Academic Council Meeting No. and Date : 08 / September 04, 2023

Agenda Number : 02 Resolution Number : 34, 35 / 2.14, 2.35

Vidya Prasarak Mandal's
B. N. Bandodkar College of Science (Autonomous), Thane

Syllabus for

Programme Code : BUIT

Programme : Bachelor of Science

Specific Programme : Information Technology

[F.Y.B.Sc. (Information Technology)]

Level 4.5

CHOICE BASED GRADING SYSTEM

Revised under NEP

From academic year 2023 - 2024

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Preamble

The B.Sc. Information Technology programme is having 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 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 students will be ready for the jobs available in different fields like:

- Software Development (Programming)
- Website Development
- Mobile app development
- Embedded Systems Programming
- Embedded Systems Development
- Software Testing
- Networking
- Database Administration
- System Administration
- Cyber Law Consultant
- GIS (Geographic Information Systems)
- IT Service Desk
- Security

Abhijeet A. Kale
Chairman
Board of Studies in Computer Science

PROGRAMME OUTCOMES (PO)

The Undergraduate Programmes of Science are intended to cater quality education and attain holistic development of learners through the following programme outcomes:

- **BACHELOR OF SCIENCE (B.Sc.)**

PO1 - Disciplinary Knowledge
Lay strong foundation of conceptual learning in science. Instil ability to apply science in professional, social and personal life.

PO2 - Inculcation of Research Aptitude
Ignite spirit of inquiry, critical thinking, analytical skills and problem-solving approach which will help learner to grasp concepts related to research methodology and execute budding research ideas.

PO3 - Digital Literacy
Enhance ability to access, select and use a variety of relevant information e-resources for curricular, co-curricular and extracurricular learning process.

PO4 - Sensitization towards Environment
Build cohesive bond with nature by respecting natural resources, encouraging eco-friendly practices and creating awareness about sustainable development.

PO5 - Individuality and Team work
Encourage learner to work independently or in collaboration for achieving effective results through practical experiments, project work and research activities.

PO6 - Social and Ethical Awareness
Foster ethical principles which will help in developing rational thinking and becoming socially aware citizens. Build attitude of unbiased, truthful actions and avoid unethical behaviour in all aspects of life.

Program Specific Outcome:

On completion of the B.Sc. (Information Technology) degree the graduates will be able to

- Develop Problem Solving and Programming Skills. (Level 6)
- Design, develop, and manage computer-based systems involving databases, operating systems, computer networks, and web technologies. (Level 6)
- Analyze statistical methods, data analytics, and modern tools to extract insights from data and demonstrate adaptability to emerging technologies. (Level 4)
- Enhance skills and adapt new computing technologies for attaining professional excellence and carrying research. (Level 6)
- Demonstrate professional ethics, teamwork, communication skills, and project management abilities required for successful careers in the IT industry. (Level 3)
- Apply self-directed learning and research skills to adopt emerging technologies and entrepreneurial practices. (Level 3)

VPM's B. N. Bandodkar College of Science (Autonomous), Thane

F.Y.B.Sc. (Information Technology) Revised under NEP

Structure of Programme

Semester I

	Course Code	Course Title	No. of lectures	Credits
Major	23BUIT1T01	Digital Electronics	**30**	**2**
	23BUIT1T02	Operating System	**30**	**2**
	23BUIT1P01	Practicals based upon 23BUIT1T01 and 23BUIT1T02	**60**	**2**
Minor	23BUIT1T03	Microprocessor Architecture	**30**	**2**
	23BUIT1T04	Introduction to C Programming	**30**	**2**
	23BUIT1P02	Practicals based upon 23BUIT1T03 and 23BUIT1T04	**60**	**2**
Generic	23BUIT1T05	Discrete Mathematics	**30**	**2**
ID	23BUID1T02	Introduction to Soft Skills	**30**	**2**
VSC	23BU1VSC04	Introduction to Programming	**30**	**2**
AEC	23BUEN1T01	Basic English Learning Course	**30**	**2**
IKS	23BUIK1T03	Science and Technology	**30**	**2**
Total				**22**

Semester II

	Course Code	Course Title	No. of lectures	Credits
Major	23BUIT2T01	Data Communications	**30**	**2**
	23BUIT2T02	Introduction to Python Programming	**30**	**2**
	23BUIT2P01	Practicals based upon 23BUIT2T01 and 23BUIT2T02	**60**	**2**
Minor	23BUIT2T03	Web Programming	**30**	**2**
	23BUIT2T04	Database Systems	**30**	**2**
	23BUIT2P02	Practicals based upon 23BUIT2T03 and 23BUIT2T04	**60**	**2**
Generic	23BUIT2T05	Numerical and Statistical Methods	**30**	**2**
VEC	23BUID2T02	Personality Development	**30**	**2**
AEC	23BUEN2T03	Introduction to Technical Writing	**30**	**2**
IKS	23BUIK2T03	Quick Mathematics	**30**	**2**
Field Project	23BUIT2P03	Green IT	**45**	**2**
Total				**22**

Semester I

Course Code	Course Title	Credits	No. of lectures
23BUIT1T01	Major: Digital Electronics	02	30

CO1	Understand the fundamental concepts and techniques of digital electronics.	L2
CO2	Understand and examine the structure of various number systems and its application in digital design	L2
CO3	Analyze and understand the basic memory element, flip flops, counters, multiplexing, encoding	L4
CO4	Analyze the working mechanism of different sequential circuits	L4

Grading will be as 3: High(>60%), 2: Moderate(40%-60%), 1: Low(<40%), 0: No mapping

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	2	3	1	2	1
CO2	3	2	3	1	2	1
CO3	3	3	2	1	3	1
CO4	3	3	2	1	3	1

Unit I	**Introduction:** Facts and History, History of Digitization Number System: Analog System, digital system, numbering system, binary number system, octal number system, hexadecimal number system, conversion from one number system to another, ASCII Code, EBCDIC **Binary Arithmetic:** Binary addition, Binary subtraction, Negative number representation, Subtraction using 1's complement and 2's complement, Binary multiplication and division, Arithmetic in octal number system, Arithmetic in hexadecimal number system, BCD **Boolean Algebra and Logic Gates:** Introduction, Logic (AND OR NOT), Boolean theorems, Boolean Laws, De Morgan's Theorem, Perfect Induction, Reduction of Logic expression using Boolean Algebra, Deriving Boolean expression from given circuit, exclusive OR and Exclusive NOR gates, Universal Logic gates, Implementation of other gates using universal gates	**15** **[CO1, CO2]**
Unit II	**Sequential Circuits:** Flip-Flop, S-R flip-flop, D flip-flop, JK flip- flop, Race-around condition, Master – slave JK flip-flop, T flip-flop, conversion from one type of flip-flop to another, Application of flip-flops. Multiplexer, De-multiplexer, ALU, Encoder and Decoder: **Counters:** Asynchronous counter, Synchronous counter, Bushing, Type T Design, Type JK Design, Presettable counter, Synchronous counter ICs, Analysis of counter circuits. **Shift Register:** Parallel and shift registers, serial shifting, serial–in serial–out, serial–in parallel–out , parallel–in parallel–out, Ring counter, Johnson counter, Applications of shift registers, Pseudo-random binary sequence generator, Seven Segment displays, analysis of shift counters.	**15** **[CO1, CO3, CO4]**

References: 1. Modern Digital Electronics by R.P Jain, Tata McGraw Hill
2. Digital Principles and Applications by Malvino and Leach, Tata McGraw Hill

Course Code	Course Title	Credits	No. of lectures
23BUIT1T02	**Major: Operating System**	02	30

CO1	Understand the basic concepts and functions of operating systems	L2
CO2	Understand Processes, Threads and Deadlocks	L2
CO3	Analyze Scheduling algorithms	L4
CO4	Understand I/O management and File systems, Deadlock	L2

Grading will be as 3: High(>60%), 2: Moderate(40%-60%), 1: Low(<40%), 0: No mapping

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	2	3	-	2	1
CO2	3	3	2	-	2	1
CO3	3	3	2	-	3	1
CO4	3	2	3	-	2	1

Unit I	**Introduction:** Timeline of Operating Systems, History of operating system, computer hardware, different operating systems, operating system concepts, system calls, operating system structure. **Processes and Threads:** Processes, threads, inter process communication, scheduling, IPC problems. **Memory Management:** No memory abstraction, memory abstraction: address spaces, virtual memory, page replacement algorithms, design issues for paging systems, implementation issues, segmentation.	**15** **[CO1, CO3]**
Unit II	**File Systems:** Files, directories, file system implementation, file-system management and optimization, MS-DOS file system, UNIX file system **Input-Output:** Principles of I/O hardware, Principles of I/O software, I/O software layers, disks, clocks, user interfaces: keyboard, mouse, monitor, thin clients, power management, **Deadlocks:** Resources, introduction to deadlocks, the ostrich algorithm, deadlock detection and recovery, deadlock avoidance, deadlock prevention, issues. **Multiple Processor Systems** Multiprocessors, multicomputer, distributed systems	**15** **[CO1, CO3, CO4]**

References:

1. Modern Operating Systems by Andrew S.Tanenbaum, Herbert Bos Pearson 4th edition - 2014
2. Operating Systems – Internals and Design Principles by Willaim Stallings, Pearson 8th edition- 2009
3. Operating System Concepts by Abraham Silberschatz, Peter B.Galvineg Gagne, Wiley 8th edition
4. Operating Systems by Godbole and Kahate, McGraw Hill 3rd edition

Course Code 23BUIT1P01	Course Title Practicals based upon 23BUIT1T01 and 23BUIT1T02	Credits 02	No. of lectures 60

CO1	Analyze logic gates and their usage in digital circuits.	L4
CO2	Understand the working of Flip flops, counter circuits.	L2
CO3	Understand operating system installation and working of commands.	L2
CO4	Compare X86 family processors.	L2

Grading will be as 3: High(>60%), 2: Moderate(40%-60%), 1: Low(<40%), 0: No mapping

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	2	3	-	2	1
CO2	3	3	2	-	3	1
CO3	3	2	3	-	2	1
CO4	3	2	3	-	2	1

Practical 1	Study of Logic Gates, Universal Building Blocks
Practical 2	Study of RS, JK Flip Flop
Practical 3	Study of Encoder and Decoder
Practical 4	Study of Half adder and Full Adder
Practical 5	Study of RS Flip Flop
Practical 6	Study of JK Flip Flop
Practical 7	Study of Encoder and Decoder
Practical 8	Study of Multiplexer and De-multiplexer
Practical 9	Study of Counter, Mod n counter
Practical 10	Study of shift counters
Practical 11	Study of Linux Installation
Practical 12	Linux commands: pwd, cd, absolute and relative paths, ls, mkdir, rmdir, file, touch, rm, cp. mv, rename, head, tail, cat, tac, more, less, strings, chmod
Practical 13	Linux commands: ps, top, kill, pkill, bg, fg, grep, locate, find, locate, date
Practical 14	Linux commands: cal, uptime, w, whoami, finger, uname, man, df, du, free, whereis, which
Practical 15	Linux User creation, group management, permissions
Practical 16	Windows (DOS) Commands: Date, time, prompt, md, cd, rd, path, Chkdsk, copy
Practical 17	Windows (DOS) Commands: xcopy, format, fidsk, cls, defrag, del, move
Practical 18	Windows (DOS) Commands: Diskcomp, diskcopy, diskpart, doskey, echo
Practical 19	Windows (DOS) Commands: Edit, fc, find, rename, set, type, ver
Practical 20	Study of X 86 families of Processors.

Course Code 23BUIT1T03	Course Title Minor: Microprocessor Architecture	Credits 02	No. of lectures 30

CO1	Describe the architecture and organization of 8085	L1
CO2	Relate the addressing modes used in the instructions	L4
CO3	Describe the 8085 instruction set, interrupt and programming techniques	L1
CO4	Understand the developments of Pentium processor	L2

Grading will be as 3: High(>60%), 2: Moderate(40%-60%), 1: Low(<40%), 0: No mapping

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	2	3	-	2	1
CO2	3	3	2	-	2	1
CO3	3	3	3	-	3	1
CO4	3	2	3	-	2	1

Unit I	**Introduction:** Evolution of Microprocessor, Block diagram of Microprocessor, Microprocessor, Microprocessor Instruction Set and Computer Languages, From Large Computers to Single-Chip Microcontrollers, Applications. **Microprocessor Architecture and Microcomputer System:** Microprocessor Architecture and its operation's, Memory, I/O Devices, Microcomputer System, Interfacing, Microprocessor-Based System Application. **8085 Microprocessor Architecture and Memory Interface:** Introduction, 8085 Microprocessor unit, 8085-Based Microcomputer, Memory Segment, 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. **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.	**15** **[CO1, CO3]**
Unit II	**Introduction to 8085 Instructions:** Data Transfer Operations, Arithmetic Operations, Logic Operation, Branch Operation, Writing Assembly Languages Programs **8085 Addressing modes:** Direct, Register, Immediate, Implicit addressing **Programming Techniques:** Looping, Counting Additional Data Transfer and 16-Bit Arithmetic Instructions, Arithmetic Instruction Related to Memory, Logic Operations: Rotate, Logics Operations: Compare, Dynamic Debugging, **Stacks and Sub-Routines:** Stack, Subroutine, Restart, Conditional Call, Return Instructions, Advanced Subroutine concepts **Interrupts:** The 8085 Interrupt, 8085 Vectored Interrupts, **The Pentium and Pentium Pro microprocessors:** Introduction, Special Pentium 15 24 / 41 registers, Memory management, Pentium instructions, Pentium Pro microprocessor, Special Pentium Pro features. **Core 2 and later Microprocessors:** Introduction, Pentium II software changes, Pentium IV and Core 2, i3, i5 and i7	**15** **[CO1, CO2, CO3, CO4]**

References:

1. Microprocessors Architecture, Programming and Applications with the 8085 by Ramesh Gaonkar, PENRAM Fifth 2012
2. Computer System Architecture by M. Morris Mano, PHI 1998
3. Structured Computer Organization by Andrew C.Tanenbaum, PHI

Course Code	Course Title	Credits	No. of lectures
23BUIT1T04	Minor: Introduction to C Programming	02	30

CO1	Acquire knowledge about the basic concept of writing a program	L3
CO2	Apply the control structures	L3
CO3	Apply code reusability with functions and pointers	L3
CO4	Develop applications in C using Structures	L6

Grading will be as 3: High(>60%), 2: Moderate(40%-60%), 1: Low(<40%), 0: No mapping

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	2	3	-	1	1
CO2	3	3	2	-	2	1
CO3	3	3	2	-	3	1
CO4	3	3	3	-	3	1

Unit I	**Introduction:** Need of writing programs, Types of Programming languages, History, features and application. Simple program logic, program development cycle, pseudo code statements and flowchart symbols, sentinel value to end a program, programming and user environments, evolution of programming models., desirable program characteristics. **Fundamentals:** Structure of a program. Compilation and Execution of a Program, Character Set, identifiers and keywords, data types, constants, variables and arrays, declarations, expressions, statements, Variable definition, symbolic constants. **Operators and Expressions:** Arithmetic operators, unary operators, relational and logical operators, assignment operators, assignment operators, the conditional operator, library functions. **Data Input and output:** Single character input and output, entering input data, scanf function, printf function, gets and puts functions, interactive programming. **Conditional Statements and Loops:** Decision Making Within A Program, Conditions, Relational Operators, Logical Connectives, If Statement, If-Else Statement, Loops: While Loop, Do While, For Loop. Nested Loops, Infinite Loops, Switch Statement	**15 [CO1, CO2, CO3]**
Unit II	**Functions:** Overview, defining a function, accessing a function, passing arguments to a function, specifying argument data types, function prototypes, recursion, modular programming and functions, standard library of 'C' functions, prototype of a function: foo1lal parameter list, return type, function call, block structure, passing arguments to a function: call by reference, call by value. **Program structure:** Storage classes, automatic variables, external variables, static variables, multifile programs, more library functions	**15 [CO3, CO4]**

	Arrays: Definition, processing, passing arrays to functions, multidimensional arrays, arrays and strings. **Pointers:** Fundamentals, declarations, Pointers Address Operators, Pointer Type Declaration, Pointer Assignment, Pointer Initialization, Pointer Arithmetic, Functions and Pointers, Arrays And Pointers, Pointer Arrays, passing functions to other functions **Structures and Unions:** Structure Variables, Initialization, Structure Assignment, Nested Structure, Structures and Functions, Structures and Arrays	

References:

1. Programming with C by Byron Gottfried, Tata McGRAW- Hill 2nd edition 1996
2. Programming Logic and Design by Joyce Farell Cengage Learning 8th edition 2014
3. "C" Programming" by Brian W. Kernighan and Denis M. Ritchie, PHI 2nd edition
4. Let us C by Yashwant P. Kanetkar, BPB publication
5. C for beginners by Madhusudan Mothe, X-Team Series 1st edition 2008
6. 21st Century C by Ben Klemens, OReilly 1st edition 2012

Course Code 23BUIT1P02	Course Title Practical Based on 23BUIT1T03 and 23BUIT1T04	Credits 02	No. of lectures 60

CO1	Understand the use of 8085 instructions and apply it in assembly language programming.	L2
CO2	Relate the addressing modes used in the instructions	L4
CO3	Understand and trace the execution of programs written in C language	L2
CO4	Construct C programs using functions, arrays, pointers.	L6

Grading will be as 3: High(>60%), 2: Moderate(40%-60%), 1: Low(<40%), 0: No mapping

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	3	3	-	2	1
CO2	3	3	2	-	2	1
CO3	3	3	3	-	2	1
CO4	3	3	3	-	3	1

Practical 1	Write a 8085 microprocessor program to perform addition of two 8-bit numbers.
Practical 2	Write a 8085 microprocessor program to perform subtraction of two 8-bit numbers
Practical 3	Write a 8085 microprocessor program to perform multiplication of two 8-bit numbers
Practical 4	Write a 8085 microprocessor program to perform addition of two 16-bit numbers
Practical 5	Write a 8085 microprocessor program to divide a 1 byte dividend by 1 byte divisor
Practical 6	Write a 8085 microprocessor program to find absolute difference between two numbers
Practical 7	Write a 8085 microprocessor program to transfer the data in reverse order
Practical 8	Write a 8085 microprocessor program to exchange the contents of two blocks
Practical 9	Write a 8085 microprocessor program to find the smallest number from given block using Linear Search
Practical 10	Write a 8085 microprocessor program to find the greatest number from given block using Linear Search
Practical 11	Write a 8085 microprocessor program to sorts the given data in Ascending / Descending Order
Practical 12	Write a ‘C’ program to i. Addition ii. Subtraction iii. Multiplication iv. Division
Practical 13	Write a ‘C’ program for Conditional Statements (if, if-else, nested if-else)
Practical 14	Write a ‘C’ program to display arithmetic operator using switch case.
Practical 15	Write a ‘C’ program for Loops (for loop, while loop, do-while loop, Nested for loop, Infinite loop)
Practical 16	Write a ‘C’ program to work with function: call by value
Practical 17	Write a ‘C’ program to work with function: call by reference
Practical 18	Write a ‘C’ program to find square of a number using functions
Practical 19	Write a ‘C’ program to swap two numbers using functions
Practical 20	Write a ‘C’ program to find a Reverse number using functions
Practical 21	Write a ‘C’ program to find Area and Circumference of Circle using functions
Practical 22	Write a ‘C’ program to find the Average of 10 Numbers Using an Array

Practical 23	Write a ‘C’ program to find the Largest Element in an Array of 10 Integers
Practical 24	Write a ‘C’ program to find Average of Five Numbers Using Pointers
Practical 25	Write a ‘C’ program to Access Array Elements Using Pointers
Practical 26	Write a ‘C’ program to have Student Details Using Structure
Practical 27	Write a ‘C’ program to find Area of Rectangle Using Structure
Practical 28	Write a ‘C’ program to print Fibonacci series up to ‘n’.
Practical 29	Write a ‘C’ program to work with matrix
Practical 30	Write a ‘C’ program to find sum of two matrices.
Practical 31	Write a ‘C’ program to find factorial of a number using recursion.

Course Code	Course Title	Credits	No. of lectures
23BUIT1T05	**Generic: Discrete Mathematics**	**02**	**30**

CO1	Describe the concepts of mathematical logic	L1
CO2	Understand the concepts of sets, relations, and functions.	L2
CO3	Explain the operations associated with sets, functions, and relations	L5
CO4	Understand formal logic notation, graph theory, recurrence relations and generating functions	L2

Grading will be as 3: High(>60%), 2: Moderate(40%-60%), 1: Low(<40%), 0: No mapping

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	3	2	-	1	1
CO2	3	3	2	-	1	1
CO3	3	3	2	-	2	1
CO4	3	3	3	-	2	1

Unit I	**Introduction:** Variables, The Language of Sets, The Language of Relations and Function **Set Theory:** Definitions and the Element Method of Proof, Properties of Sets, Disproofs, Algebraic Proofs, Boolean Algebras, **The Logic of Compound Statements**: Logical Form and Logical Equivalence, Conditional Statements, Valid and Invalid Arguments **Quantified Statements:** Predicates and Quantified Statements, Statements with Multiple Quantifiers, Arguments with Quantified Statements **Sequences, Mathematical Induction, and Recursion:** Sequences, Mathematical Induction, Strong Mathematical Induction and the Well-Ordering Principle for the Integers, Correctness of algorithms, defining sequences recursively	**15** [CO1, CO2, CO4]
Unit II	**Functions:** Functions Defined on General Sets, One-to-One and Onto, Inverse Functions, Composition of Functions, Cardinality with Applications to Computability **Relations**: Relations on Sets, Reflexivity, Symmetry, and Transitivity, Equivalence Relations, Partial Order Relations **Graphs and Trees:** Definitions and Basic Properties, Trails, Paths, and Circuits, Matrix Representations of Graphs, Isomorphism's of Graphs, Trees, Rooted Trees, Isomorphism's of Graphs, Spanning trees and shortest paths	**15** [CO2, CO3, CO4]

References:

1. Discrete Mathematics with Applications by Sussana S., Epp Cengage Learning 4th Eition 2010
2. Discrete Mathematics, Schaum's Outlines Series Seymour Lipschutz, Marc Lipson Tata MCGraw Hill 2007
3. Discrete Mathematics and its Applications by Kenneth H. Rosen, Tata MCGraw Hill
4. Discrete mathematical structures by B Kolman RC Busby, S Ross PHI
5. Discrete structures by Liu, Tata MCGraw Hill

Course Code	Course Title	Credits	No. of lectures
23BUID1T02	ID: Introduction to Soft Skills	02	30

CO1	Demonstrate effective verbal communication and active listening skills during discussions and presentations	L3
CO2	Write precise briefs or reports and technical documents	L1
CO3	Explain the purpose, structure, and key elements of group discussions, meetings, interviews, and presentations	L2
CO4	Summarize the importance of setting targets, staying motivated, and practicing creative thinking for individual effectiveness	L2

Grading will be as 3: High(>60%), 2: Moderate(40%-60%), 1: Low(<40%), 0: No mapping

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	1	2	2	-	3	3
CO2	1	2	3	-	2	3
CO3	1	2	2	-	3	3
CO4	1	3	2	-	2	3

Unit I	**Introduction to Soft Skills and Hard Skills** **Personality Development:** Knowing Yourself, Positive Thinking, Johari's Window, Communication Skills, Non-verbal Communication, Physical Fitness **Emotional Intelligence:** Meaning and Definition, Need for Emotional Intelligence, Intelligence Quotient versus Emotional Intelligence Quotient, Components of Emotional Intelligence, Competencies of Emotional Intelligence, Skills to Develop Emotional Intelligence **Etiquette and Mannerism:** Introduction, Professional Etiquette, Technology Etiquette **Communication Today:** Significance of Communication, GSC's 3M Model of Communication, Vitality of the Communication Process, Virtues of Listening, Fundamentals of Good Listening, Nature of Non-Verbal Communication, Need for Intercultural Communication, Communicating Digital World **Employment Communication:** Introduction, Resume, Curriculum Vitae, Scannable Resume, Developing an Impressive Resume, Formats of Resume, Job Application or Cover Letter **Professional Presentation:** Nature of Oral Presentation, Planning a Presentation, Preparing the Presentation, Delivering the Presentation	**15** **[C01, CO2, CO4]**
Unit II	**Job Interviews:** Introduction, Importance of Resume, Definition of Interview, Background Information, Types of Interviews, Preparatory Steps for Job Interviews, Interview Skill Tips, Changes in the Interview Process, FAQ During Interviews **Group Discussion:** Introduction, Ambience/Seating Arrangement for Group Discussion, Importance of Group Discussions, Difference between Group Discussion, Panel Discussion and Debate, Traits, Types of Group Discussions, topic based and Case based Group Discussion, Individual Traits **Creativity at Workplace:** Introduction, Current Workplaces, Creativity, Motivation,	**15** **[CO1, CO2, CO3, CO4]**

	Nurturing Hobbies at Work, The Six Thinking Hat Method **Ethical Values:** Ethics and Society, Theories of Ethics, Correlation between Values and Behavior, Nurturing Ethics, Importance of Work Ethics, Problems in the Absence of Work Ethics **Capacity Building:** Learn, Unlearn and Relearn: Capacity Building, Elements of Capacity Building, Zones of Learning, Ideas for Learning, Strategies for Capacity Building **Leadership and Team Building:** Leader and Leadership, Leadership Traits, Culture and Leadership, Leadership Styles and Trends, Team Building, Types of Teams, Decision Making and Negotiation: Introduction to Decision Making, Steps for Decision Making, Decision Making Techniques, Negotiation Fundamentals, Negotiation Styles, Major Negotiation Concepts **Stress and Time Management:** Stress, Sources of Stress, Ways to Cope with Stress	

References:

1. Soft Skills: an Integrated Approach to Maximise Personality by Gajendra S. Chauhan, Sangeeta Sharma, Wiley India
2. Personality Development and Soft Skills by Barun K. Mitra, Oxford Press
3. Business Communication by Shalini Kalia, Shailja Agrawal, Wiley India
4. Soft Skills - Enhancing Employability by M. S. Rao, I.K. International
5. Cornerstone: Developing Soft Skills by Sher field , Pearson India

Course Code	Course Title	Credits	No. of lectures
23BU1VSC04	VSC: Introduction to Programming	02	30

CO1	Study the concept of programming, high level and low level languages. flow chart, algorithm	L1
CO2	Understand the need of logic for writing the codes	L2
CO3	Analyze different programming paradigms by examining and comparing the structure, use, and mathematical foundations of loops, arrays, and functions.	L4
CO4	Apply programming concepts and development tools to build basic software applications	L3

Grading will be as 3: High(>60%), 2: Moderate(40%-60%), 1: Low(<40%), 0: No mapping

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	2	2	-	1	1
CO2	3	3	1	-	1	1
CO3	3	3	2	-	2	1
CO4	3	3	3	-	3	1

Unit I	Introduction, A program, programming languages, The Role of Programming Language, Language Description, elements of program, variable, constants, compilation, compilers, assemblers, Data types, flow chart, DFD, algorithm, Sequence Control and Subprogram Control	**15** [CO1, CO2, CO3]
Unit II	Condition checking, loops, functions, Arrays and Basic Algorithms, Pointers and File Handling, Imperative Programming, Object Oriented Programming, Functional Programming, Logic Programming, Concurrent and Network Programming	**15** [CO2, CO3, CO4]

References:

1. Introduction to Programming by Deepak Gupta Kataria, S. K., & Sons
2. Principles of Programming Language by Dr. Sachin Kumar, Kadambari Agarwal, S.K.Kataria and Sons

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Course Code	Course Title	Credits	No. of lectures
23BUEN1T01	AEC: Basic English Learning Course	02	30

CO1	Explain the concepts and rules related to sentences and their kinds, parts of speech, infinitives and participles, commands, requests, and questions, and punctuation (full stop, comma, colon, semicolon, dash) with appropriate examples	L2
CO2	Describe & discuss usage of verbs and their kinds, articles, prepositions, conjunctions, tenses and their kinds, and the use of correct verb forms in English grammar	L2
CO3	Explain the concepts, rules, and usage of sentence transformation, antonyms, synonyms, homophones, homonyms, collocations, active and passive voice, and degrees of comparison with suitable examples	L2
CO4	Describe and discuss the principles and techniques of reading comprehension, vocabulary learning, conversation skills, essay writing, short speeches, dialogue writing, and mock interview preparation for effective communication	L2

Grading will be as 3: High(>60%), 2: Moderate(40%-60%), 1: Low(<40%), 0: No mapping

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	2	2	-	1	1
CO2	3	2	2	-	1	1
CO3	3	2	2	-	2	1
CO4	3	3	3	-	3	2

Unit I	**1.1 Basic English grammar** Noun, pronoun, verb, adverb, adjective, preposition, conjunction, interjection, Tenses, kinds of tenses, Using of correct verb forms **1.2 Sentences:** a. Subject predicate and kinds (assertive, declarative, interrogative, Imperative, exclamatory) b. Types of sentences (simple, compound, complex) c. Sentence-Fragment (link) d. Run-on sentence and Comma splices, semicolon(link) e. Punctuations. f. articles-a, an, the g. Vocabulary: Word Formation: Prefix, Suffix, Conversion, compounding, abbreviation, idioms **1.3 Clause and phrase:** a. Voice-Active & passive(identify and change) b. Clauses- Independent and dependent; coordination and subordination **1.4 Transformation** - Antonyms, Synonyms - Homophones, Homonyms - Collocation - Active and passive voices - Degree of comparison	**15** [CO1, CO2, CO3]
Unit II	**2.1 Figures of speech** Simile, metaphor, personification, apostrophe, Antithesis, epigram, Metonymy, Synec doche, Hyperbole, Euphimism, Irony, Pun, Interrogation, Exclamation, Climax and anticlimax	**15** [CO2, CO3, CO4]

	2.2 Tutorial activities a. Reading b. Vocabulary learning c. Conversation d. Essay writing e. Short speeches f. Dialogues Writing g. Mock interviews h. Visual data interpretation-graphs, charts, figures, maps, animations Drafting formal mail	

References:

1. English Grammar & Composition – P.C. Wren & H. Martin
2. Practical English Grammar – A.J. Thomson & A.V. Martinet
3. Wren & Martin – High School English Grammar & Composition
4. Effective English Communication – M. Ashraf Rizvi

Course Code	Course Title	Credits	No. of lectures
23BUIK1T03	**IKS: Science and Technology**	**02**	**30**

CO1	Understand and appreciate the rich heritage that resides in our traditions	L2
CO2	Understand of the history and evolution of Indian Intelligence	L2
CO3	Describe the nature of IKS in the contemporary society.	L1
CO4	Understand inspiration for innovation, the environmental data that IT processes, and a constant source of real-world applications that drive technological advancement.	L2

Grading will be as 3: High(>60%), 2: Moderate(40%-60%), 1: Low(<40%), 0: No mapping

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	2	1	1	2	1	3
CO2	2	2	1	1	1	3
CO3	2	2	2	1	1	3
CO4	3	3	2	3	2	2

Unit I	**Introduction:** Importance of Ancient Knowledge, Defining Indian Knowledge system, IKS Corpus, Unique aspects of IKS **Foundational Concepts for Science and Technology:** Number system and Units of Measurement, Knowledge: Framework and classification, Science, Engineering and Technology in IKS: Mathematics, Astronomy	15 [CO1, CO2, CO4]
Unit II	**Space,** The future of Space Exploration, Evolving Space Technologies **The Earth,** Earth and its Resources, The Biosphere **Life**, Food, Energy, Electricity, Water, Health Care	15 [CO1, CO3, CO4]

References:

1. Introduction to Indian Knowledge System, Concepts and Applications, PHI by B. Mahadevan, Vinayak Bhat, Nagendra Pavana R.N.
2. The Scientific Indian by A.P.J. Abdul Kalam and Y.S.Rajan

Semester II

Course Code	Course Title	Credits	No. of lectures
23BUIT2T01	**Major: Data Communications**	02	30

CO1	Understand the importance of data communication, the Layered architecture of Open System Interconnection (OSI).	L2
CO2	Explore Transmission Control Protocol / Internet Protocol (TCP/IP) models	L3
CO3	Understand conversion of signals from Digital to Digital, Analog to Digital & Digital to Analog conversion, bandwidth utilization techniques	L2
CO4	Analyze Error detection and correction techniques, Flow control & error control	L4

Grading will be as 3: High(>60%), 2: Moderate(40%-60%), 1: Low(<40%), 0: No mapping

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	2	3	-	1	1
CO2	3	2	3	-	1	1
CO3	3	3	2	-	2	1
CO4	3	3	2	-	2	1

Unit I	**Introduction** – Data Communication, Networks, Internet, Intranet, Protocols, OSI & TCP/IP Models Addressing. **Physical Layer** – Signals, Analog, Digital, Analog VS Digital, Transmission impairment, Data Rate Limits, Performance. **Digital Transmission** – Line Coding (Umipolar, Polar, Biphase), Block Coding (4B/5B Encoding), Analog to digital conversion, PCM, Transmission Modes. **Analog Transmission** – Digital to analog conversion (ASK, FSK, PSK, QAM), Analog to Analog conversion.	**15** **[CO1, CO2, CO3]**
Unit II	**Multiplexing** – FDM, WDM, Synchronous TDM (time slots & frames, interleaving, data rate management). **Spread Spectrum** – FHSS, DSSS **Transmission Media** – Guided and Unguided. **Switching** – Switching, Circuit-Switched Networks, Datagram networks, Concept of Virtual circuit networks, structure of circuit and packet switch. Concepts of DSL and ADSL.	**15** **[CO1, CO3, CO4]**

References:

1. Data Communication & Networking by Foronzan 4th Edition

Course Code 23BUIT2T02	Course Title **Major: Introduction to Python Programming**	Credits 02	No. of lectures 30

CO1	Analyze basic programs using fundamental programming constructs like variables, conditional logic, looping, and functions	L4
CO2	Explain how user input can be used to create fun and interactive programs	L2
CO3	Apply string manipulation techniques and functions to solve programming problems	L3
CO4	Identify the commonly used operations involving Loops, Python Lists, Tuples, Dictionaries	L1

Grading will be as 3: High(>60%), 2: Moderate(40%-60%), 1: Low(<40%), 0: No mapping

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	3	2	-	2	1
CO2	2	2	3	-	2	1
CO3	3	3	2	-	2	1
CO4	3	3	2	-	2	1

Unit I	**Basic concepts:** interpreting and the interpreter, compilation and the compiler, language elements, syntax and semantics, Python keywords, instructions, indenting, literals: Boolean, integer, floating-point numbers, scientific notation, strings, operators: unary and binary, priorities and binding, numeric operators: ** * / % // + –, **Bitwise operators:** ~ & ^ | <<, >>, string operators: * +, Boolean operators: not and or relational operators (== != > >= < <=), building complex Boolean expressions assignments and shortcut operators, accuracy of floating-point numbers basic input and output: input(), print(), int(), float(), str() functions, formatting print() output with end= and sep= arguments **Conditional Statements:** if, if-else, if-elif, if-elif-else, the pass instruction simple lists: constructing vectors, indexing and slicing, the len() function simple strings: constructing, assigning, indexing, slicing comparing, immutability, **Building loops:** while, for, range(), in, iterating through sequences, expanding loops: while-else, for-else, nesting loops and conditional statements, controlling loop execution: break, continue	**15** **[CO1, CO2, CO4]**
Unit II	immutability, escaping using the \ character, quotes and apostrophes inside strings, multiline strings, copying vs. cloning, advanced slicing, string vs. string, string vs. nonstring, basic string methods, upper(), lower(), isxxx(), capitalize(), split(), join(), etc. and functions (len(), chr(), ord()), escape characters, **Lists:** indexing, slicing, basic methods (append(), insert(), index()) and functions (len(), sorted(), etc.), del instruction, iterating lists with the for	**15** **[CO1, CO2, CO3, CO4]**

	loop, initializing, in and not in operators, list comprehension, copying and cloning lists in lists: matrices and cubes **tuples:** indexing, slicing, building, immutability tuples vs. lists: similarities and differences, lists inside tuples and tuples inside lists **Dictionaries:** building, indexing, adding and removing keys, iterating through dictionaries as well as their keys and values, checking key existence, keys(), items() and values() methods	

References:

1. Beginning Python: From Novice to Professional by Magnus Lie Hetland, Apress 3rd edition

Course Code 23BUIT2P01	Course Title Practical Based on 23BUIT2T01 and 23BUIT2T02	Credits 02	No. of lectures 60

CO1	Apply the concepts of computer networks by identifying and demonstrating different transmission media, network topologies, and networking devices such as hubs, switches, and routers	L3
CO2	Apply basic networking commands and configurations (ipconfig, ping, tracert, netstat, telnet, arp) and implement file and printer sharing to establish and test network connectivity.	L3
CO3	Apply fundamental Python programming constructs such as data types, operators, conditional statements, loops, and functions to develop basic programs solving numerical and logical problems.	L3
CO4	Evaluate and design modular Python programs using functions and iterative techniques to solve real-world problems such as Fibonacci series generation, pattern creation, and data validation tasks.	L5

Grading will be as 3: High(>60%), 2: Moderate(40%-60%), 1: Low(<40%), 0: No mapping

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	2	2	1	3	1
CO2	3	2	3	-	3	1
CO3	3	3	2	-	2	1
CO4	3	3	3	-	3	1

Practical 1	Study of Transmission Mediums
Practical 2	Study of Star, Bus, Ring topologies
Practical 3	Study of Mesh, Tree, Hybrid topologies
Practical 4	Study of Hubs, Switches
Practical 5	Study of Routers
Practical 6	Study of ipconfig, ifconfig, ping, tracert, netstat, telnet, arp commands
Practical 7	Implement file and printer sharing.
Practical 8	Study of TCP, IP, UDP Protocols.
Practical 9	Study of HTTP, FTP, ICMP, RIP Protocols.
Practical 10	Study of Class A, B, C networks and subnet plans
Practical 11	Write a program to demonstrate different data types in Python
Practical 12	Write a program to perform different Arithmetic Operations on numbers.
Practical 13	Write a python program to find largest of three numbers
Practical 14	Write a Python program to find given number is leap year or not
Practical 15	Write a Python program to check given number is palindrome or not
Practical 16	Write a Python program to print factorial of a number
Practical 17	Write a program to understand use of i) for loop ii) while loop
Practical 18	Write a program for i) if statement ii) if else statement iii) if – elif – else statement
Practical 19	Write a Python program to construct the stars(*) pattern, using a nested for loop
Practical 20	Write a program to understand use of Break, Continue and Pass statements
Practical 21	Write a program for string functions
Practical 22	Write a program to create, append, and remove lists in python
Practical 23	Write a program to display elements of the list in reverse order
Practical 24	Write a program to remove duplicates from a list, append a list to the second list
Practical 25	Write a program to add members in a set, to perform Union, Intersection of sets
Practical 26	Define a function that takes 3 numbers as arguments & returns the largest of them
Practical 27	Write a program to demonstrate working with tuples in python
Practical 28	Define a function which generates Fibonacci series up to n numbers
Practical 29	Write a program to demonstrate working with dictionaries in python
Practical 30	Write a Python script to check whether a given key exists or not in a dictionary

Course Code 23BUIT2T03	Course Title **Minor: Web Programming**	Credits 02	No. of lectures 30

CO1	Explain the fundamentals of the Internet, WWW, formatting of web pages using HTML5 tags, lists, backgrounds, hyperlinks, anchors, tables, forms.	L5
CO2	Use of JavaScript, including client-side and server-side JavaScript, JavaScript objects, and basic security concepts FOR Web Page Development.	L3
CO3	Demonstrate event-driven coding using various JavaScript events & event handlers	L3
CO4	Develop interactive web pages by implementing JavaScript functions, variables, and statements to handle user inputs and dynamic content.	L6

Grading will be as 3: High(>60%), 2: Moderate(40%-60%), 1: Low(<40%), 0: No mapping

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	2	3	-	1	1
CO2	3	3	3	-	2	2
CO3	3	3	2	-	2	1
CO4	3	3	3	-	3	2

Unit I	**Internet and the World Wide Web:** Introduction to internet and its applications, E-mail, telnet, FTP, e-commerce, video conferencing, e-business. Internet service providers, domain name server, internet address, WWW and its evolution, URL, browsers, internet explorer, Netscape navigator, opera, Firefox, chrome, Mozilla. search engine, web saver, apache, IIS, proxy server, HTTP protocol **HTML5:** Formatting text by using tags, using lists and backgrounds, Creating hyperlinks and anchors. Style sheets, CSS formatting text using style sheets, formatting paragraphs using style sheets. **HTML5 Page layout and navigation:** Planning site organization, creating text based navigation bar, graphics based navigation bar, graphical navigation bar, image map, redirecting to another URL, creating division based layouts **HTML5 Tables, Forms and Media:** Creating simple table, specifying the size of the table, specifying the width of the column, merging table cells, using tables for page layout, formatting tables: applying table borders, applying background and foreground fills, changing cell padding, spacing and alignment, creating user forms: creating basic form, using check boxes and option buttons, creating lists, additional input types in HTML5, audio/video in HTML5, HTML multimedia basics, embedding video clips, incorporating audio on web page	**15** **[CO1]**
Unit II	**Java Script:** Client-Side,Server-Side JavaScript, JavaScript Objects and Security **Operators**: Assignment Operators, Comparison Operators, Arithmetic Operators, Modulus, Increment, Decrement, Unary Negation, Logical Operators, Short-Circuit Evaluation, String Operators, Special Operators, Conditional operator, Comma operator, delete, new, this, void **Statements:** Break, comment, continue, delete, do...while, export, for, for...in, function, if...else, import, labelled, return, switch, var, while, With. Core JavaScript (Properties and Methods of Each) : Array, Boolean, Date, Function, Math, Number, Object, String, regExp **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	**15** **[CO2, CO3, CO4]**

References: 1. Web Design The Complete Reference by Thomas Powell, Tata McGraw Hill

2. HTML5 Step by Step Faithe Wempen, Microsoft Press edition 2011
3. PHP 5.1 for Beginners by Ivan Bayross Sharanam Shah, SPD - 2013
4. PHP Project for Beginners by SharanamShah, Vaishali Shah, SPD -2015
5. PHP 6 and MySQL Bible by Steve Suehring, Tim Converse, Joyce Park, Wiley-2009
6. Head First HTML 5 programming by Eric Freeman, O'Reilly- 2013
7. JavaScript 2.0: The Complete Reference by Thomas Powell, Fritz Schneider, Tata McGraw 2nd

Course Code	Course Title	Credits	No. of lectures
23BUIT2T04	**Minor: Database Systems**	02	30

CO1	Understand importance of Data Models, Entity-Relationship diagrams, UML, Relational DBMS for enterprise level databases	L2
CO2	Create table, views, inserting records in tables, altering tables, update records, normalization, drop table and views and other DDL, DML, DQL, DCL, TCL statements	L6
CO3	Analyze working of views, NULL Values, relational algebra supporting databases, joining of tables	L4
CO4	Understanding ACID properties, Deadlocks	L2

Grading will be as 3: High(>60%), 2: Moderate(40%-60%), 1: Low(<40%), 0: No mapping

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	2	2	-	1	1
CO2	3	3	3	-	2	1
CO3	3	3	2	-	2	1
CO4	3	2	2	-	1	2

Unit I	**Introduction to Databases and Transactions :** What is database system, purpose of database system, view of data, relational databases, database architecture, transaction management **DDL, DML, DCL statements** **Data Models:** The importance of data models, Basic building blocks, Business rules,The evolution of data models, Degrees of data abstraction. **Database Design, ER Diagram and Unified Modeling Language** Overview, ER Model, Constraints, ER Diagrams, ER Issues, weak entity sets, Codd's rules, Relational Schemas, Introduction to UML **Relational database model:** Logical view of data, keys, integrity rules, Relational Database design: features of good relational database design, atomic domainand Normalization (1NF, 2NF, 3NF, BCNF).	**15** **[CO1, CO2]**
Unit II	**Joining Tables** – inner join, outer join, left outer, right outer, full outer **Subqueries** – subqueries with IN, EXISTS, subqueries restrictions, Nested subqueries, ANY/ALL clause, correlated subqueries **Constraints, Views and SQL** Constraints, types of constrain, Integrity constraints, Views: Introduction to views, data independence, security, updates on views, comparison between tables and views SQL: data definition,aggregate function, Null Values, nested sub queries, Joined relations. Triggers **Transaction management and Concurrency** Control Transaction management: ACID properties, serializability and concurrency control, Lock based concurrency control (2PL, Deadlocks),Time stamping methods, optimistic methods, database recovery management	**15** **[CO2, CO3, CO4]**

References:

1. Database System and Concepts by A Silberschatz, H Korth, S Sudarshan McGraw Hill Fifth Edition
2. Database Systems by RobCoronel Cengage Learning Twelfth Edition
3. Introduction to Database System by C.J.Date Pearson First 2003

Course Code 23BUIT2P02	Course Title Practical Based on 23BUIT1T03 and 23BUIT1T04	Credits 02	No. of lectures 60

CO1	Analyze basic HTML Tags to Design Web Pages.	L4
CO2	Study Web Development Techniques	L1
CO3	Study fundamentals of Database Management Systems	L1
CO4	Create views, procedures, triggers, package	L6

Grading will be as 3: High(>60%), 2: Moderate(40%-60%), 1: Low(<40%), 0: No mapping

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	2	3	-	1	1
CO2	3	2	3	-	2	1
CO3	3	2	2	-	1	1
CO4	3	3	3	-	2	1

	Use of Basic Tags
Practical 1	Design a web page using different text formatting tags.
Practical 2	Design a web page with links to different pages and allow navigation between web pages.
Practical 3	Design a web page demonstrating all Style sheet types
	Image maps, Tables, Forms and Media
Practical 4	Design a web page with Imagemaps.
Practical 5	Design a web page demonstrating different semantics
Practical 6	Design a web page with different tables. Design a webpages using table so that the content appears well placed.
Practical 7	Design a web page with a form that uses all types of controls.
Practical 8	Design a web page embedding with multimedia features.
	Java Script
Practical 9	Using JavaScript design, a web page that prints factorial/Fibonacci series/any given series.
Practical 10	Design a form and validate all the controls placed on the form using Java Script.
Practical 11	Write a JavaScript program to display all the prime numbers between 1 and 100.
Practical 12	Write a JavaScript program to accept a number from the user and display the sum of its digits.

Practical 13	Write a program in JavaScript to accept a sentence from the user and display the number of words in it. (Do not use split () function).
	Write a java script program to design simple calculator.
	Control and looping statements and Java Script references
Practical 14	Design a web page demonstrating different conditional statements.
Practical 15	Design a web page demonstrating different looping statements.
Practical 16	Design a web page demonstrating different Core JavaScript references (Array, Boolean, Date, Function, Math, Number, Object, String, regExp).
	SQL Statements – 1
Practical 17	Creating and Managing Tables Including Constraints
Practical 18	Insert, Update, Delete rows
Practical 19	Alter table
	SQL Statements – II
Practical 20	Writing Basic SQL SELECT Statements
Practical 21	Restricting and Sorting Data
Practical 22	Single-Row Functions
	SQL Statements – III
Practical 23	Displaying Data from Multiple Tables
Practical 24	Aggregating Data Using Group Functions
Practical 25	Sub-queries
	SQL Statements – IV
Practical 26	Creating and working with Views
Practical 27	Creating and working with Trigger
Practical 28	Creating and working with Trigger
Practical 29	Creating and working with Procedures
Practical 30	Creating and working with Packages

Course Code	Course Title	Credits	No. of lectures
23BUIT2T05	GE: Statistical Method and Testing of Hypothesis	02	30

CO1	Explain the definition, scope, and importance of Statistics, probability and relate it to real-life contexts.	L5
CO2	Interpret types of data, attributes and variables and identify appropriate scales of measurement	L5
CO3	Organize and present data effectively and analyze data	L6
CO4	Solve related problems using standard methods.	L3

Grading will be as 3: High(>60%), 2: Moderate(40%-60%), 1: Low(<40%), 0: No mapping

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	2	1	1	1	2
CO2	3	3	1	-	1	1
CO3	3	3	2	-	2	1
CO4	3	3	1	-	1	1

Unit I	Statistical Methods: Definition and scope of Statistics, concepts of statistical population and sample. Data: quantitative and qualitative, attributes, variables, scales of measurement nominal, ordinal, interval and ratio. Presentation: tabular and graphical, including histogram and ogives, consistency and independence of data with special reference to attributes	**15 [CO1, CO2, CO3]**
Unit II	Random Variables: Definition of random variable, discrete and continuous random variables, functions of random variables, probability mass, density and distribution functions with their properties and simple problems and illustrations. Notion of bivariate random variable, bivariate distribution, statements of its properties, Joint, marginal and conditional distributions, Independence of random variables. Transformation of one and two-dimensional random variable(s), simple problems on transformation of the random variable	**15 [CO1, CO2, CO4]**

References:

1. Probability, Statistics, Design of Experiments and Queuing theory, with applications of Computer Science by Trivedi, K.S. Prentice Hall of India 2009
2. A First course in probability by Ross, S.M. Pearson 6 th 2006
3. Common statistical tests by Kulkarni, M.B., Ghatpande, S.B. and Gore, S.D. Satyajeet Prakashan 1999
4. Fundamentals of Mathematical Statistics by Gupta, S.C. and Kapoor, V.K. S. Chand and Sons 2002
5. Applied Statistics by Gupta, S.C. and Kapoor, V.K. S. Chand and Sons 4th edition
6. Planning and Analysis of Experiments Montgomery by D.C., Wiley 2001

Course Code 23BUID2T02	Course Title VEC: Personality Development	Credits 02	No. of lectures 30

CO1	Identify and analyze an ethical issue in the field	L4
CO2	Understand the moral of the profession, safety and risk and concern global issues.	L2
CO3	Develop individuals with desired qualities and humanistic approach	L6
CO4	Identify the multiple ethical interests at stake in a real-world situation	L4

Grading will be as 3: High(>60%), 2: Moderate(40%-60%), 1: Low(<40%), 0: No mapping

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	1	3	1	2	1	3
CO2	1	2	1	2	1	3
CO3	1	2	1	1	2	3
CO4	1	3	1	2	2	3

Unit I	**Ethics and Human Values**: Ethics and Values, Ethical Vision, Nature of Ethics, Profession and Professionalism, Professional Ethics, Code of Ethics, Ethical Decisions, Human Values – Classification of Values, Universality of Values **Professional ethics** - Profession and its moral value in life, Profession- skill needed Profession and ethics- commitment, honesty, accountability, Professional integrity, transparency, confidentiality, objectivity, respect, obedience to the law and loyalty.	**15** **[CO1, CO2, CO3]**
Unit II	**Safety Social Responsibility and Rights:** Safety and Risk, moral responsibility for safety, case studies – Bhopal gas tragedy, Chernobyl disaster, Fukushima Nuclear disaster, Professional rights, Gender discrimination, Sexual harassment at work place **Global Issues:** Globalization and MNCs, Environmental Ethics, Computer Ethics, Cyber Crimes, Ethical living, concept of Harmony in life	**15** **[CO1, CO2, CO4]**

References:

1. Human Values for Managers by Chakraborty, S.K
2. Business Ethics, Vrinda Publications by Badi, R.V. and Badi, N.V
3. Values and Ethics for Organizations by Chakraborty
4. Perspectives in Business Ethics by Hartman, Chatterjee

Course Code	Course Title	Credits	No. of lectures
23BUEN2T03	AEC: Introduction to Technical Writing	02	30

CO1	Elaborate the importance of communication, analyzing audience	L2
CO2	Identify and use appropriate formats of document writing	L1
CO3	Develop skills for writing applications, proposals, reports	L6
CO4	Develop the skills for Presentations	L6

Grading will be as 3: High(>60%), 2: Moderate(40%-60%), 1: Low(<40%), 0: No mapping

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	1	2	2	-	2	3
CO2	1	2	3	-	1	2
CO3	1	3	2	-	2	2
CO4	1	2	2	-	3	2

Unit I	Introduction to Technical Communication, Understanding Ethical and Legal Considerations, Writing Technical Documents, Writing Collaboratively, Analyzing your audience and purpose, Researching your subject, Organizing your information	**15 [CO1, CO2]**
Unit II	Writing correspondence, Writing job Application materials, Writing Proposals, Writing Informational Reports, Writing Definitions, Descriptions and Instructions, Making Oral Presentations	**15 [CO1, CO3, CO4]**

References:

- Technical Communication by Mike Markel, 11th Edition, Launchpad

Course Code 23BUIK2T03	Course Title IKS: Quick Mathematics	Credits 02	No. of lectures 30

CO1	Discuss the concepts of Vedic Mathematics and make Mathematics enjoyable.	L2
CO2	Develop fast and accurate mental calculation skills.	L6
CO3	Develop strong foundation for Competitive Examination	L6
CO4	Improve logical thinking.	L6

Grading will be as 3: High(>60%), 2: Moderate(40%-60%), 1: Low(<40%), 0: No mapping

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	2	2	-	1	1
CO2	3	3	2	-	1	1
CO3	3	3	1	-	1	1
CO4	3	3	1	-	2	1

Unit I	Importance of learning Quick Mathematics, Origin and history, Basic Mathematical tricks to find Product of two numbers, division of two numbers, square root and cube root of a number, Square root of imperfect squares, Cubing Numbers, Base method for multiplication, squaring and Division	**15** **[CO1, CO2, CO3, CO4]**
Unit II	Digit sum method, Magic squares, Dates and Calendar, General and Simultaneous Linear equations, Working with Fractions, Simple and Compound Interest, Profit and loss, Time and Work, Time Distance and Speed.	**15** **[CO1, CO2, CO3, CO4]**

References:

- Vedic Mathematics made easy by Dhaval Bhatiya
- Vedic Mathematics by Sri Bharati Krishna

Course Code 23BUIT2P03	Course Title FP: Green IT	Credits 02	No. of lectures 45

CO1	Describe awareness among stakeholders and promote green agenda and green initiatives	L1
CO2	Identify IT Infrastructure Management and Green Data Centre Metrics	L1
CO3	Illustrate various green IT services and its roles	L4
CO4	Use Green IT Strategies and metrics for ICT development	L3

Grading will be as 3: High(>60%), 2: Moderate(40%-60%), 1: Low(<40%), 0: No mapping

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	2	2	2	3	1	3
CO2	2	2	3	3	1	2
CO3	2	2	3	2	1	2
CO4	2	2	3	3	1	2

Unit I	**Overview and Issues:** Problems: Toxins, Power Consumption, Equipment Disposal, Company's Carbon Footprint. **Minimizing Power Usage:** Power Problems, Monitoring Power Usage, Servers, Low-Cost Options, Reducing Power Use, Data De-Duplication, Virtualization **Cooling:** Cooling Costs, Power Cost, Causes of Cost, Calculating Cooling Needs, Reducing Cooling Costs, Economizers, On-Demand Cooling **Changing the Way of Work:** Old Behaviors, starting at the Top, Process Reengineering with Green in Mind, Analyzing the Global Impact **Going Paperless:** Paper Problems, The Environment, Costs: Paper and Office, Practicality, Storage, Destruction, Going Paperless **Recycling:** Problems, Materials, Means of Disposal, Recycling, Refurbishing, Make the Decision, Life Cycle, from beginning to end, Life, Cost **Hardware Considerations:** Energy Star, Computers, Monitors, Printers, Scanners, All-in-Ones, Thin Clients, Servers, Blade Servers	15

Suggested Field Projects:

1. Green IT Audit of your residence (Study toxins, power usage and suggest improvements)
2. Green IT Audit of a College Computer Lab (Study toxins, power usage and suggest improvements)
3. Carbon Footprint Analysis of College Computer Lab (Suggest reduction strategies)
4. Do survey of households, College E-waste and suggest methods for e-waste handling.
5. Consider some IT / Electronic device and Identify hazardous substances in it.
6. Study the current month electricity bill of your home and identify the reason behind the number of units used. Suggest and implement the methods to minimize the bill.
7. Study the Power consumption of Desktop, Laptop and other IT Gazettes.
8. Study how virtualization reduces power usage.
9. Analyze duplicate data in our college. Do required study for Storage Optimization.
10. Compare traditional servers and blade servers (theoretical + field)
11. Study AC usage and cooling costs. Suggest cost reduction methods.
12. Study Natural Cooling & Economizer Techniques Study.
13. Measure paper consumption and propose digital alternatives.
14. Study the use of cloud tools to design paperless workflow.
15. Compare paper and digital storage costs
16. Life cycle of Computer System from manufacturer to disposal and analyze the environmental cost.
17. Study feasibility of reusing old hardware for education
18. Analyze Energy Star ratings of electronic gazettes.

References: 1. Green IT by Toby Velte, Anthony Velte, McGraw Hill,

2. Green Computing and Green IT Best Practice by Jason Harris, Emereo Publication

Evaluation and Examination Scheme

Evaluation Scheme 30:20
Internals Based on Unit 1 / Unit 2 / Unit 3/ Unit 4

Assignments/ Tutorials/Class Test	Seminar or any other activities	Active Participation & Leadership qualities	Total
10	05	05	20

Suggested Format for Mandatory Question paper

Duration: 1.30Hours **Total Marks: 30**

N. B.: 1. All the questions are compulsory
2. Figures to the right indicate full marks.
3. Answer to the same question must be written together.
4.Use of non-programmable calculator is allowed.

Q.1 **Attempt any Two** **8**
(A)
(B)
(C)
(D)

Q.2 **(A)** **Attempt any One** **4**
i)
ii)

(B) **Attempt any One** **3**
i)
ii)

Q.3 **Attempt any Two** **8**
(A)
(B)
(C)
(D)

Q.4 **(A)** **Attempt any One** **4**
i)
ii)

(B) **Attempt any One** **3**
i)
ii)

Semester End Practical Examination:
Practical examination of each paper for 50 marks will be held for 2 or 3 hours.

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VPM's B. N. Bandodkar College of Science (Autonomous), Thane

Curriculum Structure for the Undergraduate Degree Programme F.Y.B.Sc. Information Technology

	Course Code	SEMESTER–I	Course imparts Employability (EM), Entrepreneurship (EN), Skill Development (SD)			Course integrates with Professional Ethics (PE), Gender Equity (GE), Human Value (HV), Environmental Sustainability (ES)			
		Course Title	EM	EN	SD	PE	GE	HV	ES
Major	23BUIT1T01	Digital Electronics		√	√				
	23BUIT1T02	Operating System		√	√				
	23BUIT1P01	Practicals based upon 23BUIT1T01 and 23BUIT1T02	√	√	√				
Minor	23BUIT1T03	Microprocessor Architecture	√	√	√				
	23BUIT1T04	Introduction to C Programming	√	√	√				
	23BUIT1P02	Practicals based upon 23BUIT1T03 and 23BUIT1T04	√	√	√				
GE	23BUIT1T05	Discrete Mathematics			√				
ID	23BUID1T02	Introduction to Soft Skills	√	√	√				
VSC	23BU1VSC04	Introduction to Programming	√	√	√				
AEC	23BUEN1T01	Basic English Learning Course	√	√	√				
IKS	23BUIK1T03	Science and Technology	√	√	√				

	Course Code	SEMESTER–II	Course imparts Employability (EM), Entrepreneurship (EN), Skill Development (SD)			Course integrates with Professional Ethics (PE), Gender Equity (GE), Human Value (HV), Environmental Sustainability (ES)			
		Course Title	EM	EN	SD	PE	GE	HV	ES
Major	23BUIT2T01	Data Communications	√	√	√				
	23BUIT2T02	Introduction to Python Programming	√	√	√				
	23BUIT2P01	Practicals based upon 23BUIT2T01 and 23BUIT2T02	√	√	√				
Minor	23BUIT2T03	Web Programming	√	√	√				
	23BUIT2T04	Database Systems	√	√	√				
	23BUIT2P02	Practicals based upon 23BUIT2T03 and 23BUIT2T04	√	√	√				
GE	23BUIT2T05	Numerical and Statistical Methods			√				
VEC	23BUID2T02	Personality Development	√	√	√	√		√	
AEC	23BUEN2T03	Introduction to Technical Writing	√	√	√				
IKS	23BUIK2T03	Quick Mathematics	√	√	√				
FP	23BUIT2P03	Green IT	√	√	√			√	

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