friend function.<br>**Constructors and Destructors:** Introduction, Default Constructor, Parameterized Constructor and examples, Destructors. | 10 |
| II | **Program development using Inheritance:** Introduction, Advantages provided by inheritance, choosing the access specifier, Derived class declaration, derived class constructors, class hierarchies, multiple inheritance, multilevel inheritance, hybrid inheritance.<br>**Polymorphism:** Concept of function overloading, overloaded operators, overloading unary and binary operators. | 10 |

| | | |
|---|---|---|
| **III** | **Virtual Functions:** Introduction and need, Pure Virtual Functions, this Pointer, abstract classes, virtual destructors.<br>**Exception Handling:** Introduction, Exception Handling Mechanism, Concept of throw & catch with example.<br>**Working with Files:** Introduction, File Operations, Various File Modes, File Pointer and their Manipulation. | **10** |

| **Course Outcome** |
|---|
| **Learners should be able use C++ language to** |
| **CO1** Implement the basic principles of OOPs |
| **CO2** Implement Object Oriented Concepts like classes , constructors, destructors etc. |
| **CO3** Implement various types of inheritance, polymorphism and virtual function. |
| **CO4** Implement exception and file handling. |
| **CO5** Develop a project / application using C++. |

**Books and References:**

| Sr. No. | Title | Author/s | Publisher | Edition | Year |
|---|---|---|---|---|---|
| 1. | Object Oriented Analysis and Design | Timothy Budd | TMH | 3rd | 2012 |
| 2. | Mastering C++ | K R Venugopal, Rajkumar Buyya, T Ravishankar | Tata McGraw Hill | 2nd | 2011 |
| 3. | C++ for beginners | B. M. Hirwani | SPD | | 2013 |
| 4. | Effective Modern C++ | Scott Meyers | SPD | | |
| 5. | Object Oriented Programming with C++ | E. Balagurusamy | Tata McGraw Hill | 4th | |
| 6. | Learning Python | Mark Lutz | O' Reilly | 5th | 2013 |
| 7. | Mastering Object Oriented Python | Steven F. Lott | Pact Publishing | | 2014 |

| B. Sc. (Information Technology) | | Semester – II | |
|---|---|---|---|
| **Course Name: Object Oriented Programming using C++ Practical** | | **Course Code: VGVUSTMP201** | |
| **Periods per week (1 Period is 120 minutes)** | | **1** | |
| **Credits** | | **1** | |
| | | **Hours** | **Marks** |
| **Evaluation System** | **Practical Examination** | **2** | **50** |
| | **Internal** | **--** | **--** |

| **Course Objective** |
|---|
| To make learner understand / implement |
| 1. The installation process of software used for C++ and OOPs concepts. |
| 2. The familiar of software and working of C++ programs. |
| 3. Implementation of Libraries in programs. |
| 4. Implementation of Object-Oriented Principles in C++ programs. |
| 5. Implement various OOPs concepts using C++. |

| **List of Practical:** | |
|---|---|
| **1.** | **Classes and methods :** |
| a. | Design an employee class for reading and displaying the employee information, the getInfo() and displayInfo() methods will be used respectively. Where getInfo() will be private method |
| b. | Design the class Learner containing getData() and displayData() as two of its methods which will be used for reading and displaying the Learner information respectively. Where getData() will be a private method. |
| c. | Design the class Demo which will contain the following methods: readNo(), factorial() for calculating the factorial of a number, reverseNo() will reverse the given number, isPalindrome() will check the given number is palindrome,<br>isArmstrong() which will calculate whether the given number is armStrong or not.WhereareadNo() will be a private method. |
| d. | Write a program to demonstrate function definition outside class and accessing class members in function definition. |
| | |
| **2.** | **Using friend functions :** |
| a. | Write a friend function for adding the two complex numbers, using a single class |
| b. | Write a friend function for adding two different distances and display its sum, using two classes. |

| | |
|---|---|
| c. | Write a friend function for adding two matrices from two different classes and display its sum. |
| | |
| **3.** | **Constructors and method overloading :** |
| a. | Design a class Complex for adding the two complex numbers and also show the use of constructor. |
| b. | Design a class Geometry containing the methods area() and volume() andalso overload the area() function . |
| c. | Design a class StaticDemo to show the implementation of static variables and static functions. |
| | |
| **4.** | **Operator Overloading :** |
| a. | Overload the operator unary(-) for demonstrating operator overloading. |
| b. | Overload the operator+ for adding the timings of two clocks, And also pass objects as an argument. |
| c. | Overload the + for concatenating the two strings. For e.g "Py" + "thon" = Python |
| | |
| **5.** | **Inheritance :** |
| a. | Design a class for single level inheritance using public and private type derivation. |
| b. | Design a class for multiple inheritance. |
| c. | Implement hierarchical inheritance. |
| | |
| **6.** | **Virtual functions and abstract classes :** |
| a. | Implement the concept of method overriding. |
| b. | Show the use of virtual function |
| c. | Show the implementation of abstract class. |
| | |
| **7.** | **Exception handling :** |
| a. | Show the implementation of exception handling |
| b. | Show the implementation for exception handling for strings |
| c. | Show the implementation of exception handling for using the pointers. |
| | |
| **8.** | **File handling :** |
| a. | Design a class FileDemo opens a file in read mode and displays the total number of words and lines in the file. |
| b. | Design a class to handle multiple files and file operations |
| c. | Design a editor for appending and editing the files |

| Course Outcome | |
|---|---|
| **Learners should be able use C++ language to** | |
| **CO1** | Implement the syntax and semantics of C++ programming. |
| **CO2** | Understand how to model real world scenarios using class and be able to exhibit the communication between objects. |
| **CO3** | Understand the reusability of programs using the concepts of inheritance and polymorphism. |
| **CO4** | Apply the concepts of Exception handling to develop efficient and error free codes. |
| **CO5** | Implement basic programs which help to read and write the data in a file using file handling. |

| B. Sc. (Information Technology) | | Semester – II | |
|---|---|---|---|
| Course Name: Database Management System | | Course Code: VGVUSTMDS201 | |
| Periods per week (1 Period is 60 minutes) | | 2 | |
| Credits | | 2 | |
| | | Hours | Marks |
| Evaluation System | Theory Examination | 2 | 60 |
| | Internal | -- | 40 |
| | | | |

| Course Objective |
|---|
| To make learner |
| 1. Aware about the concept of database management system with the help of various models of database design. Will be able to design the database schema with the use of ER diagram. |
| 2. Concept of operators, data input and output, Conditional statements and loops in C. |
| 3. Aware of using different constraints for database creation, writing various SQL queries and views concept as well as implement the database concepts using Oracle 11g. |
| 4. Will study transaction management in DBMS. |
| 5. Understand and implement Pl/SQL concept using Oracle 11g. |

| Unit | Details | Lectures |
|---|---|---|
| I | **Introduction :** Database System Applications, Database Systems versus File Systems, View of data, Database languages, Database users and administrators, Transaction management, database architecture.<br>**Data Models**<br>**Entity-relationship model** – Basic concepts. Constraints, Keys, Design Issues, Entity-relationship Diagram, Weak Entity Sets, Extended E-R Features, Reduction of an E-R Schema to Tables.<br>**Relational Model** - Structure of Relational Databases, Basic Structure, Database Schema, Keys, Schema Diagram, Query Languages. | 10 |
| II | **SQL :** Introduction, The Role of SQL,SQL Features and Benefits<br>**Database Structure :** The Data Definition Language, Table Definitions, Constraint Definition<br>**Updating Data :** Adding Data to Database, Deleting data from Database, Modifying data in database.<br>**Retrieving Data :** SQL Basics, Simple Queries, Multitable Queries, Summary Queries, Subqueries.<br>**Views:** What is view?, Creating View, Updating View, Dropping View. | 10 |

| | | |
|---|---|---|
| | **Transaction :** What is a transaction? Transaction Concept, ACID Properties, Transaction State. | |
| III | **PL-SQL**: Introduction,Generic PL/SQL block, Execution Environment, The character set, literals, Data types, Variables, Constants, Logical C\comparisons, Disp[laying user messages on the screen, Comments, Conditional control,Iterative control.<br>**Cursor :** Introduction, Types of cursor, Implicit Cursor, Explicit Cursor, Cursor For Loop, Parameterized cursor.<br>**Error Handling :** Error handling in PL/SQL, Oracle's named Exception Handlers, User Defined Exception Handler for I/O validation and Business Rule validation.<br>**Database Objects :** Stored Procedures and functions, Advantages, Procedures versus Functions, Creating stored Procedure and Functions, Deleting Stored Procedure and Functions, Database Triggers - Introduction, use of database trigger, Database Trigger versus Procedures, Database Trigger versus Declarative Integrity Constraints, Applying Database /triggers, Types of Triggers, Declaring a Trigger. | 10 |

| **Course Outcome** | |
|---|---|
| **Learners should be able to** | |
| **CO1** | Understand the importance of database management system. |
| **CO2** | Create database schema using ER model and Relational Model. |
| **CO3** | Write various SQL queries, apply various constraints, creating database objects. |
| **CO4** | Apply PL SQL concepts. |
| **CO5** | Motivate the student to work as database administrator. |

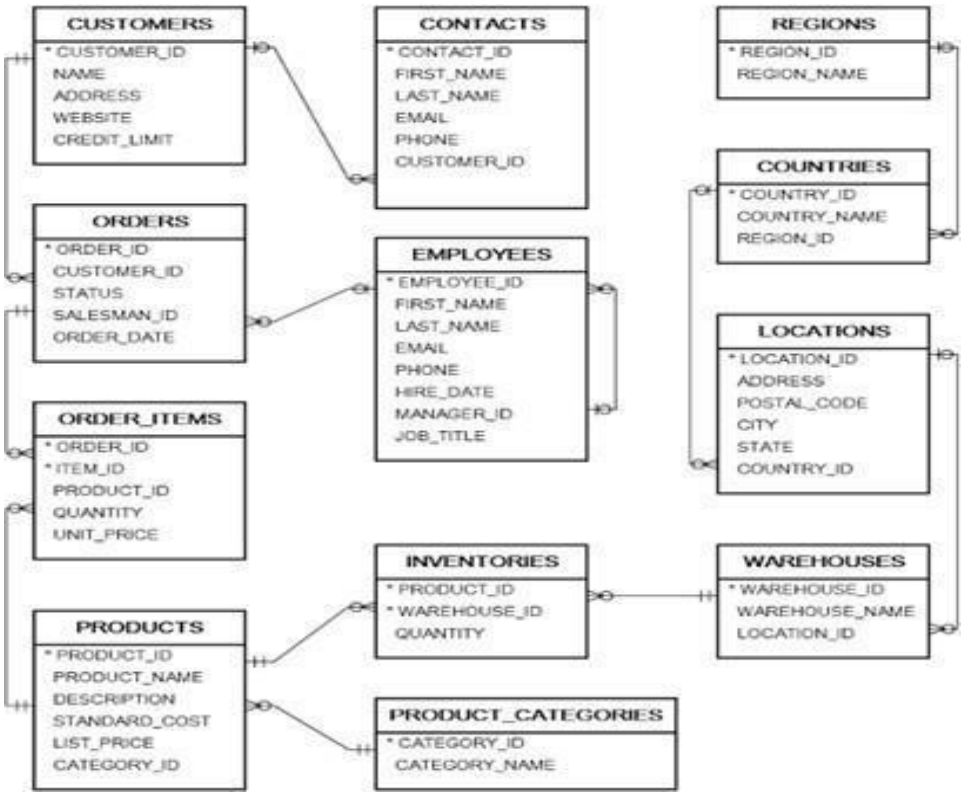
**Books and References:**

| Sr. No. | Title | Author/s | Publisher | Edition | Year |
|---|---|---|---|---|---|
| 1. | Database System and Concepts | A Silberschatz, H Korth, S udarshan | McGraw-Hill | Fifth Edition | |
| 2. | Database Systems | RobCoronel | Cengage Learning | Twelfth Edition | |
| 3. | Programming with PL/SQL for Beginners | H.Dand,R.Patil and T.Sambare | X –Team | First | 2011 |
| 4. | Introduction to Database System | C.J.Date | Pearson | First | 2003 |

| B. Sc. (Information Technology) | | Semester – II | |
|---|---|---|---|
| Course Name: Database Management System Practical | | Course Code: VGVUSTMP201 | |
| Periods per week (1 Period is 120 minutes) | | 1 | |
| Credits | | 1 | |
| | | Hours | Marks |
| Evaluation System | Practical Examination | 2 | 50 |
| | Internal | -- | -- |

| Course Objective |
|---|
| To make learner |
| 1. Aware of various DDL statements used for database creation. |
| 2. Aware of various DDL statements used for modifying data in the database. |
| 3. Aware of various SQL statements used to retrieve data from the database. |
| 4. Aware of creating and using concept of views. |
| 5. Understand PL/SQL concepts. |

**Consider the following schema for practices.**



| List of Practical | |
|---|---|
| **1.** | **Creating and Managing Tables :** |
| a. | Creating Tables for the above schema with constraints defined (if required). |
| b. | Insert at least 5 rows in each table. |
| | |
| **2.** | **SQL Statements – 1 :** |
| a. | Writing Basic SQL SELECT Statements |
| b. | Display the rows of table in Sorted order (ascending / descending) |
| c. | Use various single row function like Upper, Lower, Concat, Length, SUBSTR,TRIM, LTRIM, RTRIM REPLACE |
| | |
| **3.** | **SQL Statements – 2 :** |
| a. | Displaying Data from Multiple Tables |
| b. | Subqueries |
| c. | Use various aggregrate functions like min, max, sum, avg, count |
| | |
| **4.** | **Manipulating Data :** |
| a. | Use Update statement to update the rows of tables. |
| b. | Illustrate use of DELETE statement |
| | |
| **5.** | **Creating and Managing other database objects :** |
| a. | Creating Views |
| b. | Other Database Objects like sequence, index and synonym |
| c. | Controlling User Access |
| | |
| **6.** | **Using SET operators, Date/Time Functions, GROUP BY clause (advanced features) and advanced subqueries :** |
| a. | Using SET Operators |
| b. | Use various Date Functions like NEXT_DAY, LAST_DAY, TO_CHAR,ADD_MONTHS, CURRENT_DATE, SYSDATE |
| c. | Enhancements to the GROUP BY Clause |
| d. | Advanced Subqueries |
| | |
| **7.** | **PL/SQL Basics :** |
| a. | Declaring Variables |

| | |
|---|---|
| b. | Writing Executable Statements |
| c. | Interacting with the Oracle Server |
| d. | Writing Control Structures |
| | |
| **8.** | **Composite data types, cursors and exceptions. :** |
| a. | Working with Composite Data Types |
| b. | Writing Explicit Cursors |
| c. | Handling Exceptions |
| | |
| **9.** | **Procedures and Functions :** |
| a. | Creating Procedures , Functions, |
| b. | Managing Subprograms |

| **Course Outcome** | |
|---|---|
| **Learners should be able** | |
| **CO1** | To create and alter the database structure. |
| **CO2** | To fire SQL queries based on INSERT, UPDATE, SELECT and DELETE statements. |
| **CO3** | To execute queries based on date, strings. |
| **CO4** | To create and manage views. |
| **CO5** | To write a PL/SQL code block based on cursor, procedure, function and, exception. |

**Books and References:**

| Sr. No. | Title | Author/s | Publisher | Edition | Year |
|---|---|---|---|---|---|
| 1. | SQL The Complete Reference | Paul Weinberg, James Groff, Andrew Oppel | McGraw-Hill | Third | |
| 2. | Programming with PL/SQL for Beginners | H.Dand , R.Patil and T. Sambare | X –Team | First | 2011 |
| 3. | PL/SQL Programming | Ivan Bayross | BPB | First | 2010 |

| B. Sc (Information Technology) | | Semester – II | |
|---|---|---|---|
| Course Name: Basics of Data Science | | Course Code: VGVUSTNDS201 | |
| Periods per week (1 Period is 60 minutes) | | 2 | |
| Credits | | 2 | |
| | | Hours | Marks |
| Evaluation System | Theory Examination | 2 | 60 |
| | Internal | -- | 40 |

| Course Objective |
|---|
| At the end of the course, a learner will be able to |
| 1. Describe the significance of data science. |
| 2. Understand the Data Science process. |
| 3. Explain how data is collected, managed and stored for data science. |
| 4. Build, and prepare data for use with a variety of statistical methods and models. |
| 5. Analyze Data using various Visualization techniques. |

| Unit | Details | Lectures |
|---|---|---|
| I | **Introduction:** What Is Data Science?, Importance and Need of Data science, Data Science Process , Prerequisite for Data Scientist, Components of Data Science, The Industry Applications Of Data Science Real-Life Examples Of Data Science, Data Science Terminologies, Computer Science, Data Science, and Real Science, Properties of Data, Classification and Regression<br>**Mathematical Preliminaries:** Probability, Descriptive Statistics, Correlation Analysis, Logarithms | 10 |
| II | **Data Munging :** Languages for Data Science, Collecting Data, Cleaning Data, Crowdsourcing<br>**Scores and Rankings:** The Body Mass Index(BMI), Developing Scoring Systems, Z-scores and Normalization, | 10 |
| III | **Statistical Analysis:** Statistical Distributions, Sampling from Distributions, Statistical Significance, Permutation Tests and P-values<br>**Visualizing Data:** Exploratory Data Analysis, Developing a Visualization Aesthetic, Chart Types, Great Visualizations, Reading Graphs | 10 |

| Course Outcome | |
|---|---|
| **Learners will be able to** | |
| **CO1** | Understand the basics of data science. |
| **CO2** | Understand the concepts of Data collection and management. |
| **CO3** | Establish sources of data and various mathematical concepts for Data Science. |
| **CO4** | Use the concepts of statistics and Identify distribution properties of data using statistical concepts. |
| **CO5** | Understand types of data Visualization techniques. |

**Books and References:**

| Sr. No. | Title | Author/s | Publisher | Edition | Year |
|---|---|---|---|---|---|
| 1. | The Data Science Design Manual | Steven S. Skiena | Springer | 1st | 2017 |
| 2. | Foundations of Data Science | Avrim Blum, John Hopcroft, and Ravindran Kannan | | | |
| 3. | Doing Data Science | Rachel Schutt and Cathy O'Neil | O'Reilly | First Edition | 2013 |
| 4. | Data Science from Scratch | Joel Grus | O'Reilly | Second Edition | 2019 |
| 5. | Fundamentals of Data Science | Sanjeev J. Wagh, Manisha S. Bhende, Anuradha D. Thakare | Chapman & Hall | First Edition | 2021 |

| B. Sc (Information Technology) | | Semester – II | |
|---|---|---|---|
| **Course Name: Fundamentals of Digital Electronics** | | **Course Code: VGVUSTVSE201** | |
| **Periods per week (1 Period is 60 minutes)** | | **2** | |
| **Credits** | | **2** | |
| | | **Hours** | **Marks** |
| **Evaluation System** | **Theory Examination** | **2** | **60** |
| | **Internal** | **--** | **40** |

| **Course Objective** |
|---|
| To make learner understand concept of |
| 1. Number system and binary arithmetic. |
| 2. Boolean algebra, logic gates and Karnaugh Map. |
| 3. Combinational Logic circuit and arithmetic circuits. |
| 4. Multiplexer, demultiplexer, encoder, decoder and flip-flops. |
| 5. Counters and shift registers |

| Unit | Details | Lectures |
|---|---|---|
| **I** | **Number System:** Analog System, digital system, Numbering system(Binary, Octal, Hexadecimal), conversion from one number system to another, weighted codes, Error detection and correction, Code Conversion.<br>**Binary Arithmetic:** Binary addition, Binary subtraction, multiplication and division, Negative number representation, Subtraction using 1's complement and 2's complement.<br>**Logic Gates:** Introduction to Logic gates, Exclusive OR and Exclusive NOR gates, Universal Logic gates, Implementation of other gates using universal gates. | **10** |
| **II** | **Boolean Algebra:** Boolean theorems and Laws, De Morgan's Theorem, Perfect Induction, Reduction of Logic expression using Boolean Algebra, Deriving Boolean expression from given circuit,<br>**Minterm, Maxterm, and Karnaugh Maps:** Introduction, minterms and sum of minterm form, maxterm and Product of maxterm form, Reduction technique using Karnaugh maps – 2/3/4 variable K-maps, Grouping of variables in K-maps, minimize Boolean expression using K- map. | **10** |

| | | |
|---|---|---|
| **III** | **Combinational Logic Circuits:** Introduction, Multi-input, multi-output Combinational circuits, Code converters design and implementations.<br>**Arithmetic Circuits:** Introduction, Adders, Subtractor, Multiplier, Comparator.<br>**Multiplexer, Demultiplexer, Encoder and Decoder:** Introduction, Multiplexer, Demultiplexer, Decoder, Encoders.<br>**Sequential Circuits:** Introduction to flip-flop and its types. | **10** |

| **Course Outcome** | |
|---|---|
| **Learners should be able to** | |
| **CO1** | Perform conversions among different number systems, become familiar with basic logic gates and understand Boolean algebra. |
| **CO2** | Understand the use of K-map for hardware minimization. |
| **CO3** | Understand the design of combinational circuits such as multiplexer, demultiplexer, encoder and decoder etc. |
| **CO4** | Understand the design of sequential Circuits such as flip-flops, Registers, and Counters. |
| **CO5** | Obtain a basic level of Digital Electronics knowledge and set the stage to perform the analysis and design of Complex Digital electronic Circuits. |

**Books and References:**

| Sr. No. | Title | Author/s | Publisher | Edition | Year |
|---|---|---|---|---|---|
| 1. | Digital Electronics and Logic Design | N. G. Palan | Technova | | |
| 2. | Make Electronics | Charles Platt | O'Reilly | 1st | 2010 |
| 3. | Modern Digital Electronics | R. P. Jain | Tata McGraw Hill | 3rd | |
| 4. | Digital Principles and Applications | Malvino and Leach | Tata McGraw Hill | | |
| 5. | Digital Electronics: Principles, Devices and Applications, | Anil K. Maini | Wiley | | 2007 |

| B. Sc (Information Technology) | | Semester – II | |
|---|---|---|---|
| **Course Name: Fundamentals of Digital Electronics Practical** | | **Course Code: VGVUSTVSEP201** | |
| **Periods per week (1 Period is 120 minutes)** | | **2** | |
| **Credits** | | **2** | |
| | | **Hours** | **Marks** |
| **Evaluation System** | **Practical Examination** | **2** | **50** |
| | **Internal** | **--** | **--** |

| **Course Objective** |
|---|
| To make learner |
| 1. Aware of electronic trainer kit and its Usage |
| 2. How to use various integrated circuits for basic logic gates |
| 3. To implement the applications of basic logic gates in Combinational circuits |
| 4. To implement the applications of basic logic gates in Sequential circuits |
| 5. To introduce and use Logisim simulator |

| **List of Practical** | |
|---|---|
| **1.** | **Study of Logic gates and their ICs and universal gates:** |
| a. | Study of AND, OR, NOT, XOR, XNOR, NAND and NOR gates. |
| b. | IC 7400, 7402, 7404, 7408, 7432, 7486, 74266. |
| | |
| **2.** | **Study of Universal Gates:** |
| a. | Implement AND, OR, NOT, XOR, XNOR using NAND gates. |
| b. | Implement AND, OR, NOT, XOR, XNOR using NOR gates. |
| | |
| **3.** | **Implement the given Boolean expressions using minimum number of gates:** |
| a. | Verifying De Morgan's laws. |
| b. | Implement other given expressions using a minimum number of gates. |
| c. | Implement other given expressions using a minimum number of ICs. |
| | |
| **4.** | **Implement combinational circuits:** |
| a. | Design and implement combinational circuit based on the problem given and minimizing using K-maps. |
| | |

| | |
|---|---|
| 5. | **Implement code converters:** |
| a. | Design and implement Binary – to – Gray code converter. |
| b. | Design and implement Gray – to – Binary code converter. |
| c. | Design and implement Binary – to – BCD code converter |
| d. | Design and implement Binary – to – XS-3 code converter |
| | |
| **6.** | **Implement Adder and Subtractor Arithmetic circuits.:** |
| a. | Design and implement Half adder and Full adder. |
| b. | Design and implement Half subtractor and Full subtractor. |
| | |
| **7.** | **Implement Arithmetic circuits:** |
| a. | Design and implement a 2-bit by 2-bit multiplier. |
| b. | Design and implement a 2-bit comparator. |
| | |
| **8.** | **Implement Encode and Decoder:** |
| a. | Design and implement 8:3 encoder. |
| b. | Design and implement 3:8 decoder. |
| | |
| **9.** | **Implement Multiplexer and Demultiplexers:** |
| a. | Design and implement 4:1 multiplexer. Study of IC 74153, 74157 |
| b. | Design and implement 1:4 demultiplexer. Study of IC 74139 |
| | |
| **10.** | **Study of flip-flops :** |
| a. | Study of IC 7473. |
| b. | Study of IC 7474. |
| c. | Study of IC 7476. |

| **Course Outcome** |
|---|
| To make learner |
| 1.To be familiar with the Electronic trainer kit. |
| 2. To understand and design and implement combinational circuits. |
| 3. To understand design and implement Sequential circuits. |
| 4. To Perform simulation of various circuits on Logisim simulator |
| 5. To develop applications (Half adder, Full adder) of combinational circuit and Sequential circuit(Flip Flop). |

| Books and References: | | | | | |
|---|---|---|---|---|---|
| **Sr. No.** | **Title** | **Author/s** | **Publisher** | **Edition** | **Year** |
| 1. | Digital Electronics and Logic Design | N. G. Palan | Technova | | |
| 2. | Digital Principles and Applications | Malvino and Leach | Tata McGraw Hill | | |

| B. Sc (Information Technology) | | Semester – II | |
|---|---|---|---|
| Course Name: Web Programming | | Course Code: VGVUFAE204 | |
| Periods per week (1 Period is 60 minutes) | | 2 | |
| Credits | | 2 | |
| | | Hours | Marks |
| Evaluation System | Theory Examination | 2 | 60 |
| | Internal | -- | 40 |

| Course Objective |
|---|
| To make learners understand |
| 1. Basics of Internet and HTML5. |
| 2. HTML5 elements. |
| 3. Concept of JavaScript. |
| 4. Concept of PHP and MYSQL. |
| 5. Web pages using various concepts of HTML5, JavaScript, PHP and MYSQL. |

| Unit | Details | Lectures |
|---|---|---|
| I | **HTML5:** Introduction to HTML5? Formatting text by using tags, using lists and backgrounds, Creating hyperlinks and anchors. Style sheets<br>**HTML5 Page layout and navigation:** Creating navigational aids(text based and graphics based navigation bar), creating image map, HTML5 semantic tags,<br>**HTML5 Tables:** Creating simple table, Specifying the size, width ,merging, formatting tables | 10 |
| II | **HTML5 Forms and Media:** Introduction to form elements(text, textarea, radio, checkbox, sumbit button, select, label, option), multimedia basics,embedding video clips, Incorporating audio on webpage.<br>**Java Script:** Introduction to Client-Side JavaScript and Server-Side JavaScript, Operators, Statements,<br>**Core JavaScript (Properties and Methods of Each) :** Array, Boolean, Date, Function, Math, Number, Object, String, regExp **Document and its associated objects:** document, Link, Area, Anchor, Image, Applet, Layer. | 10 |
| III | **Events and Event Handlers :** General Information about Events, Defining Event Handlers, event, onAbort, onBlur, onChange, onClick, onDblClick, onDragDrop, onError, onFocus, onKeyDown, onKeyPress, onKeyUp, onLoad, onMouseDown, onMouseMove, onMouseOut, onMouseOver, onMouseUp, onMove, onReset, onResize, onSelect, onSubmit, onUnload. | 10 |

| | | |
|---|---|---|
| | **PHP:** Server-side scripting, Basics of PHP,Functions, passing information with PHP, GET, POST, formatting form variables.<br>**Advanced PHP and MySQL:** PHP/MySQL Functions, Integrating web forms and databases, Displaying queries in tables, Building Forms from queries. | |

| **Course Outcome** | |
|---|---|
| **Learners should be able to** | |
| **CO1** | Design web pages using HTML 5 elements. |
| **CO2** | Develop dynamic web pages using JavaScript. |
| **CO3** | Develop web applications using PHP and MySQL. |
| **CO4** | Develop static / dynamic web applications using HTML5, PHP and MYSQL. |
| **CO5** | Feel interested and motivated to pursue further study in the field of web development. |

**Books and References:**

| Sr. No. | Title | Author/s | Publisher | Edition | Year |
|---|---|---|---|---|---|
| 1. | Web Design The Complete Reference | Thomas Powell | Tata McGraw Hill | | - |
| 2. | HTML5 Step by Step | FaitheWempen | Microsoft Press | | 2011 |
| 3. | PHP 5.1 for Beginners | Ivan Bayross Sharanam Shah, | SPD | | 2013 |
| 4. | PHP Project for Beginners | SharanamShah, Vaishali Shah | SPD | | 2015 |
| 5. | PHP 6 and MySQL Bible | Steve Suehring, Tim Converse, Joyce Park | Wiley | | 2009 |
| 6. | Head First HTML 5 programming | Eric Freeman | O'Reilly | | 2013 |
| 7. | JavaScript 2.0: The Complete Reference | Thomas Powell and Fritz Schneider | Tata McGraw Hill | 2nd | |

| B. Sc (Information Technology) | | Semester – II | |
|---|---|---|---|
| Course Name: Environmental Study for Sustainable IT II | | Course Code: VGVUVE206 | |
| Periods per week (1 Period is 60 minutes) | | 2 | |
| Credits | | 2 | |
| | | Hours | Marks |
| Evaluation System | Theory Examination | 2 | 60 |
| | Internal | | 40 |

| Course Objective |
|---|
| To aid learner to |
| 1. Understand issues of Green Computing as well as different standards. |
| 2. Understand the modern approaches to Green Computing. |
| 3. Understand the alternatives for cooling your data center. |
| 4. Understand the need for making computer networks and communications energy efficient |
| 5. Understand cloud computing in the context of environmental sustainability and various elements of clouds that contribute to total energy consumption |

| Unit | Details | Lectures |
|---|---|---|
| I | **Overview and Issues:** Problems: Toxins, Power Consumption, Equipment Disposal, Company's Carbon Footprint: Measuring, Details, reasons to bother, Plan for the Future, Cost Savings: Hardware, Power.<br>**Initiatives and Standards:** Global Initiatives: United Nations, Basel Action Network, Basel Convention, North America: The United States, Canada, Australia, Europe, WEEE Directive, RoHS, National Adoption, Asia: Japan, China, Korea. | 10 |
| II | **Minimizing Power Usage:** Power Problems, Monitoring Power Usage, Servers, Low-Cost Options, Reducing Power Use, Data De-Duplication, Virtualization, Management, Bigger Drives, Involving the Utility Company, Low-Power Computers, PCs, Linux, Components, Servers, Computer Settings, Storage, Monitors, Power Supplies, Wireless Devices, Software.<br>**Cooling:** Cooling Costs, Power Cost, Causes of Cost, Calculating Cooling Needs, 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 | 10 |

| | | |
|---|---|---|
| | Considerations, System Design, Datacentre Design, Centralized Control, Design for Your Needs**.** | |
| III | **Green Networks and Communications :** Introduction, Objectives of Green Network Protocols, Green Network Protocols and Standards.<br>**Green Cloud Computing and Environmental Sustainability :** Introduction, What is Cloud Computing?, Cloud Computing and Energy Usage Model: A Typical Example, Features of Clouds Enabling Green Computing, Green Cloud Architecture | 10 |

| **Course Outcome** |
|---|
| **Learners should be able to** |
| **CO1** Give an account of the concept green IT, environmental perspectives on IT use, standards and certifications related to sustainable IT products. |
| **CO2** Describe green IT in relation to technology. |
| **CO3** Evaluate IT use in relation to environmental perspectives. |
| **CO4** Formulate plans for reducing IT heating and cooling requirements. |
| **CO5** Implement Green IT in Real Life. |

**Books and References:**

| Sr. No. | Title | Author/s | Publisher | Edition | Year |
|---|---|---|---|---|---|
| 1. | Green IT | Toby Velte, Anthony Velte, & Robert Elsenpete | McGraw Hill | | 2008 |
| 2. | Harnessing Green It Principles And Practices | San Murugesan, G.R. Gangadharan | WILEY | | - |
| 3. | Green Data Center: Steps for the Journey | Alvin Galea, Michael Schaefer, Mike Ebbers | Shroff Publishers And Distributors | | 2011 |
| 4. | Green Computing and Green IT Best Practice | Jason Harris | Emereo | | |
| 5. | Green Computing Tools and Techniques for Saving Energy, Money and Resources | Bud E. Smith | CRC Press | | 2014 |

# Evaluation Scheme

**(Major, Minor, VSEC)**

## *1. Internal Evaluation (40 marks).*

**i. Test: 1 Class test of 15 marks. (Can be taken online)**

| Q | Attempt *any three* of the following: | 15 |
|---|---|---|
| a. | | |
| b. | | |
| c. | | |
| d. | | |
| e. | | |
| f. | | |

**ii. 15 marks project/presentation/assignment.**

**iii. 10 marks: Active participation in the class, overall conduct, attendance.**

## *2. External Examination: (60marks)*

| All questions are compulsory | | |
|---|---|---|
| Q.1. | (Based on Unit 1) Attempt *any three* of the following: | 15 |
| a. | | |
| b. | | |
| c. | | |
| d. | | |
| e. | | |
| f. | | |
| Q.2. | (Based on Unit 2) Attempt *any three* of the following: | 15 |
| Q.3. | (Based on Unit 3) Attempt *any three* of the following: | 15 |
| Q.4. | (Based on whole syllabus) Attempt *any three* of the following: | 15 |

## *3. Practical Exam: 100marks*

**A Certified copy journal is essential to appear for the practical examination.**

| | | |
|---|---|---|
| 1. | Practical Question 1 | **40** |
| 2. | Practical Question 2 | **40** |
| 3. | Journal | 10 |
| 4. | Viva Voce | 10 |

**OR**

| | | |
|---|---|---|
| 1. | Practical Question | **80** |
| 2. | Journal | 10 |
| 3. | Viva Voce | 10 |

# Evaluation Scheme

**(AEC, VEC, IKS)**

***1Internal Evaluation (50 marks).***

i. **Test: 1 Class test of 15 marks. (Can be taken online)**

| Q | Attempt *any three of* the following: | 15 |
|---|---|---|
| a. | | |
| b. | | |
| c. | | |
| d. | | |
| e. | | |
| f. | | |

ii. **25 marks project/presentation/assignment.**

iii. **10 marks: Active participation in the class, overall conduct, attendance.**

# Evaluation Scheme

**(CC)**

***1Internal Evaluation (50 marks).***

i. **Test: 1 Class test of 15 marks. (Can be taken online)**

| Q | Attempt *any three of* the following: | 15 |
|---|---|---|
| a. | | |
| b. | | |
| c. | | |
| d. | | |
| e. | | |
| f. | | |

ii. **35 marks Activities**