Academic Council Meeting No. and Date : 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 : 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 and many others

The students will also be trained in communication skills and green computing.

Abhijeet A. Kale
Chairman
Board of Studies in Computer Science

Program Specific Outcome:

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

- Design, develop and test software systems to provide solutions to real world problems.
- To enhance skills and adapt new computing technologies for attaining professional excellence and carrying research.

Eligibility:

Passed 12th standard (HSC) of Maharashtra State Board / CBSE / ICSE board with Mathematics as one of the subjects.

Discipline/Subject:

Name of the Degree Program:	B.Sc.
Duration:	1 Year (includes SEM I and SEM II)
Level:	4.5
Mode of Conduct:	Offline
	Laboratory Practicals / Offline lectures / Online lectures
Total Credits for the Program:	132
Year of implementation:	2023- 24
Specific Programme:	F.Y.B.Sc. Subject (Major) Credits: 06

Eligibility For certificate if exit at level 4.5

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	23BUIT1T1	Digital Electronics	**30**	**2**
	23BUIT1T2	Operating System	**30**	**2**
	23BUIT1P1	Practical 1	**60**	**2**
Minor	23BUIT1T3	Microprocessor Architecture	**30**	**2**
	23BUIT1T4	Introduction to C Programming	**30**	**2**
	23BUIT1P2	Practical 2	**60**	**2**
Generic	23BUIT1T5	Discrete Mathematics	**30**	**2**
OE -ID	23BUID1T6	Introduction to Soft Skills	**30**	**2**
VSC	23BUVS1T7	Introduction to Programming/Practical 3	**30**	**2**
AEC	23BUEN1T8	Basic English Learning course	**30**	**2**
IKS	23BUIK1T9	IKS: Science and Technology	**30**	**2**
Total				**22**

Semester II

	Course Code	Course Title	No. of lectures	Credits
Major	23BUIT2T1	Data Communications	**30**	**2**
	23BUIT2T2	Introduction to Python Programming	**30**	**2**
	23BUIT2P1	Practical 1	**60**	**2**
Minor	23BUIT2T3	Web Programming	**30**	**2**
	23BUIT2T4	Database Systems	**30**	**2**
	23BUIT2P1	Practical 2	**60**	**2**
Generic	23BUIT2T5	Numerical and Statistical Methods	**30**	**2**
OE -ID	23BUID2T6	Personality Development	**30**	**2**
Field Project	23BUAE2T7	Green IT	**60**	**2**
AEC	23BUIK2T8	Introduction to Technical Writing	**30**	**2**
IKS	23BUFP2T9	IKS: Quick Mathematics	**30**	**2**
Total				**22**

Semester I

Course Code 23BUIT1T1	Course Title **Digital Electronics**	Credits 02	No. of lectures
Course Outcomes: After studying this course the students would gain enough knowledge • Have a thorough understanding of the fundamental concepts and techniques used in digital electronics. • To understand and examine the structure of various number systems and its application in digital design. • The ability to understand, analyze and design various combinational and sequential circuits. • Ability to identify basic requirements for a design application and propose a cost effective solution. • The ability to identify and prevent various hazards and timing problems in a digital design.			
Unit I	**Introduction :** Electronics, Devices, 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
Unit II	**Sequential Circuits:** Flip-Flop: Introduction, Terminologies used, S-R flip-flop, D flip-fop, 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, Demultiplexer, ALU, Encoder and Decoder: **Counters:** Introduction, Asynchronous counter, Terms related to counters, Synchronous counter, Bushing, Type T Design, Type JK Design, Presettable counter, Synchronous counter ICs, Analysis of counter circuits. **Shift Register:** Introduction, 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
References: • Modern Digital Electronics by R.P Jain, Tata McGraw Hill • Digital Principles and Applications by Malvino and Leach, Tata McGraw Hill			

Course Code 23BUIT1T2	Course Title **Operating System**	Credits 02	No. of lectures

Course Outcomes:

- To understand the basic concepts and functions of operating systems.
- To understand Processes, Threads and Deadlocks.
- To analyze Scheduling algorithms.
- To analyze memory management schemes.
- To understand I/O management and File systems.

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**
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**

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 23BUIT1P1	Course Title Practical 1	Credits 02	No. of lectures 60

Course Outcomes:

- To give knowledge of some basic electronic components and circuits.
- To study logic gates and their usage in digital circuits.
- Make use of appropriate Linux commands
- To study Fundamentals of MS-DOS

Practical 1	Study of Logic Gates and their ICs, 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	Linux commands: Working with Directories: pwd, cd, absolute and relative paths, ls, mkdir, rmdir, file, touch, rm, cp. mv, rename, head, tail, cat, tac, more, less, strings, chmod
Practical 6	Linux commands: Working with files: ps, top, kill, pkill, bg, fg, grep, locate, find, locate, date, cal, uptime, w, whoami, finger, uname, man, df, du, free, whereis, which
Practical 7	Windows (DOS) Commands – I Date, time, prompt, md, cd, rd, path, Chkdsk, copy, xcopy, format, fidsk, cls, defrag, del, move
Practical 8	Windows (DOS) Commands – II Diskcomp, diskcopy, diskpart, doskey, echo, Edit, fc, find, rename, set, type, ver

Course Code 23BUIT1T3	Course Title Microprocessor Architecture	Credits 02	No. of lectures

Course Outcomes: On completion of this course the student will be able to:

- Describe the architecture & organization of 8085
- Relate the addressing modes used in the instructions.
- Familiarize the architecture and operation of Programmable Interface Devices and realize the programming & interfacing of it with 8085 microprocessor
- Understanding of developments of Pentium processor.

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 **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,	**15**
Unit II	**Introduction to 8085 Instructions:** Data Transfer Operations, Arithmetic Operations, Logic Operation, Branch Operation **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, Restart as S/W Instructions, Additional I/O Concepts and processes. **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**

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 23BUIT1T4	Course Title Introduction to C Programming	Credits 02	No. of lectures
Course Outcomes: After completion of the course, the learner will be able to • Develop a C program. • Understand the basic programming constructs • Understand logics which will help them to create programs			
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
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 **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 | **Structures and Unions:** Structure Variables, Initialization, Structure Assignment, Nested Structure, Structures and Functions, Structures and Arrays		15
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			

Course Code 23BUIT1P2	Course Title Practical 2	Credits 02	No. of lectures 60
Course Outcomes: • To give knowledge of some basic electronic components . • To digital circuits and digital components with instruction commands. • Make use of appropriate C programming in Problem solving • To study Fundamentals of C Programming			
Practical 1	Addition, subtraction, multiplication, division of 8 bit and 16 bit numbers.		
Practical 2	Add the contents of a set of memory locations and store the result.		
Practical 3	Find the largest and smallest number in a block of data.		
Practical 4	Write a program to sort given 10 numbers		
Practical 5	Write a 'C' program to i. Addition ii. Subtraction iii. Multiplication iv. Division		
Practical 6	Write a 'C' program for i. Conditional Statements ii. Loops		
Practical 7	Write a 'C' program to demonstrate use of functions.		
Practical 8	Write a 'C' program for use of Arrays, Pointers, Structures		

Course Code	Course Title	Credits	No. of
23BUIT1T5	Discrete Mathematics	02	lectures

Course Outcomes: After completion of the course, the learner will be able to

- Use mathematically correct terminology and notation.
- Construct correct direct and indirect proofs
- Apply logical reasoning to solve a variety of problems.

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**
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**

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
23BUID1T6	**Introduction to Soft Skills**	02	lectures

Course Outcomes: After completion of the course, the learner will be able to

- Effectively communicate through verbal/oral communication and improve the listening skills
- Write precise briefs or reports and technical documents
- Actively participate in group discussion / meetings / interviews and prepare & deliver presentations
- Become more effective individual through goal/target setting, self motivation and practicing creative thinking.

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**
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, **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, 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	**15**

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

Course Code 23BUVS1T7	Course Title **Introduction to Programming**	Credits 02	No. of lectures
Course Outcomes: After completion of the course, learner will be • Able to explore the concept of programming. • Understand what high-level and low-level programming languages are. • Aware of basic elements of a program. • Aware of software and tools used by professional developers			
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**
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**
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			

Course Code 23BUEN1T8	Course Title Basic English Language Course	Credits 02	No. of lectures
Course Outcomes: After completion of the course, learner will be • Students can read and understand any text in English listening to the inputs given by the teacher in the classroom • Students write paragraphs, essays, and letters • Students perform various speaking and writing tasks, such as role plays, debates, group discussions apart from the use of correct spelling, punctuation and the ability to transfer information in the writing tasks			
Unit I	Sentence, kind of Sentence Parts of speech Infinitive and participles Commands, Requests and questions Punctuation: Full stop, comma, colon, semicolon, dash Verbs, Kind of verbs Articles, prepositions, conjunctions Tenses, Kinds of senses, Use of correct verb forms		**15**
Unit II	Transformation, Antonyms, Synonyms Homophones, Homonyms, Collocation Active and passive voices, Degree of comparison Reading, Vocabulary learning, Conversation, Essay writing, Short speeches, Dialogue writing, Mock interview		**15**
References:			

Course Code	Course Title	Credits	No. of
23BUIT1T9	**IKS: Science and Technology**	**02**	**lectures**

Course Outcomes:

- Learners will be able to understand and appreciate the rich heritage that resides in our traditions.
- They will be able to understand of the history and evolution of Indian Intelligence.
- They will be able to understand overall organization of IKS
- They will learn importance of nature of IKS in the contemporary society.
- Learners may get motivate to take up a detailed study of some of these topics and explore their application potential

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**
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**

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 23BUIT2T1	Course Title **Data Communications**	Credits 02	No. of lectures
Course Outcomes: • Understand the importance of data communication, the Layered architecture of Open System Interconnection (OSI) and Transmission Control Protocol / Internet Protocol (TCP/IP) models. • Understand conversion of signals from Digital to Digital, Analog to Digital & Digital to Analog conversion, bandwidth utilization techniques. • Understand Error detection and correction techniques, Flow control & error control			
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
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
References: 1. Data Communication & Networking (Foronzan) – IV Edition → Chapters (1, 2, 3, 4, 5, 6, 7, 8, 9)			

Course Code	Course Title	Credits	No. of
23BUIT2T2	**Introduction to Python Programming**	02	lectures

Course Outcomes:

- Build basic programs using fundamental programming constructs like variables, conditional logic, looping, and functions.
- Work with user input to create fun and interactive programs.
- Express proficiency in the handling of strings and functions.
- Identify the commonly used operations involving file systems and regular expressions

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**
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 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	**15**

References:

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

Course Code 23BUIT2P1	Course Title Practical 3	Credits 02	No. of lectures 60
Course Outcomes: • To give knowledge of some basic Network components and circuits. • To study components, network topologies and their usage in Networking. • Make use of appropriate Programming skill in Problem solving • To study Fundamentals of Python Programming			
Practical 1	Study of transmission mediums		
Practical 2	To Study LAN using Star Topology.		
Practical 3	To Study Configure Hub/Switch		
Practical 4	Write Python program for Addition, subtraction, multiplication and division.		
Practical 5	Write a Python program for i. Conditional Statements ii. Loops		
Practical 6	Write a Python program for List demonstration		
Practical 7	Write a Python program for Tuples demonstration		
Practical 8	Write a Python program for Dictionary demonstration		

Course Code 23BUIT2T3	Course Title **Web Programming**	Credits 02	No. of lectures

Course Outcomes:

- Support the development of web pages.
- Write scripts using JavaScript in a web page.
- Effectively incorporate JavaScript in a web page.
- Create forms and check for data accuracy.

Unit I	**Internet and the World Wide Web:** What is Internet? Introduction to internet and its applications, E-mail, telnet, FTP, e-commerce, video conferencing, e-business. Internet service providers, domain name server, internet address, World Wide Web (WWW): World Wide Web and its evolution, uniform resource locator (URL), browsers – internet explorer, Netscape navigator, opera, Firefox, chrome, Mozilla. search engine, web saver – apache, IIS, proxy server, HTTP protocol **HTML5:** Introduction, Why 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:** Creating navigational aids: planning site organization, creating text based navigation bar, creating graphics based navigation bar, creating graphical navigation bar, creating image map, redirecting to another URL, creating division based layouts: HTML5 semantic tags, creating divisions, creating HTML5 semantic layout, positioning and formatting divisions. **HTML5 Tables, Forms and Media:** Creating tables: 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, Incorporating sound and video: audio and video in HTML5, HTML multimedia basics, embedding video clips, incorporating audio onweb page	**15**
Unit II	**Java Script:** Introduction, Client-Side JavaScript, Server-Side JavaScript, JavaScript Objects, JavaScript 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**

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 and Fritz Schneider, Tata McGraw Hill-2nd edition

Course Code	Course Title	Credits	No. of lectures
23BUIT2T4	**Database Systems**	02	

Course Outcomes: At the end of this Database Management Systems course, students will be able to:

- Model Entity-Relationship diagrams for enterprise level databases
- Formulate Queries using SQL and Relational Formal Query Languages
- Apply different normal forms to design the Database
- Summarize concurrency control protocols and recovery algorithms
- Identify suitable Indices and Hashing mechanisms for effective storage and retrieval of Data

Unit I	**Introduction to Databases and Transactions :** What is database system, purpose of database system, view of data,relational databases, database architecture, transaction management **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). **Relational Algebra and Calculus : I**ntroduction, Selection and projection, set operations, renaming, Joins, Division, syntax, semantics. Operators,grouping and ungrouping, relational comparison.	15
Unit II	**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

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 23BUIT2P2	Course Title Practical 4	Credits 02	No. of lectures 60

Course Outcomes:

- To give knowledge of some basic HTML Tags to Design Web Pages
- To study Web Development Techniques.
- Make use of appropriate Database Commands to perform Data Handling Opeartions
- To study Fundamentals Database Management Systems.

Practical 1	**Use of Basic Tags**
a.	Design a web page using different text formatting tags.
b.	Design a web page with links to different pages and allow navigation between web pages.
c.	Design a web page demonstrating all Style sheet types
Practical 2	**Image maps, Tables, Forms and Media**
a.	Design a web page with Imagemaps.
b.	Design a web page demonstrating different semantics
c.	Design a web page with different tables. Design a webpages using table so that the content appears well placed.
d.	Design a web page with a form that uses all types of controls.
e.	Design a web page embedding with multimedia features.
Practical 3	**Java Script**
a.	Using JavaScript design, a web page that prints factorial/Fibonacci series/any given series.
b.	Design a form and validate all the controls placed on the form using Java Script.
c.	Write a JavaScript program to display all the prime numbers between 1 and 100.
a.	Write a JavaScript program to accept a number from the user and display the sum of its digits.
d.	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).
e.	Write a java script program to design simple calculator.
Practical 4	**Control and looping statements and Java Script references**
a.	Design a web page demonstrating different conditional statements.
b.	Design a web page demonstrating different looping statements.
c.	Design a web page demonstrating different Core JavaScript references (Array, Boolean, Date, Function, Math, Number, Object, String, regExp).
Practical 5	**SQL Statements – 1**
a.	Creating and Managing Tables
b.	Including Constraints
c.	Insert, Update, Delete rows
Practical 6	**SQL Statements – II**
	Writing Basic SQL SELECT Statements
	Restricting and Sorting Data
	Single-Row Functions
Practical 7	**SQL Statements – III**
	Displaying Data from Multiple Tables
	Aggregating Data Using Group Functions
	Subqueries
Practical 8	**SQL Statements – IV**
	Creating and working with Views
	Creating and working with Trigger

Course Code 23BUIT2T5	Course Title Statistical Method and Testing of Hypothesis	Credits 02	No. of lectures

Course Outcomes:

- Enable learners to know descriptive statistical concepts
- Enable study of probability concept required for Computer learners
- Enable students to work statistically in every field of study
- Enable students to generate the solutions for the data handling problems

Unit I	**Data Presentation:** Data types : attribute, variable, discrete and continuous variable Data presentation : frequency distribution, histogram o give, curves, stem and leaf display **Data Aggregation:** Measures of Central tendency: Mean, Median, mode for raw data, discrete, grouped frequency distribution. **Measures dispersion:** Variance, standard deviation, coefficient of variation for raw data, discrete and grouped frequency distribution, quartiles, quantiles Real life examples **Moments:** raw moments, central moments, relation between raw and central moments **Measures of Skewness and Kurtosis:** based on moments, quartiles, relation between mean, median, and mode for symmetric, asymmetric frequency curve.	**15**
Unit II	**Correlation and Regression:** bivariate data, scatter plot, correlation, nonsense correlation, Karl Pearson's coefficients of correlation, and independence. **Linear regression:** fitting of linear regression using least square regression, coefficient of determination, properties of regression coefficients (only statement) **Probability :** Random experiment, sample space, events types and operations of events **Probability definition :** classical, axiomatic, Elementary Theorems of probability (without proof) $0 \leq P(A) \leq 1$, $P(A \cup B) = P(A) + P(B) - P(A \cap B)$ $P(A') = 1 - P(A)$ $P(A) \leq P(B)$ if $A \subseteq B$	**15**

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 23BUID2T6	Course Title Personality Development	Credits 02	No. of lectures
Course Outcomes: After completion of the course, learner will be able to • should be able to understand the importance of ethics and values in life and society. • students will be able to work in a professional manner in the organization			
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**
Unit II	**Safety Social Responsibility and Rights:** Safety and Risk, moral responsibility of engineers 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**
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 23BUFP2T7	Course Title Green IT	Credits 02	No. of lectures

Course Outcomes:

- Describe awareness among stakeholders and promote green agenda and green initiatives
- Identify IT Infrastructure Management and Green Data Centre Metrics
- Illustrate various green IT services and its roles
- Use Green IT Strategies and metrics for ICT development

Unit 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. **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. **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 Considerations, System Design, Datacentre Design, Centralized Control	30
Unit II	**Changing the Way of Work:** Old Behaviours, starting at the Top, Process Reengineering with Green in Mind, Analysing the Global Impact of Local Actions, Steps: Water, Recycling, Energy, Pollutants, Teleworkers and Outsourcing, Telecommuting, Outsourcing, how to Outsource. **Going Paperless:** Paper Problems, The Environment, Costs: Paper and Office, Practicality, Storage, Destruction, Going Paperless, Organizational Realities, Changing Over, Paperless Billing, Handheld Computers vs. the Clipboard, Unified Communications, Intranets, What to Include, Building an Intranet, Microsoft Office SharePoint Server 2007, Electronic Data Interchange (EDI), Nuts and Bolts, Value Added Networks, Advantages, Obstacles. **Recycling:** Problems, Materials, Means of Disposal, Recycling, Refurbishing, Make the Decision, Life Cycle, from beginning to end, Life, Cost, Green Design, Recycling Companies, Finding the Best One, Checklist, Certifications, Hard Drive Recycling, Consequences, cleaning a Hard Drive, Pros and cons of each method, CDs and DVDs, good and bad about CD and DVDs disposal, Change the mind-set, David vs. America Online **Hardware Considerations:** Certification Programs, EPEAT, RoHS, Energy Star, Computers, Monitors, Printers, Scanners, All-in-Ones, Thin Clients, Servers, Blade Servers, Consolidation, Products, Hardware Considerations, Planned Obsolescence, Packaging, Toxins, Other Factors, Remote Desktop, Using Remote Desktop, Establishing a Connection, In Practice	30

References:

1. Green IT by Toby Velte, Anthony Velte, McGraw Hill,
2. Green Computing and Green IT Best Practice by Jason Harris, Emereo Publication

Course Code 23BUAE2T8	Course Title **Introduction to Technical Writing**	Credits 02	No. of lectures

Course Outcomes:

- Clearly convey specialized information from a technical field to a non-specialized audience.
- Identify and use appropriate formats and conventions derived from individual disciplines.
- Develop strategies for information design, to include producing visually enhanced documents.
- Summarize larger texts in clear, direct style for practical applications.
- Edit documents with peer exchange and according to professional guidelines.

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**
Unit II	Writing correspondence, Writing job Application materials, Writing Proposals, Writing Informational Reports, Writing Definitions, Descriptions and Instructions, Making Oral Presentations	**15**

References:

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

Course Code 23BUIK2T9	Course Title IKS: Quick Mathematics	Credits 02	No. of lectures
Course Outcomes: • Clear concepts and a strong foundation in mathematics • Develop problem solving skills • To enhance computational skills in maths • Crack entrance on competitive exam.			
Unit I	Basic Mathematical tricks to find Product of two numbers, division of two numbers, square root and cube root of a number		**15**
Unit II	Digit sum method, Magic squares, Dates and Calendar		**15**
References: • Vedic Mathematics made easy by Dhaval Bhatiya • Vedic Mathematics by Sri Bharati Krishna			