Resolution No:___4____

Bharatiya Vidya Bhavan's

M. M. College of Arts, N.M. Institute of Science, H.R.J. College of Commerce. (Bhavan's College) Autonomous

(Affiliated to University of Mumbai)

Syllabus for: F.Y.B.Sc.Computer Science

Program: B.Sc.
Program Code: BH. BSc

Course Code: (BH. USCS)

Choice Based Credit System (CBCS)

with effect from academic year 2023-24

PREAMBLE

The goal of B.Sc. program in computer science is to provide students the foundations of various career opportunities in the field of Information and Communication Technology (ICT). This programme emphasizes acquisition of knowledge and understanding of system, various programming languages and tools requires for effective computation based problem solving.

The main objective of this program is to inculcate among the students, the technical as well as the theoretical knowledge about the computers and its various applications in different fields. This program is designed in such a way that students can have a detailed knowledge of subjects as well as the knowledge of information technology related applications. Throughout this program the students will go through the Information and Communication Technology (ICT) scenario, its scope, career and the essentials of the ICT world.

The Bachelor of Computer Science programme will equip the students with the necessary knowledge and skills for the existing and emerging challenges that a career in computing and software technology will entail. In addition it prepares graduates to show high quality of independent thought, flexibility and maturity based on a sound technical knowledge of the field.

Semester-I (Theory)

Course Code	Course Type	Course Title	Credits	Lectures/ Week
BH.USCS.Maj101	Major Core Subject	C++ Programming	3	3
BH.USCS.Min101	Minor Core Subject	**DATA SCIENCE & ANALYSIS MINOR** –Introduction to Data Science with R	3	3
BH.USCS.Min102		**NETWORK TECHNOLOGIES MINOR-**Digital System &Architecture		
BH.USCS.OE101	Open Elective Subject	Web Designing	3	3
BH.USCS.VSEC101	VSC/SEC Subject	Programming in Python	3	3
BH.USCS.IKS101	IKS Subject	Indian Linguistic Theories & LanguageTechnology	2	2
BH.USCS.VEC101	VEC Subject	Universal Human Values-I	2	2
BH.USCS.AEC101	AEC Subject	Soft Skills for Tech Professionals-I	2	2

Semester-I (Practical)

Course Code	Course Type	Course Title	Credits	Lectures/ Week
BH.USCS.MajP101	Major Core SubjectPractical	Practical of **BH.USCS.Maj101**	1	2
BH.USCS.MinP101 **BH.USCS.MinP102**	Minor Core SubjectPractical	Practical of **BH.USCS.Min101** **BH.USCS.Min102**	1	2
BH.USCS.OEP101	Open Elective SubjectPractical	Practical of **BH.USCS.OE101**	1	2
BH.USCS.VSECP101	VSC/SEC SubjectPractical	Practical's of **BH.USCS.VSEC101**	1	2

F.Y.B.Sc. Computer Science (NEP Based)
Syllabus Outline

Semester-II (Theory)

Course Code	Course Type	Course Title	Credits	Lectures/ Week
BH.USCS.Maj201	Major Core Subject	Database Management System	3	3
BH.USCS.Min201	Minor Core Subject	**DATA SCIENCE & ANALYSIS MINOR** –Big Data Technology	3	3
BH.USCS.Min202		**NETWORK TECHNOLOGIES MINOR-**IOT Technology		
BH.USCS.OE201	Open Elective Subject	Data Analytics using TABLEAU	3	3
BH.USCS.VSEC201	VSC/SEC Subject	Linux Operating System	3	3
BH.USCS.IKS201	VEC Subject	Universal Human Values-II	2	2
BH.USCS.VEC201	AEC Subject	Soft Skills for Tech Professionals-II	2	2
BH.USCS.AEC201	OJT/FP/CEP Subject	-	2	2

Semester-II (Practical)

Course Code	Course Type	Course Title	Credits	Lectures/ Week
BH.USCS.MajP201	Major Core Subject Practical	Practical of **BH.USCS.Maj201**	1	2
BH.USCS.MinP201 **BH.USCS.MinP202**	Minor Core Subject Practical	Practical of **BH.USCS.Min201** **BH.USCS.Min202**	1	2
BH.USCS.OEP201	Open Elective Subject Practical	Practical of **BH.USCS.OE201**	1	2
BH.USCS.VSECP201	VSC/SEC Subject Practical	Practical of **BH.USCS.VSEC201**	1	2

PROGRAM OUTCOMES

	PO Description
	A student completing Bachelor's Major Degree in <u>B.Sc</u> program in the subject of Computer Science and Minor (Data Science & Analysis/ Network Technologies). Students will be able to
PO-1	Form strong foundation in Computer science, through Introduction of emerging trends and groom the students for the challenges of ICT industry
PO-2	Formulate fundamental skills for solving computational problems while the subjects of Mathematics & Statistics course will inculcate research-oriented acumen.
PO-3	to align the programme structure and course curriculum with student aspirations and corporate expectations as the proposed curriculum is more contextual, industry affable and suitable to cater the needs of society and Nation in present day context.
PO-4	helps the student evaluate domain specific skills and to meet industry expectations
PO-5	Have introduction of Ethical Hacking, Cyber Forensic and Information and Network Security. Besides getting hands on experience Linux Server Administration and Web Services
PO-6	Be introduced to the physical world through Architecting of IoT and Wireless Sensor Networks and Mobile Communication
PO-7	To create a pool of technologically savvy, theoretically strong, innovatively skilled and ethically responsible generation of computer science professional

PROGRAM SPECIFIC OUTCOME

PSO	Description
	A student completing Bachelor's Major Degree in <u>B.Sc</u> program in the subject of Computer Science and Minor (Data Science & Analysis/ Network Technologies). Students will be able to:
PSO 1	**Foundation of mathematical concepts:** obtain the Ability to apply mathematical methodologies to solve computation task, model real world problem using appropriate data structure and suitable algorithm. **Foundations of Software development:** obtain the Ability to understand the structure and development methodologies of software systems. Possess professional skills of software design process.

PSO 2	**Applications of Computing and Research Ability:** obtain the Ability to use knowledge in various domains to identify research gaps and hence to provide solution to new ideas and innovation **Problem analysis:** Identify, formulate, review research literature, and analyze complex technical problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and computer sciences.
PSO 3	**Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. **Project management and finance:** Demonstrate knowledge and understanding of the development and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PSO 4	**Design/development of solutions:** Design solutions for complex technical problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PSO 5	**Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the software development practice
PSO 6	**Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern technical methods and IT tools including prediction and modeling with an understanding of the limitations. **Communication:** Communicate effectively on complex technical activities with the development community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

DETAILED SYLLABUS

SEMESTER I

C++ Programming

Programme: B.Sc.(CS)			Semester: I		
Course: C++ Programming			**Course Code: BH.USCS.Maj101**		
Teaching Scheme			**Evaluation Scheme (Theory)**		
Lecture (Periods per week)	**Practical (Periods per week per batch)**	**Tutorial (Periods per week per batch)**	**Credits (Theory +Practical)**	**Continuous Internal Assessment (CIA)**	**End Semester Examination (ESE)**
3	**2**	**0**	**3+1**	**(Marks: 40)**	**(Marks: 60)**

Pre-requisites:
  1. Basic knowledge of using a computer, manipulating files and folders

Course Objectives: The learner should be able
  A. The objective of this course is to provide a comprehensive study of the C++ programming language, identify and practice the object-oriented programming concepts and techniques.
  B. To write modular, efficient, maintainable, and portable code using C++ classes
  C. To be able to use arrays, inheritance, virtual functions and polymorphism in C++

Course Outcomes: After successfully completing the course, the learner will be able to -
  A. Write, compile and debug programs in C++ language, using different data types in a C++ program.
  B. design programs involving object-oriented concepts.
  C. write advanced programs using C++ concepts of inheritance, virtual functions and polymorphism

	Detailed Syllabus	
Unit	**Detailed Description**	**Lecture/Period**
I	**Principles of OOP and Indian contribution to object-oriented programming:** OOP paradigm, basic concepts of OOP, benefits of OOP, OO Languages, who are the known object oriented programmers of India? What are their contributions? Study any 2 research papers written by them. **Beginning with C++:** what is C++? applications of C++, a simple C++ program, C++ statements, structure of C++ program, creating, compiling and lining a file. **Tokens, expressions and control structures:** Tokens, keywords, identifiers, constants and symbolic constants, basic, user-defined and derived data types,	15 Lectures

	type compatibility, variables (declaration and dynamic initialization), reference variables, operators in C++(including scope resolution, member dereferencing, memory management, type cast), manipulators, expressions, implicit conversion, operator precedence. Control structures **Arrays& Strings:** Single-Dimension Arrays, Passing Single-Dimension Arrays to Functions, Null-Terminated Strings, Two-Dimensional Arrays, Multidimensional Arrays, Creating and manipulating String objects	
II	**Functions in C++:** Introduction, main(), function prototyping, call by value and reference, return by reference, inline functions, default arguments, function overloading, friend and virtual functions **Classes and objects:** Introduction, specifying a Class, member functions, inline functions outside class, private member functions, arrays within class, memory allocation for objects, Static data members and member functions, arrays of objects, objects as function arguments, friendly functions, returning objects from functions, pointers to members. **Constructors and destructors:** Introduction, types of constructors (default, parameterized, overloaded, copy constructors), dynamic constructors, destructors	15 Lectures
III	**Inheritance:** Introduction, defining derived classes, types of inheritance (single, multiple, multilevel, hierarchical, hybrid), making a private member inheritable, virtual base class, abstract classes, constructors in derived classes **Pointers, virtual functions and Polymorphism:** Introduction, pointers, pointers to objects, this pointer, pointers to derived classes, virtual functions, pure virtual functions	15 Lectures
	Total	45 Lectures

Test Book:

1. Object Oriented Programming with C++(fourth edition): E. Balagurusamy
   (https://www.anandinstitute.org/pdf/Balaguruswamy%20Object%20Oriented%20Programming%20With%20C++%20Fourth%20Edition%20(3).pdf)

Additional Reference:
1. The Complete Reference C++ (fourth edition): Herbert Schildt
   (https://docs.google.com/file/d/0ByYLraYXu0PHYVJHcEFtcFFCNVE/edit)
2. Mastering C++: K.R.Venugopal, Rajkumar Buyya, T. Ravishankar
   (https://tfetimes.com/wp-content/uploads/2015/09/Mastering-C-By-KR-Venugopal-1.pdf)

Self-Study topics:
1. As per teacher's instructions

List of Topics for the practicals forFundamentals of C++ Programming:

1. Programs to understand the basic data types and I/O, operators and expressions
2. Programs on decision statements, switch..case statements
3. Programs on looping.
4. Programs on arrays.
5. Programs on pointers and dynamic allocation.
6. Programs on:
   a. Functions and default arguments.
   b. function overloading

      c. friend functions

      d. virtual functions

7. Programs on Classes and Objects

8. Programs on
   a. Arrays of objects
   b. Pointers to objects,
   c. Dynamic Allocation for Objects

9. Programs on constructors (and its types)

10. Programs on
   a. Inheritance
   b. polymorphism

Details of Conduct of Practical Examination (Evaluation Scheme):

    40 -Marks practical work

    05 -Marks Viva

    05 -Marks Journal

SEMESTER I
DATA SCIENCE & ANALYSIS MINOR

Introduction to Data Science with R (minor)

Programme: B.Sc.(CS)			Semester: I		
Course: Introduction to Data Science with R (minor)			Course Code: BH.USCS.Min101 (Elective)		
Teaching Scheme			Evaluation Scheme (Theory)		
Lecture (Periods per week)	**Practical (Periods per week per batch)**	**Tutorial (Periods per week per batch)**	**Credits (Theory +Practical)**	**Continuous Internal Assessment (CIA)**	**End Semester Examination (ESE)**
3	**2**	**0**	**3+1**	**(Marks: 40)**	**(Marks: 60)**

Pre-requisites:
1. Deep knowledge of statistics and mathematics.
2. You must have a good understanding of graphs and plots that are used for data visualization.
3. You should have good analytical skills that will help you understand the patterns in the data.

Course Objectives: The learner should be able
A. To use R for analytical programming and implement data structure in R
B. To use R loop functions and debugging tools, matrices and Data visualization in R
C. To perform inferential statistics with R

Course Outcomes: After successfully completing the course, the learner will be able to -
A. Use R for analytical programming and implement data structures in R
B. Write programs with R loop functions and debugging tools, matrices and perform Data visualization in R
C. To perform inferential statistics with R

Detailed Syllabus		
Unit	**Detailed Description**	**Lecture/Period**
I	**Introduction to Data Science-** Introduction- Definition - Data Science in various fields - Examples - Impact of Data Science - Data Analytics Life Cycle - Data Science Toolkit - Data Scientist - Data Science Team Understanding data: Introduction – Types of Data: Numeric – Categorical – Graphical – High Dimensional Data – Classification of digital Data: Structured, Semi-Structured and Unstructured - Example Applications. Sources of Data: Time Series – Transactional Data – Biological Data – Spatial Data – Social Network Data – Data Evolution. **Introduction to R**- Features of R - Environment - R Studio. Basics of R- Assignment - Modes - Operators - special numbers - Logical values - Basic Functions - R help functions - R Data Structures - Control Structures.	15 Lectures

	Vectors: Definition- Declaration - Generating - Indexing - Naming - Adding & Removing elements - Operations on Vectors - Recycling - Special Operators - Vectorized if- then else-Vector Equality – Functions for vectors - Missing values - NULL values - Filtering & Subsetting. **Indian contribution to the field of Data Science** – Who are the known data scientists of India? What are their contributions? Study any 2 research papers written by them.	
II	**Matrices** - Creating Matrices - Adding or Removing rows/columns - Reshaping - Operations - Special functions on Matrices. Lists - Creating List – General List Operations - Special Functions - Recursive Lists. Data Frames - Creating Data Frames - Naming - Accessing - Adding - Removing - Applying Special functions to Data Frames - Merging Data Frames-Factors and Tables. **Input / Output** – Reading and Writing datasets in various formats - Functions - Creating User defined functions - Functions on Function Object - Scope of Variables - Accessing Global, Environment - Closures - Recursion. Exploratory Data Analysis - Data Pre-processing - Descriptive Statistics - Central Tendency - Variability - Mean - Median - Range - Variance - Summary - Handling Missing values and Outliers - Normalization Data **Visualization in R :** Types of visualizations - packages for visualizations - Basic Visualizations, Advanced Visualizations and Creating 3D plots.	15 Lectures
III	**Inferential Statistics with R** - Types of Learning - Linear Regression- Simple Linear Regression - Implementation in R - functions on lm() - predict() - plotting and fitting regression line. Multiple Linear Regression - Introduction -comparison with simple linear regression - Correlation Matrix - F-Statistic - Target variables Vs Predictor	15 Lectures
	Total	45 Lectures

Text Book:
1. Nina Zumel, John Mount, "Practical Data Science with R", Manning Publications, 2014.
   (Download from: http://www.ievbras.ru/ecostat/Kiril/R/Biblio_N/R_Eng/Mount2014.pdf)

Reference Books:
1. Jure Leskovec, Anand Rajaraman, Jeffrey D.Ullman, "Mining of Massive Datasets", Cambridge University Press, 2014.
   (Download from : http://infolab.stanford.edu/~ullman/mmds/book.pdf)
2. Mark Gardener, "Beginning R - The Statistical Programming Language", John Wiley & Sons, Inc., 2012. (Download from: http://students.aiu.edu/submissions/profiles/resources/onlineBook/A7E7d8_Beginning%20R%20statistics.pdf)
3. W. N. Venables, D. M. Smith and the R Core Team, "An Introduction to R", 2013.
4. Tony Ojeda, Sean Patrick Murphy, Benjamin Bengfort, Abhijit Dasgupta, "Practical Data Science Cookbook", Packt Publishing Ltd., 2014.
5. Nathan Yau, "Visualize This: The FlowingData Guide to Design, Visualization, and Statistics", Wiley, 2011.
6. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, "Professional Hadoop Solutions", Wiley, ISBN: 9788126551071, 2015.

Self-Study topics:
1. Discuss and differentiate between Data Science Programming Language.
2. Various Data visualization techniques.
3. Comparative study of Simple Linear Regression and Multiple Linear Regression.
4. Study of various statistical tools: SAS, RapidMiner, Tableau, MySQL etc.
5. Various Case studies.

List of Topics for the practicals forIntroduction to Data Science with R :

1	A. Installing R and R studio B. installing the "ggplot2", "caTools", "CART" packages
2	A. Basic operations in r B. Loops and functions - Find the factorial of a given number
3	Working with Vectors: i. Create a vector v1 with elements 1 to 20. ii. Add 2 to every element of the vector v1. iii. Divide every element in v1 by 5 iv. Create a vector v2 with elements from 21 to 30. Now add v1 to v2.

4 Using the data present in the table given below, create a Matrix "M"

	C1	C2	C3	C4	C5
C1	0	12	13	8	20
C2	12	0	15	28	88
C3	13	15	0	6	9
C4	8	28	6	0	33
C5	20	88	9	33	0

     i. Find the pairs of cities with shortest distance.

5 Consider the following marks scored by the 6 students

Section	Student no	M1	M2	M3
A	1	45	54	45
A	2	34	55	55
A	3	56	66	64
B	1	43	44	45
B	2	67	76	78
B	3	76	68	37

    i. create a data structure for the above data and store in proper positions with proper names
    ii. display the marks and totals for all students
    iii. Display the highest total marks in each section.
    iv. Add a new subject and fill it with marks for 2 sections.

A. Three people denoted by P1, P2, P3 intend to buy some rolls, buns, cakes and bread. Each of them needs these commodities in differing amounts and can buy them in two shops S1, S2. The individual prices and desired quantities of the commodities are given in the following table "demand

	price			demand.quantity			
	S1	S2		Roll	Bun	Cake	Bread
Roll	1.5	1	P1	6	5	3	1
Bun	2	2.5	P2	3	6	2	2
Cake	5	4.5	P3	3	4	3	1
Bread	16	17					

    i.   Create matrices for above information with row names and col names.
    ii.   Display the demand.quantity and price matrices
    iii. Find the total amount to be spent by each person for their requirements in each shop
    iv. Suggest a shop for each person to buy the products which is minimal.

6	Consider the following employee details:

employee details as follows	
emp_no:1	
name: Ram	
salary	
	basic: 10000
	hra: 2500
	da: 4000
deductions	
	pf: 1100
	tax: 200
total salary	
	gs(Gross Salary):
	ns(Net Salary)

    i.   Create a list for the employee data and fill gross and net salary.
    ii.   Add the address to the above list
    iii. display the employee name and address
    iv. remove street from address
    v.   Remove address from the List.
To do at least 4 more such questions with separate cases lie student, patient,etc.

7	Implementation of Data Frame and its corresponding operators and functions
8	Implementation of Reading data from the files and writing output back to the specified file
9	Implementation of Visualizations - Bar, Histogram, Box, Line, scatter plot, etc.
10	Implementation of Linear and multiple Linear Regression

Details of Conduct of Practical Examination (Evaluation Scheme):
40 -Marks practical work
05 -Marks Viva
05 -Marks Journal

SEMESTER I
NETWORK TECHNOLOGIES MINOR

Digital System &Architecture (minor)

Programme: B.Sc.(CS)			Semester: I		
Course: Digital System &Architecture (minor)			Course Code: BH.USCS.Min102 (Elective)		
Teaching Scheme			Evaluation Scheme (Theory)		
Lecture (Periods per week)	Practical (Periods per week per batch)	Tutorial (Periods per week per batch)	Credits (Theory +Practical)	Continuous Internal Assessment (CIA)	End Semester Examination (ESE)
3	3	1	2+1	(Marks: 40)	(Marks: 60)

Pre-requisites:
1. Knowledge of basic working of a computer.

Course Objectives: The learner should be able
  A. Discuss the basic concepts and structure of computers.
  B. Understand concepts of register transfer logic and arithmetic operations.
  C. Explain different types of addressing modes and memory organization.

Course Outcomes: After successfully completing the course, the learner-
  A. Use appropriate tools to design verify and test the CPU architecture.
  B. Understand concepts of register transfer logic.
  C. Define different number systems, binary addition and subtraction, 2's complement representation and operations with this representation.

	Detailed Syllabus	
Unit	Detailed Description	Lecture/Period
I	**Number Systems:** Analogue Versus Digital, Introduction to Number Systems- Decimal Number System, Binary Number System, Octal Number System, Hexadecimal Number System, Number Systems – Some Common Terms, Number Representation in Binary, Finding the Decimal Equivalent, Decimal-to-Binary Conversion, Decimal-to-Octal Conversion, Decimal-to-Hexadecimal Conversion, Binary–Octal and Octal–Binary Conversions, Hex–Binary and Binary–Hex Conversions, Hex–Octal and Octal–Hex Conversions , The Four Axioms, Floating-Point Numbers. **Binary Codes:**	15 Lectures

	Alphanumeric Codes- ASCII code, EBCDIC code, Unicode. **Digital Arithmetic:** Basic Rules of Binary Addition and Subtraction, Addition of Larger-Bit Binary Numbers, Subtraction of Larger-Bit Binary Numbers. **Logic Gates and Related Devices:** Positive and Negative Logic , Truth Table, Logic Gates, Universal Gates, Gates with Open Collector/Drain Outputs, Tristate Logic Gates, AND-OR-INVERT Gates, Schmitt Gates, Special Output Gates, Fan-Out of Logic Gates, Buffers and Transceivers.		
II	**Boolean Algebra and Simplification Techniques:** Introduction to Boolean Algebra, Postulates of Boolean Algebra, Theorems of Boolean Algebra, Simplification Techniques- Sum-of-Products Boolean Expressions, Product-of-Sums Expressions, Expanded Forms of Boolean Expressions, Canonical Form of Boolean Expressions and Nomenclature. **Arithmetic Circuits:** Combinational Circuits, Implementing Combinational Logic, Arithmetic Circuits – Basic Building Blocks, Adder–Subtractor, BCD Adder, Carry Propagation–Look-Ahead Carry Generator, Arithmetic Logic Unit (ALU) ,Multipliers, Magnitude Comparator. **Multiplexers and Demultiplexers:** Multiplexer, Encoders, Demultiplexers and Decoders.		15 Lectures
III	**Flip-Flops and Related Devices:** R-S Flip-Flop, Level-Triggered and Edge-Triggered Flip-Flops, J-K Flip-Flop, Toggle Flip-Flop (T Flip-Flop), D Flip-Flop, Synchronous and Asynchronous Inputs. **Counters and Registers:** Ripple (Asynchronous) Counter, Synchronous Counter, Modulus of a Counter, Binary Ripple Counter – Operational Basics, Synchronous (or Parallel) Counters, UP/DOWN Counters, Decade and BCD Counters, Shift registers.		15 Lectures
		Total	45 Lectures

Text Book:
   1. Computer Organization and Architecture (tenth edition): William Stallings (https://tfetimes.com/wp-content/uploads/2015/09/Mastering-C-By-KR-Venugopal-1.pdf)
   2. Computer Organization and Design (Fifth Edition): Carl Hamacher

Reference Books:
   1. Computer System Architecture (third edition): M. Morris Mano

(https://poojavaishnav.files.wordpress.com/2015/05/mano-m-m-computer-system-architecture.pdf)
2. Digital Electronics : Principles, Devices and Applications , Anil K.Maini ©2007 John Wiley & Sons , Ltd.

Self-Study topics:

1. Computer Fundamentals:

Anatomy of a Computer, A Computer System, Types of Computer System, Computer Memory, Random Access Memory, Read Only Memory, Expanding Memory Capacity, Input and Output Ports, Input/Output Devices, Secondary Storage or Auxiliary Storage.

List of Topics for the practicals forDigital System Architecture:
1. Study conversion form decimal numbers to binary, octal and hexadecimal and vice versa
2. Study conversion from Octal to binary and hexadecimal and vice versa
3. Study conversion from binary to hexadecimal and vice versa
4. Study and verify the truth table of various logic gates (NOT, AND, OR, NAND, NOR, EX- OR, and EX-NOR).
5. Simplify given Boolean expression and realize it.
6. Design and verify a half/full adder
7. Design and verify half/full subtractor.
8. Design a 4 bit magnitude comparator using combinational circuits.
9. To design and study ripple counter.
10. To implement control circuit using multiplexer.

Details of Conduct of Practical Examination (Evaluation Scheme):
40 -Marks practical work
05 -Marks Viva
05 -Marks Journal

SEMESTER I

Web Designing

Programme: B.Sc.(CS)			Semester: I		
Course: Web Designing			**Course Code: BH.USCS.OE101**		
Teaching Scheme			**Evaluation Scheme (Theory)**		
Lecture (Periods per week)	**Practical (Periods per week per batch)**	**Tutorial (Periods per week per batch)**	**Credits (Theory +Practical)**	**Continuous Internal Assessment (CIA)**	**End Semester Examination (ESE)**
3	**2**	**1**	**3+1**	**(Marks: 40)**	**(Marks: 60)**

Pre-requisites:
1. Basic knowledge of computing

Course Objectives: The learner should be able
A. provide insight into emerging technologies.
B. design and develop the art of web applications using client-side scripting and server-side scripting.
C. Develop a website with database connectivity.

Course Outcomes: After successfully completing the course, the learner-
A. designs valid, well-formed, scalable, and meaningful web-pages using emerging technologies.
B. implements client-side and server-side scripting language programs.
C. develops Database Driven Websites.

	Detailed Syllabus	
Unit	**Detailed Description**	**Lecture/Period**
I	**Web Programming:** Static and Dynamic Web, Client side &Server-side Scripting, Introduction to other Server side languages, Webserver (IIS & Apache), Web Hosting, Virtual Host, Multi-Homing, Distributed Web Server Overview. **HTML5**: Fundamental Elements of HTML, Formatting Text in HTML, Organizing Text in HTML, Links and URLs in HTML, Tables in HTML, Images on a Web Page, Image Formats, Image Maps, Colors, FORMs in HTML, Interactive Elements, Working with Multimedia - Audio and Video File Formats, HTML elements for inserting Audio / Video on a web page	15 Lectures
II	**CSS:** Understanding the Syntax of CSS, CSS Selectors, Inserting CSS in an HTML Document, CSS properties to work with background of a Page, CSS properties to work with Fonts and Text Styles, CSS properties for positioning an element **JavaScript:** Using JavaScript in an HTML Document, Functions – Defining	15 Lectures

	and Invoking a Function, Defining Function arguments, Defining a Return Statement, JavaScript Objects - String, RegExp, Math, Date, Browser Objects - Window, Navigator, History, Location, Document, Cookies, Document Object Model, Form Validation using JavaScript	
III	**AJAX:** AJAX Web Application Model, How AJAX Works, XMLHttpRequest Object – Properties and Methods, Handling asynchronous requests using AJAX **PHP:** Variables and Operators, Program Flow, Arrays, Working with Files and Directories, Working with Databases, Working with Cookies **jQuery:** Fundamentals, Selectors, methods to access HTML attributes, methods for traversing, manipulators, events, effects	15 Lectures
	Total	45 Lectures

Text Book:
1. HTML 5 Black Book, Covers CSS 3, JavaScript, XML, XHTML, AJAX, PHP and jQuery, 2ed, Dreamtech Press
2. Web Programming and Interactive Technologies, scriptDemics, StarEdu Solutions India.
3. PHP: A Beginners Guide, Vikram Vaswani, TMH

Reference Books:
1. HTML, XHTML, and CSS Bible Fifth Edition, Steven M. Schafer, WILEY
2. Learn to Master HTML 5, scriptDemics, StarEdu Solutions Pvt Ltd.
3. Learning PHP, MySQL, JavaScript, CSS & HTML5, Robin Nixon, O'Reilly
4. PHP, MySQL, JavaScript & HTML5 All-in-one for Dummies, Steve Suehring, Janet Valade Wiley

Self-Study topics:
1. Comparing JavaScriptwith PHP.
2. Advantages and Disadvantages of JavaScript
3. Design a static web page of your choice.
4. Advantages of jQuery.
5. Advantages of AJAX.

List of Topics for the practicals for Web Designing:
1. Design a webpage that makes use of
   a. Document Structure Tags
   b. Various Text Formatting Tags
   c. List Tags
   d. Image and Image Maps

2. Design a webpage that makes use of
   a. Table tags
   b. Form Tags (forms with various form elements)
   c. Navigation across multiple pages
   d. Embedded Multimedia elements

3. Design a webpage that make use of Cascading Style Sheets with
   a. CSS properties to change the background of a Page
   b. CSS properties to change Fonts and Text Styles
   c. CSS properties for positioning an element

4. Write JavaScript code for
   a. Performing various mathematical operations such as calculating factorial / finding Fibonacci Series /

Displaying Prime Numbers in a given range / Evaluating Expressions / Calculating reverse of a number
  b. Validating the various Form Elements

5. Write JavaScript code for
  a. Demonstrating different JavaScript Objects such as String, RegExp, Math, Date
  b. Demonstrating different JavaScript Objects such as Window, Navigator, History, Location, Document,
  c. Storing and Retrieving Cookies

6. Design a webpage to handle asynchronous requests using AJAX on a. Mouseover b. button click

7. Write PHP scripts for
  a. Retrieving data from HTML forms
  b. Performing certain mathematical operations such as calculating factorial / finding Fibonacci Series / Displaying Prime Numbers in a given range / Evaluating Expressions / Calculating reverse of a number
  c. Working with Arrays
  d. Working with Files (Reading / Writing)

8. Write PHP scripts for
  a. Working with Databases (Storing Records / Reprieving Records and Display them)
  b. Storing and Retrieving Cookies
  c. Storing and Retrieving Sessions

9. Design a webpage with some jQuery animation effects using mouse events

10. Design a webpage with some jQuery animation effects using keyboard events

Details of Conduct of Practical Examination (Evaluation Scheme):
    40 -Marks practical work
    05 -Marks Viva
    05 -Marks Journal

SEMESTER I
Programming in Python

Programme: B.Sc.(CS)			Semester: I		
Course: Programming in Python			**Course Code: BH.USCS.VSEC101**		
Teaching Scheme			**Evaluation Scheme (Theory)**		
Lecture (Periods per week)	**Practical (Periods per week per batch)**	**Tutorial (Periods per week per batch)**	**Credits (Theory +Practical)**	**Continuous Internal Assessment (CIA)**	**End Semester Examination (ESE)**
3	**2**	**0**	**3+1**	**(Marks: 40)**	**(Marks: 60)**

Pre-requisites:
1. Basic concept of programming.

Course Objectives: The learner should be able
A. To explore various concepts of programming language. B. To explore the style of structured programming. C. To design real life application.

Course Outcomes: After successfully completing the course, the learner-
A. Learners will be able to understand basic constructsof programming and to explore ways to deal with errors. B. Learners will be able to develop logicsfor problem solving. C. Learners will be able to design applications using GUI controls, connect database to move to/from the applications and read or send emails.

Detailed Syllabus		
Unit	**Detailed Description**	**Lecture/Period**
I	**Introduction**: History of programming languages in India, python programming language introduced in India,list of its different versions with its pros,Programming languages that influenced python, contribution in various fields, ways python developed in business aspects. **Compound Datatypes** : (String , Tuples, List and Dictionaries) **Working with Functions**:Function parameters, Formal Parameters, Actual Parameters, Parameter Passing,Global and local variables, using range functions, Value-Returning Functionsand Non-Value-Returning Functions, Keyword and Default ArgumentsAnonymous functions, List comprehensions.	15 Lectures
II	**Python File Input-Output:** Opening and closing files, various types of file modes, reading and writing to files, manipulating directories.	15 Lectures

	GUI Programming in Python (using Tkinter/wxPython/Qt) What is GUI, Advantages of GUI, Introduction to GUI library. Layout management, events and bindings, fonts, colours, drawing on canvas (line, oval, rectangle, etc.) Widgets such as: frame, label, button, checkbutton, entry, listbox, message, radiobutton, text, spinbox etc.		
III	**Exception handling**: What is an exception, various keywords to handle exceptions such try, catch, except, else, finally, raise. **Database connectivity in Python**: Installing MySQL connector, accessing connector module, using connect, cursor, execute & close functions, reading single & multiple results of query execution, executing different types of statements, executing transactions, understanding exceptions in database connectivity. **Network connectivity**: Socket module, creating server-client programs, sending email, reading from URL.		15 Lectures
		Total	45 Lectures

Text Book:
1. Magnus Lie Hetland, Beginning Python: From Novice to Professional, Apress
2. Paul Gries, et al., Practical Programming: An Introduction to Computer Science Using Python 3, Pragmatic Bookshelf.
3. James Payne , Beginning Python: Using Python 2.6 and Python 3, Wiley India

Reference Books:
1. Charles Dierbach, Introduction to computer Science using Python, Wiley.
2. Programming Languages - Principles and Paradigms, Adesh Pandey, Narosa
3. Introduction to Computer Science using Python, Charles Dierbach, Wiley, 2013

Self-Study topics:
1. Semicolon-separated sequence of simple statements and types of statements.
2. Control flow statements (The conditional statements: [if, if-else, if-elif-else. Iterative statements: while, while- else, for-else. The continue and break statements).
3. Compound datatypes (string, tuple and list; Indexing, built in functions: min, max and sum)
4. Regular Expressions: (various types, using match function).
5. Reading writing with files of different formats.
6. Comparative study of iterables and iterators.
7. Explore more GUI application programming.

List of Topics for the practicals:
1. Installing and setting up the Python IDLE interpreter. (Execute statements like: assert, assignment, expression statements, delete statements, print function)
2. Programs based on lists, conditional constructs, for statement and range function.
3. Programs related to string manipulation.
4. Programs based on importing and executing built-in functions from the time, math and random modules.
5. User defined functions.
6. Programs using list comprehensions and anonymous functions.

7. Programs to read and write files.
8. Working with GUI.
9. Program to create server-client and exchange basic information.
10. Program to send email & read contents of URL.

Details of Conduct of Practical Examination (Evaluation Scheme):
    40 -Marks practical work
    05 -Marks Viva
    05 -Marks Journal

SEMESTER I

Indian Linguistic Theories & Language Technology (IKS)

Programme: B.Sc.(CS)			Semester: I		
Course: Indian Linguistic Theories & Language Technology (IKS)			Course Code: BH.USCS.IKS101		
Teaching Scheme			**Evaluation Scheme (Theory)**		
Lecture (Periods per week)	**Practical (Periods per week per batch)**	**Tutorial (Periods per week per batch)**	**Credits (Theory +Practical)**	**Continuous Internal Assessment (CIA)**	**End Semester Examination (ESE)**
2	**0**	**0**	**2+0**	**(Marks: 10)**	**(Marks: 40)**
Pre-requisites: 1. Basics of computing. 2. Role of programming languages.					
Course Objectives: The learner should be able A. Understand legacy of Indian languages. B. How language technologies are developed and widely used in India.					
Course Outcomes: After successfully completing the course, the learner- A. Shall learn linguistics theories of India. B. Shall practice and learn Indian Language Technology.					

Detailed Syllabus		
Unit	Detailed Description	Lecture/Period
I	**India's Contribution to Science and Technology** (From Ancient to Modern), Indian computer scientists, India's Latest Achievements. **Indian Language Sciences:** Linguistics in Premodern India, The origin of Indian linguistics, The Structure of the Aṣṭādhyāyī, Machine Translation, Corpus Linguistics, Scientific theories of communication through Languages, IT Developments and Indian Languages. The Current Indian Linguistic Scene. IT in India. **Role of Linguistics in Spoken Language Technology:** Speech Recognition, Speech Understanding (Integration of Speech Recognition and Natural Language Processing), Text Generation, Speech Synthesis.	15 Lectures
II	**Language Technology in India:** 1. Corpora creation and analysis 2. Smart content creation 3. Language technology be integrated into curricula 4. Indian language speech databases 5. Multilingual multimedia content development 6. Speech engine: speech recognition, specific speech I/O 7. Indian language support on internet applications 8. Machine Aided Translation	15 Lectures

	9. Cross Lingual Information Retrieval Tools (CLIR), and 10. Speech to speech translation Corpora Building and Databases	
	Total	30 Lectures

Text Book:
1. Corpus_Linguistics_A_General_Introduction.
2. COMPUTATIONAL LINGUISTICS IN INDIA AN OVERVIEW.
3. Indian Contributions to science By Vijnana Bharati, Vibha Shikshan bharti

Reference Books:
1. Computational Sanskrit & Digital Himanities.
2. Indian-languages-Defining-Indias-Internet.
3. MachineTranslation-3 by india

Self-Study topics:
1. History of Indian Languages.
2. Contribution of Indian researchers for language technologies.
3. Case study on any Indian Language Technology.
4. Programming languages developed in India.

SEMESTER I

Universal Human Values-I

Programme: B.Sc.(CS)			Semester: I		
Course: Universal Human Values-I			**Course Code: BH.USCS.VEC101**		
Teaching Scheme			**Evaluation Scheme (Theory)**		
Lecture (Periods per week)	**Practical (Periods per week per batch)**	**Tutorial (Periods per week per batch)**	**Credits (Theory +Practical)**	**Continuous Internal Assessment (CIA)**	**End Semester Examination (ESE)**
2	**0**	**0**	**2+0**	**(Marks: 10)**	**(Marks: 40)**

Pre-requisites:
1. Basic understanding of life
2. Sensitive attitude towards nature and animals too.
3. Understanding of Indian culture and values.

Course Objectives: The learner should be able
- A. To help the students appreciate the essential complementarily between 'VALUES' and 'SKILLS' and ensure sustained happiness and prosperity.
- B. To facilitate the development of a Holistic perspective among students towards life and profession and to develop skills, attitudes, and behaviours that promote a harmonious and compassionate society.

Course Outcomes: After successfully completing the course, the learner-
- A. Learners will be more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mindto lead apeaceful life.
- B. Learners will develop a deep sense of gratitude towards life and its culture and tradition.

	Detailed Syllabus	
Unit	**Detailed Description**	**Lecture/Period**
I	**Introduction**: Purpose and motivation for the course. Key universal human values, Types,Importance of human values in prevailing education, its impact on life,Feedback of some prominent people (Dr.APJAbdul Kalam, Swami Vivekananda, Mother Teresa, Mahatma Gandhi, Rabindranath Tagore). Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration. Respect to human dignity, Peace-Violence,compassion and empathy.	15 Lectures

	Human values in ancient India & Present Scenario. True meaning of Values, its categories, Indian culture the oldest one,**Human values needed? Contribution to our nation.** **Understanding Harmony in the Nature** Whole existence as Coexistence Understanding the harmony in the Nature, self-regulation in nature. Interdependence,Biodiversity, Nature cycles and Rhythms, Personal connection (Observation, Exploration and Contemplation)	
II	**Understanding Harmony in the Human Being** - Harmony in Myself! Understanding human being as a co-existence of the sentient 'I' and the material 'Body'.Sanyam and Health; meaning of Prosperity. **Understanding Student life ethics and values:** Basics for Ethical Human conduct, Student life ethics-meaning and objective of education, ethical leadership in academic institution, interpersonal relation and community life HEI. Human values and ethics-Vulnerable section of society. (Issues related to elders, persons with disability and child labour). Values-Respect, integrity, compassion, cooperationcollaboration, self - discipline and open-mindedness.	15 Lectures
	Total	30 Lectures

Text Book:
1. A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019.
2. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010

Reference Books:
1. Jeevan Vidya: EkParichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999. 2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004. 3. The Story of Stuff (Book).
2. Bharat Mein Angreji Raj - PanditSunderlal 9. Rediscovering India - by Dharampal 10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
3.India Wins Freedom - Maulana Abdul Kalam Azad
4.Gandhi - Romain Rolland (English)

Self-Study topics:

1. Human approach towards nature.
2. Studies on importance of nature and its existence.
3. Ways to respect/value nature and human.
4. Possible ways that drive away from values as a student and happiness.
5. Reflect on personal values.
6. Articles on ethics and road to character.

SEMESTER I

Soft Skill for Tech Professionals-I

Programme: B.Sc.(CS)			Semester: I		
Course: Soft Skill for Tech Professionals-I			**Course Code: BH.USCS.AEC101**		
Teaching Scheme			**Evaluation Scheme (Theory)**		
Lecture (Periods per week)	**Practical (Periods per week per batch)**	**Tutorial (Periods per week per batch)**	**Credits (Theory +Practical)**	**Continuous Internal Assessment (CIA)**	**End Semester Examination (ESE)**
2	**0**	**0**	**2+0**	**(Marks: 10)**	**(Marks: 40)**

Pre-requisites:
1.Basic knowledge of spoken English.

Course Objectives: The learner should be able
  A. To help learners develop their soft skills and personality together with their technical skills.
  B. To develop professional and personal skills to harness hidden strengths, capabilities and knowledge which equips students to excel in various different environments includes corporate life.

Course Outcomes: After successfully completing the course, the learner-
  A. Learners know about various aspects of soft skills and learn ways to develop one's personality.
  B. Learners are provided with insights of technical and non-technical skills and develop one's personally and also professionally.

	Detailed Syllabus	
Unit	**Detailed Description**	**Lecture/Period**
I	Introduction – History, Hard skill vs soft skills, Dr.APJ Abdul Kalam (Ignited Minds: Unleashing the Power within India), Various Expertsbrought soft skill forefront, Researches on soft skillby Indians. **Self-Development:** Self-Management: Self-Evaluation, Self-Discipline, Self-Criticism, Self-awareness, Self-Confidence,Positive Thinking, Perceptions and Attitudes, Values and Belief Systems, Career Planning & Goal setting, prioritization. Attitude: Managing self –Healthy Ego, Pride, Attitude - Concept - Significance - Factors affecting, Positive attitude – Advantages –Negative attitude- Disadvantages - Ways to develop positive attitude - Importance of self- motivation, Factors leading to de-motivation.	15 lectures

	Personality development: Building Self-Esteem, 5 Dimensions of personality, its significance and importance,Defining the difference between aggressive, submissive and assertive behaviours,the concept of success and failure: What is success? - Hurdles in achieving success - Overcoming hurdles - Factors responsible for success –Failure and Time management (its importance, styles and techniques)	
II	**Business Communication Skills:** **Communication:** Significance of Communication- types and its barriers, The 7 C's, Effective, Interactive and Non-interactive communication,Inter-Intra Personal Skill, Verbal and non-Verbal Communication, Direction of communication, Culture components (Culture Shock, Ethnocentrism, Stereotyping) **Speaking,Listening, WritingSkills**: Importance of speaking effectively, conversation and oral skills, fluency and self-expression, body language phonetics, speaking techniques, word and correct stress patterns, voice quality, types of tones, positive image projection techniques, Story narration, Verb pattern, Public Speaking and Netiquettes,Presentation skills. **Creativity at Workplace:** Introduction, Current Workplaces, Creativity, Perseverance, Resourcefulness, Curiosity, Passion, Flexibility, Problem-Solving, Nurturing Hobbies at Work, The Six Thinking Hat Method.	15 lecturers
	Total	30 Lectures

Text Book:

1. Soft Skills: An Integrated Approach to Maximize Personality, Gajendra S Sharma, Wiley India.
2. Business Communication, Shalini Kalia, Shailja Agrawal, Wiley India.
3. De Bono, Edward. 1993. Serious Creativity. Re print. Harper Business

Reference Books:
1. Personality Development and Soft Skills, Barun K. Mitra, Oxford Press.
2. Soft Skills Enhancing Employability, M. S. Rao, I. K. Int India International Cornerstone: Developing Soft Skills, Sherfield, Pearson India.
3. John, Seely The Oxford guide to writing and speaking. Oxford U P, 1998, Delhi

Self-Study topics:
1. SWOT analysis and its benefits(Knowing Yourself- strengths and weaknesses)
2. Personal & Career Goal setting – Short term & Long term.
3. Johari's Window2
4. Resume writing (Instruction to be provided).
5. Writing Skills.
    (Paraphrasing, Note-Making, Summarising, Gathering and Organizing data, Proof reading and more.)
6. Letter / Application / Email writing.

List of classroom activities:

1. Presentation of given topics.
2. Report writing (Given scenario).
3. Creativity skills activities.
4. Problem solving situations.
5. Effective writing (bibliography).
6. Creative thinking games/activities.
7. Group Discussion (topics to be given – max-3).

SEMESTER- II

Database Management System

Programme: B.Sc.(CS)			Semester: II		
Course: Database Management System			**Course Code: BH.USCS.Maj201**		
Teaching Scheme			**Evaluation Scheme (Theory)**		
Lecture (Periods per week)	**Practical (Periods per week per batch)**	**Tutorial (Periods per week per batch)**	**Credits (Theory +Practical)**	**Continuous Internal Assessment (CIA)**	**End Semester Examination (ESE)**
3	**1**	**0**	**3+1**	**(Marks: 40)**	**(Marks: 60)**

Pre-requisites:
1. Knowledge of computer basics including software and about hardware.
2. Basics on database in computer.

Course Objectives: The learner should be able
A. To introduce the concept of the DBMS with respect to the relational model.
B. To understand creation, manipulation and querying of data in databases.
C. To develop understanding of concepts and techniques for data management and learn PLSQL.

Course Outcomes: After successfully completing the course, the learner-
A. Learners should be able to evaluate business information problem and find the requirements of a problem in terms of data.
B. Learners should be able to design the database schema and perform multiple operations with data.
C. Learners should be able to work on PL/SQL for data management

Detailed Syllabus		
Unit	**Detailed Description**	**Lecture/Period**
I	**Introduction:** History of database, reasons of introducing, evolution of database systems, various databases used as backend,Dr. Sham Navathe- his research on database, contribution of database technology to the society,DBMS – Database, Advantages of DBMS, Levels of abstraction, Data independence, DBMS Architecture. **Data models** - Client/Server Architecture, Object Based Logical Model, Record Based Logical Model (relational, hierarchical, network)	15 Lectures

	Entity Relationship Model - Entities, attributes, entity sets, relations, relationship sets, constraints (key constraints, participation constraints, weak entities, aggregation / generalization, Conceptual Design using ER (entities VS attributes, Entity Vs relationship, binary Vs ternary, constraints beyond ER) **Relational data model**– Domains, attributes, Tuples and Relations, Characteristics of Relations, Relational Constraints - primary key, referential integrity, unique constraint, Null constraint, Check constraint.	
II	**ER to Table**- Entity to Table, Relationship to tables with and without key constraints. **Schema refinement and Normal forms**: Functional dependencies, first, second, third, and BCNF normal forms based on primary keys, lossless join decomposition. **Relational Algebra operations** (selection, projection, set operations union, intersection, difference, cross product, Joins –conditional, equi join and natural joins, division)	15 Lectures
III	**Triggers**: Concept of triggers, implementing triggers – creating triggers, Insert, delete, and update triggers, nested triggers, viewing, deleting and modifying triggers, and enforcing data integrity through, triggers. **Transaction Management**: ACID Properties, Serializability, Two-phase Commit Protocol, Concurrency Control, Lock Management,Lost Update Problem, Inconsistent Read Problem, Read-Write Locks,Deadlocks Handling, Two Phase Locking protocol. **Crash Recovery**: ARIES algorithm. The log-based recovery, recoveryrelated structures like transaction and dirty page table, Write-aheadlog protocol, check points, recovery from a system crash, Redo andUndo phases.	15 Lectures
	Total	45 ectures

Text Book:
1. 1.Ramez Elmasri & Shamkant B.Navathe, Fundamentals of Database Systems, Pearson Education, Sixth Edition, 2010
2. Ramakrishnam, Gehrke, Database Management Systems, McGraw-Hill, 2007
3. 3.Joel Murach, Murach's MySQL, Murach, 2012

Reference Books:
1. 1.Ivan Bayross, "SQL,PL/SQL -The Programming language of Oracle", B.P.B. Publications
2. Abraham Silberschatz, Henry F. Korth,S. Sudarshan , Database System Concepts.
3. 3.Robert Sheldon, Geoff Moes, Begning MySQL, Wrox Press

Self-Study topics:
1. Comparative study on different types of databases.
2. Design an ER diagram for different organizations that includes all constraints.
3. Demonstrate the benefits of databases on various platforms.
   (Social media/healthcare/ecommerce/Telecommunication/educational platforms)

4. Mapping tables of different datatypes.
5. Different tools used to protect data.

List of Topics for the practicals:

1 . Perform basic queries:
   a. DML statements
      - View structure of table
      - Update, Delete, Select specific column/records.
      - Unique
      - Conditional select, in clause, between clause, limit
   b. DDL statements
      - Viewing all databases
      - Creating and Using Database
      - Creating Tables
         - With Constraints (primary key, default, check, not null)
         - Without Constraints
      - Alter,Rename and Drop tables.

2. Perform the queries involving:
   a. String functions (concat, instr, left, right, mid, length, lcase/lower, ucase/upper, replace, strcmp, trim, ltrim, rtrim)
   b. Math functions(abs, ceil, floor, mod, pow, sqrt, round, truncate)
   c. Date functions(adddate, datediff, day, month, year, hour, min, sec, now, reverse)

3. Perform practical of the following:
   a. Joins -Inner and Outer Joins.
   b. Views
      - Creating Views (with and without check option)
      - Selecting from a view
      - Dropping views

4. Creating and working with Insert/Update/Delete Trigger using Before/After clause.

5. Perform practicals using PLSQL
   (i).Writing PL/SQL Blocks with basic programming constructs by including following:
      a. If...then...Else, IF...ELSIF...ELSE... END IF
      b. Case statement
   (ii). Writing PL/SQL Blocks with basic programming constructs for following Iterative Structure:
      a. While-loop Statements
      b. For-loop Statements.
   (iii)Writing PL/SQL Blocks with basic programming constructs by including a GoTO
      to jump out of a loop and NULL as a statement inside IF

6. Perform Sequences: Creating sequences, referencing, altering and dropping a sequence.

7.Writing Procedures in PL/SQL Block
   a. Create an empty procedure, replace a procedure and call procedure
   b. Create a stored procedure and call it
   c. Define procedure to insert data
   d. A forward declaration of procedure

8.Writing Functions in PL/SQL Block.

a. Define and call a function
b. Define and use function in select clause,
c. Call function in dbms_output.put_line
d. Recursive function
e. Count Employee from a function and return value back
f. Call function and store the return value to a variable
g. Writing a recursive Functions in PL/SQL Block

9. Write a PL/SQL program to experience a deadlock.
10. TCL statements: Commit, Rollback and Save points (perform on transactions).

Details of Conduct of Practical Examination (Evaluation Scheme):
40 -Marks practical work
05 -Marks Viva
05 -Marks Journal

SEMESTER II
DATA SCIENCE & ANALYSIS MINOR

Big Data Technology (minor)

Programme: B.Sc.(CS)			Semester: II		
Course: Big Data Technology (minor)			**Course Code: BH.USCS.Min201 (Elective)**		
Teaching Scheme			**Evaluation Scheme (Theory)**		
Lecture (Periods per week)	**Practical (Periods per week per batch)**	**Tutorial (Periods per week per batch)**	**Credits (Theory +Practical)**	**Continuous Internal Assessment (CIA)**	**End Semester Examination (ESE)**
3	**2**	**0**	**3+1**	**(Marks: 40)**	**(Marks: 60)**

Pre-requisites:
  1. Should have completed the INTRODUCTION TO DATA SCIENCE WITH R course

Course Objectives: The learner:
  A. Will acquire knowledge of HDFS components, Namenode, Datanode, etc., knowledge of storing and maintaining data in cluster, reading data from and writing data to Hadoop cluster.
  B. Will be able to maintain files in HDFS
  C. Will be able to write MapReduce applications to access data present on HDFS, to read different formats of files into map-reduce application, to develop MapReduce applications to analyse Big Data related to the real-world use cases, to write MapReduce applications that can take data from multiple datasets and join them and to optimize the performance of Map-Reduce application

Course Outcomes: After successfully completing the course, the learnerwill-
  A. Have knowledge of HDFS components and of storing and maintaining data in Hadoop cluster
  B. Be able to maintain filed in HDFS
  C. Will be able to write MapReduce applications to access data present on HDFS, to read different formats of files into map-reduce application, to develop MapReduce applications to analyse Big Data related to the real-world use cases, to write MapReduce applications that can take data from multiple datasets and join them and to optimize the performance of Map-Reduce application

	Detailed Syllabus	
Unit	**Detailed Description**	**Lecture/Period**
I	**Introduction to Big Data** –Distributed File System – Big Data and its importance, Characteristics of Big Data, Limitation of Conventional Data Processing Approaches, Need of big data frameworks, Big data analytics, Limitations of Big Data and Challenges, Big data applications **Hadoop**: Basic Concepts of Hadoop and its features -The Hadoop	15 Lectures

	Distributed File System (HDFS)- Anatomy of a Hadoop Cluster - Hadoop cluster modes -Hadoop Storage - Hadoop daemons (Name node-Secondary name node-Job tracker-Task tracker-Data node,etc) - Anatomy of Read & Write operations – Interacting HDFS using command-line (HDFS Shell and FS shell commands) -Interacting HDFS using Java APIs – Dataflow – Blocks –Replica - YARN. **Indian contribution to the field of Big Data and Hadoop** – Who are the known Big Data and Hadoop programmes of India? What are their contributions? Study any 2 research papers written by them	
II	**Hadoop Ecosystem Components** – Schedulers- Fair and Capacity, **Hadoop Cluster Setup** – SSH & Hadoop Configuration –HDFS Administering – Monitoring & Maintenance. **Hadoop MapReduce** - Introduction - Phases in MapReduce Framework - Anatomy of MapReduce Job run - Failures, Job Scheduling, Shuffle and Sort, Task Execution, Map Reduce Types and Formats, Map Reduce Features. Understanding Basic	15 Lectures
III	MapReduce Pogram (WordCount program): The Driver Code - The Mapper class - The Reducer class. Writing first MapReduce Program- Hadoop's Streaming API - Using Eclipse for Rapid Development –Advanced MapReduce Concepts: Partitioner – Combiner – Joins – Map-side Join – Reduce-side Join.	15 Lectures
	Total	45 Lectures

Text Book:
1. Boris lublinsky, Kevin t. Smith Alexey Yakubovich, "Professional Hadoop Solutions".
   a. Wiley, ISBN : 9788126551071, 2015.

Reference Books:
1. Chris Eaton, Dirk Deroos et al., "Understanding Big Data", McGraw Hill , 2010.
2. Tom White, "HADOOP" : The definitive Guide", O Reilly 2012.
3. Srinath Perera, Thilina Gunarathne, "Hadoop MapReduce Cookbook", PACKT publishing, 2013.

Self-Study topics:
1. Privacy, Security Issues in Big Data.
2. Big Data Hadoop Architecture.
3. The MapReduce algorithm.
4. YARN Vs MapReduce.
5. Case Study: Weblog Analysis done using Mapper, Reducer, Combiner, Partitioner, etc.

List of Topics for the practicals for Big Data Technology:
1. Implement the following Data Structures in Java
   a) Linked Lists
   b) Stacks
   c) Queues
   d) Set
   e) Map

2. Hadoop Cluster Setup
   a) Perform setting up and Installing Hadoop in its three operating modes: Standalone, Pseudo, distribute, d Fully, distribute, d

b) Use web based tools to monitor your Hadoop setup.

3. Implement the following file management tasks in Hadoop:
   a) Adding files and directories, List the files and directories
   b) Retrieving files
   c) Deleting files
   d) Copying files from one folder to another in HDFS
   e) Copying files from Local File System to HDFS

4. Run a basic Word Count Map Reduce program to understand Map Reduce Paradigm
5. Write a Map Reduce program that mines weather data (NCDC). Weather sensors collecting data every hour at many locations across the globe gather a large volume of log data, which is a good candidate for analysis with MapReduce, since it is semi structured and record-oriented. Data available at: ftp://ftp.ncdc.noaa.gov/pub/data/noaa/.
   a) Find average, max and min temperature for each year in NCDC data set
   b) Filter the readings of a set based on value of the measurement, Output the line of input files associated with a temperature value greater than 30.0 and store it in a separate file.
6. Implement Matrix Multiplication program with Hadoop Map Reduce.
7. Stop word elimination problem:
   Input:
   a) A large textual file containing one sentence per line
   b) A small file containing a set of stop words (One stop word per line)
   Output:
   a) A textual file containing the same sentences of the large input file without the words appearing in the small file.
8. Write a MapReduce Application to implement Combiners
9. Write a MapReduce Application to implement Reduce-side Join
10. Write a MapReduce Application to implement Map-side Join

Details of Conduct of Practical Examination (Evaluation Scheme):
   40 -Marks practical work
   05 -Marks Viva
   05 -Marks Journal

SEMESTER II
NETWORK TECHNOLOGIES MINOR

IoT Technology (minor)

Programme: B.Sc.(CS)			Semester: II		
Course: IoT Technology (minor)			Course Code: BH.USCS.Min202 (Elective)		
Teaching Scheme			Evaluation Scheme (Theory)		
Lecture (Periods per week)	Practical (Periods per week per batch)	Tutorial (Periods per week per batch)	Credits (Theory +Practical)	Continuous Internal Assessment (CIA)	End Semester Examination (ESE)
3	2	0	3+1	(Marks: 40)	(Marks: 60)

Pre-requisites:
1. Basics of electronics and computing.

Course Objectives: The learner should be able
A. To learn about SoC architectures.
B. To know how Raspberry Pi works.
C. Learn to program Raspberry Pi. Implementation of the Internet of Things and Protocols.

Course Outcomes: After successfully completing the course, the learner-
A. Enable learners to understand System On Chip Architectures.
B. Introduction and preparing Raspberry Pi with hardware and installation.
C. Learn physical interfaces and electronics of Raspberry Pi and program them using practical's also to learn how to make consumer grade IoT safe and secure with proper use of protocol.

Detailed Syllabus		
Unit	Detailed Description	Lecture/Period
I	**SoC and Raspberry Pi** **System on Chip:** What is System on chip? Structure of System on Chip. **SoC products:** FPGA, GPU, APU, Compute Units. **ARM 8 Architecture:** SoC on ARM 8. ARM 8 Architecture Introduction **Introduction to Raspberry Pi:** Introduction to Raspberry Pi, Raspberry Pi Hardware, Preparing your raspberry Pi. Raspberry Pi Boot: Learn how this small SoC boots without BIOS. Configuring boot sequences and hardware.	15 Lectures
II	**Programming Raspberry Pi** **Raspberry Pi and Linux:** About Raspbian, Linux Commands, Configuring Raspberry Pi with Linux Commands	15 Lectures

	Programming interfaces: Introduction to Node.js, Python. **Raspberry Pi Interfaces:** UART, GPIO, I2C, SPI **Useful Implementations:** Cross Compilation, Pulse Width Modulation, SPI for Camera.	
III	**Introduction to IoT:** What is the IoT and why is it important? Elements of an IoT ecosystem, Technology drivers, Business drivers, Trends and implications, Overview of Governance, Privacy and Security Issues. **IoT and Protocols** **IoT Security:** HTTP, UPnp, CoAP, MQTT, XMPP. **IoT Service as a Platform:**Clayster, Thinger.io, SenseIoT, carriots and Node RED. **IoT Security and Interoperability:** Risks, Modes of Attacks, Tools for Security and Interoperability.	15 Lectures
	Total	45 Lectures

Text Book:
1. Learning Internet of Things, Peter Waher, PacktPublishing(2015)
2. Mastering the Raspberry Pi, Warren Gay, Apress(2014)

Reference Books:
1. 1.Vijay Madisetti and ArshdeepBahga, "Internet of Things (A Hands-on-Approach)",1st Edition, VPT, 2014.
2. Abusing the Internet of Things, Nitesh Dhanjani, O'Reilly.

Self-Study topics:
1. Knowledge about machine learning technology, sensor technology, AI.

List of Topics for the practicals forNETWORK TECHNOLOGIES MINOR (4C) – IOT TECHNOLOGY:
1. Preparing Raspberry Pi: Hardware preparation and Installation.
2. Linux Commands: Exploring the Raspbian.
3. GPIO: Light the LED with Python .
4. GPIO: LED Grid Module: Program the 8X8 Grid with Different Formulas.
5. Node RED: Connect LED to Internet of Things .
6. Stack of Raspberry Pi for better Computing and analysis.
7. SPI: Camera Connection and capturing Images using SPI.
8. Stepper Motor Control: PWM to manage stepper motor speed.
9. Create a simple Web server using Raspberry Pi.
10. Case study on IOT.

Details of Conduct of Practical Examination (Evaluation Scheme):
40 -Marks practical work
05 -Marks Viva
05 -Marks Journal

SEMESTER II

Data Analytics using Tableau

Programme: B.Sc.(CS)			Semester: II		
Course: Data Analytics using Tableau			**Course Code: BH.USCS.OE201**		
Teaching Scheme			**Evaluation Scheme (Theory)**		
Lecture (Periods per week)	**Practical (Periods per week per batch)**	**Tutorial (Periods per week per batch)**	**Credits (Theory +Practical)**	**Continuous Internal Assessment (CIA)**	**End Semester Examination (ESE)**
3	**2**	**0**	**3+1**	**(Marks: 40)**	**(Marks: 60)**

Pre-requisites:
1. Basic knowledge of computing for Statistics

Course Objectives: The learner should be able
   A. To understand fundamentals of business analytics.
   B. To analyse the datasets with Business Analytics perspectives.
   C. To elaborate the basics of analytical tools in the field of management.

Course Outcomes: After successfully completing the course, the learner-
   A. Comprehends key terms, topics and concepts in datasets and business analytics.
   B. Understands analytical concepts to real life situations from consumer and managerial perspectives.
   C. Applies the analytical concepts with open-source tools for analysis of the datasets.

Detailed Syllabus		
Unit	**Detailed Description**	**Lecture/Period**
I	**Need of database and datasets:** Definition of database and dataset, goals of collecting and maintaining datasets, challenges in maintaining the data sets, application of datasets. Merits of analysing the datasets in decision making in a business environment, Demerits of analysing the data sets. **Data Analytics:** Types – Phases - Quality and Quantity of data – Measurement - Exploratory data analysis	15 Lectures
II	**Tools of Analytics:** Types of data sets, types of analytical tools, Open-source tools, similarities and differences between tools with respect to their features and specifications, and applications. E.g., MS- Excel, SAS Visual Analytics, Python, R, Tableau, Power BI, KNIME etc. **Applications of Tools:** Applications can be understood with case studies on any one tool based on case studies on real time datasets of any three to four industry examples, Retail industry, Travel industry, social media, Healthcare,	15 Lectures

	etc, 1. Regression Analysis 2. Data Collection with Market Survey	
III	**Introduction to data visualization:** Data visualization options – Filters – Dashboard development tools – Creating an interactive dashboard **Basics of Tableau:** Connecting Tableau to several sources, Navigating Tableau, Creating Calculated Fields Adding colors, Adding Labels and formatting, exporting your worksheet, Time Series, Aggregation and Filters, Working with Data extracts in Tableau, Working with Time Series, Understanding Aggregation, Granularity, and level of detail, Creating an Area Chart & Learning about Highlighting, Adding Filter and Quick Filter	15 Lectures
	Total	45 Lectures

Text Book:
1. "Learning Tableau 2019, Third Edition", Joshua N. Milligan
2. "Learning Tableau 10", Joshua N. Milligan

Reference Books:
1. "Practical Tableau: 100 Tips Tips, Tutorials, and Strategies from a Tableau Zen Master", Ryan Sleeper, O'Reilly

Self-Study topics:
1. goals of collecting and maintaining datasets
2. Types of data sets
3. case studies on real time datasets
4. Different types of Analytical tool
5. Case study on any one tool
6. Need for creating interactive dashboard

List of Topics for the practicals of Data Analytics using Tableau:
1. Install tableau and create first visualization
2. Working with sheets in tableau
3. Using context filters and improving dashboard
4. Relationships, Joins and Unions in Tableau
5. Joining and Unioning Data Sources
6. Using Dynamic Parameters in tableau
7. Creating HR dashboard using Tableau
8. Customer Analysis using Tableau
9. Retail Dataset Analysis using Tableau
10. Project - Create a dashboard of any dataset

Details of Conduct of Practical Examination (Evaluation Scheme):
    40 -Marks practical work
    05 -Marks Viva
    05 -Marks Journal

SEMESTER II

Linux Operating System

Programme: B.Sc.(CS)			Semester: II		
Course: Linux Operating System			**Course Code: BH.USCS.VSEC201**		
Teaching Scheme			**Evaluation Scheme (Theory)**		
Lecture (Periods per week)	**Practical (Periods per week per batch)**	**Tutorial (Periods per week per batch)**	**Credits (Theory +Practical)**	**Continuous Internal Assessment (CIA)**	**End Semester Examination (ESE)**
3	**2**	**0**	**3+1**	**(Marks: 40)**	**(Marks: 60)**

Pre-requisites:
1. Basic understanding of the working of the computer
2. Knowledge of programming in any high level programming language

Course Objectives: The learner should be able
A. To provide a sound understanding of the Computer operating system
B. To comprehend what a process is and how processes are synchronized and scheduled
C. To introduce the concept behind Free and Open-Source Software's, its use, importance and impact in the society.

Course Outcomes: After successfully completing the course, the learner-
A. Understands the Computer operating system, its structures and functioning.
B. Implements various process scheduling algorithms
C. Identify and use Linux utilities to create and manage simple file processing operations.

	Detailed Syllabus	
Unit	**Detailed Description**	**Lecture/Period**
I	**Introduction and Operating-Systems Structures:** Definition of Operating system, Operating-System Operations, Functions of Operating System, Computing Environments **Operating-System Structures:** Operating-System Services, User and Operating-System Interface, System Calls, Types of System Calls, Operating-System Structure **Processes:** Process Concept, Process Scheduling, Interprocess Communication **Threads:** Overview, Multicore Programming, Multithreading Models	15 Lectures

II	**Process Synchronization:**Race condition, The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic Problems of Synchronization, Monitors **CPU Scheduling:** Scheduling Criteria, Scheduling Algorithms (FCFS, SJF, SRTF, Priority, RR, Multilevel Queue Scheduling, Multilevel Feedback Queue Scheduling) **Main Memory:**Logical address space, Physical address space, MMU, Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of the Page Table	15 Lectures
III	**Linux System:** History, Design Principles, Kernel Modules, ProcessManagement, Scheduling, Memory Management, File system, I/O. **Linux Basics:** Looking into the Linux Kernel, GNU Utilities, Desktopenvironments, The Linux console ,The Unix/Linux architecture, Features of Unix/Linux. **Essential System Administration:** root: The system administrator'slogin, The administrator's privileges, Startup & Shutdown. **TCP/IP networking:** TCP/IP Basics, TCP/IP Model, Resolving IP addresses, Applications, telnet, ftp, Berkeley commands. **Advanced System Administration:** Partitions & file systems, /etc/fstab, fsck, System startup and init, Shutdown & sync operation.	15 Lectures
	Total	45 Lectures

Text Book:
1. Abraham Silberschatz, Peter Galvin, Greg Gagne, Operating System Concepts, Wiley,8th Edition
2. SGG: Operating System Concepts, 6e, Silberschatz, Galvin and Gagne, Wiley.
3. SD: UNIX Concepts and Applications, 4e, Sumitabha Das., TMH.
4. RB: Linux Command line and Shell Scripting: Bible, Richard Blum, Wiley-India.

Reference Books:
1. Achyut S. Godbole, Atul Kahate, Operating Systems, Tata McGraw Hill
2. Naresh Chauhan, Principles of Operating Systems, Oxford Press
3. Andrew S Tanenbaum, Herbert Bos, Modern Operating Systems, 4e Fourth Edition, Pearson Education, 2016
4. UNIX Complete Reference, TMH.
5. Linux Complete Reference, TMH.

Self-Study topics:
1. Operating System's role
2. Computing Environments
3. Operations on Processes
4. General structure of a typical process
5. Use and compare various Linux distributions.
6. Explore more with Linux File permission security.

List of Topics for the practicals of Linux Operating System:
1. Linux Installation:
2. Study of Basic and advanced Linux Commands
3. Installing and Removing Software:
4. Study of Filter Commands
5. Command line operations
6. File Operations
7. Use environment
8. Linux Editors: vim/emacs
9. Linux Security
10. Network
11. Shell Scripting

Details of Conduct of Practical Examination (Evaluation Scheme):

40 -Marks practical work

05 -Marks Viva

05 -Marks Journal

SEMESTER II

Universal Human Values-II

Programme: B.Sc.(CS)			Semester: II		
Course: Universal Human Values-II			**Course Code: BH.USCS.VEC201**		
Teaching Scheme			**Evaluation Scheme (Theory)**		
Lecture (Periods per week)	**Practical (Periods per week per batch)**	**Tutorial (Periods per week per batch)**	**Credits (Theory +Practical)**	**Continuous Internal Assessment (CIA)**	**End Semester Examination (ESE)**
2	**0**	**0**	**2+0**	**(Marks: 10)**	**(Marks: 40)**

Pre-requisites:
    1. Understanding of basic values.

Course Objectives: The learner should be able
    A. To be able to self-explore that enables to critically evaluate their pre-conditionings and present beliefs in turn strengthen self-reflection and develop attitude of commitment and courage to act.
    B. To highlight plausible implications of such a holistic understanding in terms of ethical human conduct, trustful and mutually enriching interaction with Nature.

Course Outcomes: After successfully completing the course, the learner-
    A. Learners will apply what they have learnt on their own in different day-to-day routine of their life which strengthens to stand firm.
    B. Learners will able to be sensitive to their commitment towards (human values, human relationship, and human society).

	Detailed Syllabus	
Unit	**Detailed Description**	**Lecture/Period**
I	**Understanding Harmony in the Family and Society:** Understanding values, meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational. Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust). Visualizing a universal harmonious order in society- Undivided Society, Global citizenship and Interconnectedness,	15 Lectures
II	**Implications of the Holistic Understanding –Professional Ethics:**	15 Lectures

Defects in Ethical Human Conduct, Holistic Alternative, Ethical Conduct. Value Based Life and Profession, Right Understanding, Vision for Holistic, Holistic Technologies, Technologies and Production System. Strategies for Transition towards Value-based Life and Profession

Implications of the above Holistic Understanding of Harmony on Professional Ethics:

Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in professional ethics:
a. Ability to utilize the professional competence for augmenting universal human order,
b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems,
c. Ability to identify and develop appropriate technologies and management patterns for above production systems.

Case studies of typical holistic technologies, management models and production systems. Strategy for transition from the present state to Universal Human Order:
a. At the level of individual: as socially and ecologically responsible engineers, technologists, and managers,
b. At the level of society: as mutually enriching institutions and organizations.

		Total	30 Lectures

Text Book:
1. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.
2. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010

Reference Books:
1. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi.
2. M Govindrajran, S Natrajan & V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.
3. A N Tripathy, 2003, Human Values, New Age International Publishers.

Self-Study topics:
1. Study ethical theories.
2. Ways to engage in moral reasoning and self-reflections.
3. Research on different perspectivetowards human values.
4. Study on importance of human values in day-to-day life.
5. Role models- inculcated human values in our nation.

SEMESTER II

Soft Skill for Tech Professionals-II

Programme: B.Sc.(CS)			Semester: II		
Course: Soft Skill for Tech Professionals-II			**Course Code: BH.USCS.AEC201**		
Teaching Scheme			**Evaluation Scheme (Theory)**		
Lecture (Periods per week)	**Practical (Periods per week per batch)**	**Tutorial (Periods per week per batch)**	**Credits (Theory +Practical)**	**Continuous Internal Assessment (CIA)**	**End Semester Examination (ESE)**
2	**0**	**0**	**2+0**	**(Marks: 10)**	**(Marks: 40)**

Pre-requisites:
1. Basic knowledge of spoken English.

Course Objectives: The learner should be able
A. To help learners to excel in various skills required for IT firms and personal life.
B. To help learners to prepare for the cooperate interviews.
C. To build-in etiquette and values needed.

Course Outcomes: After successfully completing the course, the learner-
A. Learners will be skilled in various aspects in terms of personally and professionally.
B. Learners should be having
C. Learners will be professional prepared in using skills in the right manner.

	Detailed Syllabus	
Unit	**Detailed Description**	**Lecture/Period**
I	**Leadershipskills:** Indian – Remarkable contribution in their leadership qualities (Dr.B.R.Ambedkar,Mahatma Gandhi,Vallabhbhai Patel), Professional leaders of India (Shantanu Narayen, Sundar Pichai,Vishal Sikka,Neal Mohan), Leadership Types, Traits and Culture, Salient Features of Corporate Culture, Stylesand trends. **Team Building:** Team Development Stages, Team building and Role of team lead, Types of Teams: Cross-functional Team, Problem-solving Team, Assertiveness and Confidence building. Types of Conflict and its resolutions. Emotional intelligence and empathy,Types of Non – functional Behaviour, Improving group performance, Group discussion **Stress and Time Management:** Introduction, Stress in Today 's Time: Identify the Stress Source, Signs of Stress, Ways to Cope: Healthier Ways to Combat Stress, Steps to be Taken in	15 Lectures

		the Organizations: Open communication, Time Management, working towards Your Goals, Smart Work, prioritize your Tasks,4 Ds of Decision Making.	
II		**Ethics, Etiquette(Group/Telephone/Meeting) and Mannerism:** **Ethical Values:** Ethics and Society, Theories of Ethics, Correlation between Values and Behaviour, Nurturing Ethics, Importance of Work Ethics, Problems in the Absence of Work Ethics. Professional Etiquette: Etiquette at Meetings, Etiquette at Dining, Public Relations Office(PRO)'s Etiquettes, Technology Etiquette : Phone,Social Media, Video Conferencing, Interview, Dressing (Executive Corporate Attire / Formal Dressing).Etiquettes: for Interview, offices and social functions. **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	15 Lectures
		Total	30 Lectures

Text Book:
   1. Hindle, Tim. Reducing Stress. Essential Manager series. Dk Publishing, 2003
   2. Stephen P. Robbins and Timothy A. Judge(2014), Organizational Behavior 16th Edition: Prentice Hall.

Reference Books:
   1. Pease, Allan. 1998. Body Language: How to Read Others Thoughts by their Gestures. Suda Publications. New Delhi.
   2. Lewis, Norman. 1991. Word Power Made Easy. Pocket Books.
   3. Peter, Francis. Soft Skills and Professional Communication. New Delhi: Tata McGraw Hill.

Self-Study topics:
   1. Qualities of a leader with its struggles faced.
   2. Task prioritizing.
   3. Different types of stress and ways to overcome.
   4. Task /Goal Oriented- ways to prioritize.
   5. Self -Appraisal/ Self- Assessment(on paper task).

Modality of Assessment

Theory Examination Pattern:

A) Internal Assessment - 40% - 40 Marks

SR. NO	EVALUATION TYPE	MARKS
1	**CONTINOUS INTERNAL ASSESSMENT-I (CIA-I):** Internal Class Test with Objective types questions MCQ's.	20

2	**CONTINOUS INTERNAL ASSESSMENT-II (CIA-II):** Assignments, Case study, Mini project, Group activity, Presentations, Tutorial, Quizzes etc.	20
	TOTAL	**40**

B) External Examination- 60%- 60 Marks

SemesterEnd Theory Examination: 60 marks

1. **Duration**: These examinations shall be of **2 hours** duration.

2. **Passing criteria**: Student has to acquire minimum of 40% marks in each course.

3. **Paper Pattern:**

-   There shall be **four** questions each of **15** marks. On each unit there will be **seven/eight** questions.

    -   All questions shall be compulsory with internal choice within some questions. Each Question may be sub-divided into sub questions as a, b, c, d & e, etc & the allocation of Marks depends on the weightage of the topic

In case if exams are conducted online then following examination pattern will befollowed.
Theory Examination Pattern:

A) Internal Assessment- 40%- 40 Marks

SR. NO	EVALUATION TYPE	MARKS
1	**CONTINOUS INTERNAL ASSESSMENT-I (CIA-I):** Internal Class Test with Objective types questions MCQ's. **Online platform such as Google Classroom, Google Form, zoom, Google meet etc. can be used.**	20
2	**CONTINOUS INTERNAL ASSESSMENT-II (CIA-II):** Assignments, Case study, Mini project, Group activity, Presentations, Tutorial and Quizzes etc. **Online platform such as Google Classroom, zoom, Google meet etc. can be used.**	20
	TOTAL	**40**

B) External Examination- 60%- 60 Marks Semester

End Theory Examination: 60 marks

a. **Duration**: These examinations shall be of **90mins** duration.

b. **Passing criteria**: Student has to acquire minimum of 40% marks in each course.

c. **Paper Pattern: All MCQ questions.**

    Pattern of MCQ question paper should be as follows:

Unit l -14 one mark and 3 two-mark questions	20 Marks
Unit ll -13 one mark and 3 two-mark questions	19 Marks
Unit lll - 13 one mark and 4 two-mark questions	21 Marks
TOTAL	**60 Marks**

Practical Examination Pattern:

External Examination- 50 marks

1. **Duration**: These examinations shall be of **2 hours** duration.

2. **Passing criteria**: Student has to acquire minimum of 40% marks in each course. Minimum 75% practical from each core/allied course are required to be completed and written in the journal.

3. **Certified E-Journal is compulsory for appearing at the time of Practical Exam.**

4. **Examination pattern**:
    a. Practical work and Viva: 40 marks
    b. Journal: 10 marks

Overall Examination & Marks Distribution Pattern (Semester I&II)

COURSE	THEORY:	BH.USCS 101,102,103,104,105,106,107 BH.USCS 201,202,203,204,205,206,207
	PRACTICALS:	BH.USCSP 101,102,103,104 BH.USCSP 201,202,203,204
	Internal	External	Total
Theory	40	60	700
Practical's	-	50	300
Total			1000

Rubrics of evaluation for ESE:

Unit	Knowledge	Understanding	Analysis & critical thinking	Total marks/unit
from all units	05	05	5	15
1	05	05	5	15
2	05	05	5	15
3	05	05	5	15
Total	20	20	24	60
% Weightage	33.33	33.33	33.34	100

Rubrics of evaluation for CIA-2 Assignment: Presentation/debate/quiz

Parameters	Max Marks	80 – 100% Excellent	60 -80% Good	40 – 60% Satisfactory	20 – 40% Poor	0-20% very poor
CONTENT	10					
Content: Knowledge	02					
Content: Development	03					
Content: Conclusion	03					
Content: Bibliography	02					
Effective communication skill	10					
Language, Styleand Structure;	05					
Teaching aids;	05					
Total	20					

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BHAVAN'S COLLEGE(AUTONOMOUS): ANDHERI(WEST): MUMBAI-400058

DEPARTMENT OF B.Sc.Computer Science

Date: 6th June 2023

Minutes of Meeting of BOS members held on 06/06/2023, 5.00 p.m.

The following people were present in the meeting which was conducted through video conferencing on Zoom

Dr. R Srivaramangai, Mr. Viral Bhatt, Mrs. Vandana Bharadi, Mr. Shahjahan Khan, Mrs. Krupa Kamdar, Mrs. Smitha Renny, Ms. Nancy Nelson, Mrs. Shamaila Baloch, Ms. Prajakta Tanavde.

1. Dr. R Srivaramangai

2. Mrs. Srimathi Narayan

3. Mr. Shahjahan Khan

4. Mrs. Vandana Bharadi

5. Mr. Viral Bhatt

6. Mrs. Krupa Kamdar

7. Mrs. Smitha Renny

8. Ms. Nancy Nelson

9. Mrs. Shamaila Baloch

10. Ms. Prajakta Tanavde

Mr. Arun Dalvi , Mrs. Srimathi Narayan and Dr. R Srivaramangai an external BOS member was not able to attend this meeting due to prior commitments.

The meeting was started by first introducing the BOS members and addressing their achievements.

The agenda of the meeting, with their respective discussions, was as follows:

1. To discuss the feedback of the students, alumni and industry regarding the existing syllabus.

- Most students and alumni have expressed an interest in increasing industry exposure for students in the undergraduate course.
- For this they have requested industry collaboration for certification courses they have also suggested internship in the undergraduate level.
  Resolved that current technological software tools be used while practical conduction.

2. Discuss the proposed changes within the syllabus for semester 1 and 2

- There were some queries about the course/program nomenclature which were laterclarified.
- The below given changes to the syllabus were also discussed:
1. Introduction of fundamentals of C++ into semester 1 as a major subject.
2. Data Science and Analysis - Introduction to Data Science with R & NetworkTechnologies - Digital System & Architecture as Minor.
3. Open Elective - Web designing subject for other courses.
4. Vocational Skill Course / Skill Enhancement Course - Programming in Python.
5. Indian Linguistic Theories & Language Technology taken as a new subject underIndian Knowledge System.
6. Universal human Values and Soft skills Professionals added in two sections in boththe semesters.
   Resolved that proposed revised syllabus at FYBSc (Computer Science) under NEP attached herewith are to be implemented from academic year 2023-24

3. To discuss the credits / weighted allocated to each unit within the course in semester 1and 2

- Each subject will have 3 credits for theory and 1 credit for practical.
- Ability Enhancement Courses will have 2 credits each.
Resolved that credit structure be as per university guidelines.

4. To discuss the pattern of the course for each semester

- Major courses will have practicals demonstration and Ability Enhancement Skillssubjects will have projects and case studies.
Resolved that each subject will have a separate assessment for internal exams.

5. Discuss the propose Master courses to be introduced by the department and set up andframed syllabi for the same on the basis of under graduate course syllabus.

- The Master courses to be introduced by the department and set up the syllabi for thesame were discussed in the meeting.
Resolved that after getting approval from academic counsil the detailed syllabus willmailed to BOS members for approval.

6. Any other matter with the permission of the Chair

The members were happy on approval of the new education policy (NEP) and gave their compliments and good wishes hoping for a great change towards our mission inmoulding students career.
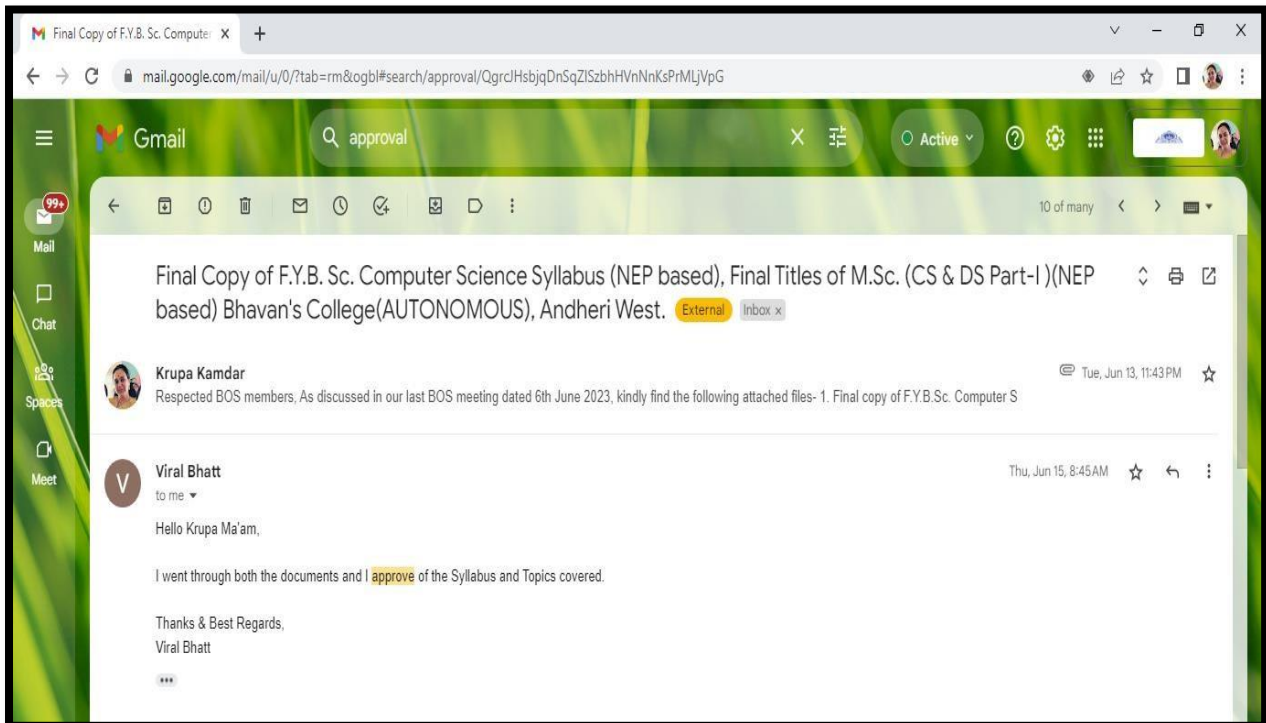 The Meeting concluded in thanking the chair members for spending their valuable time.
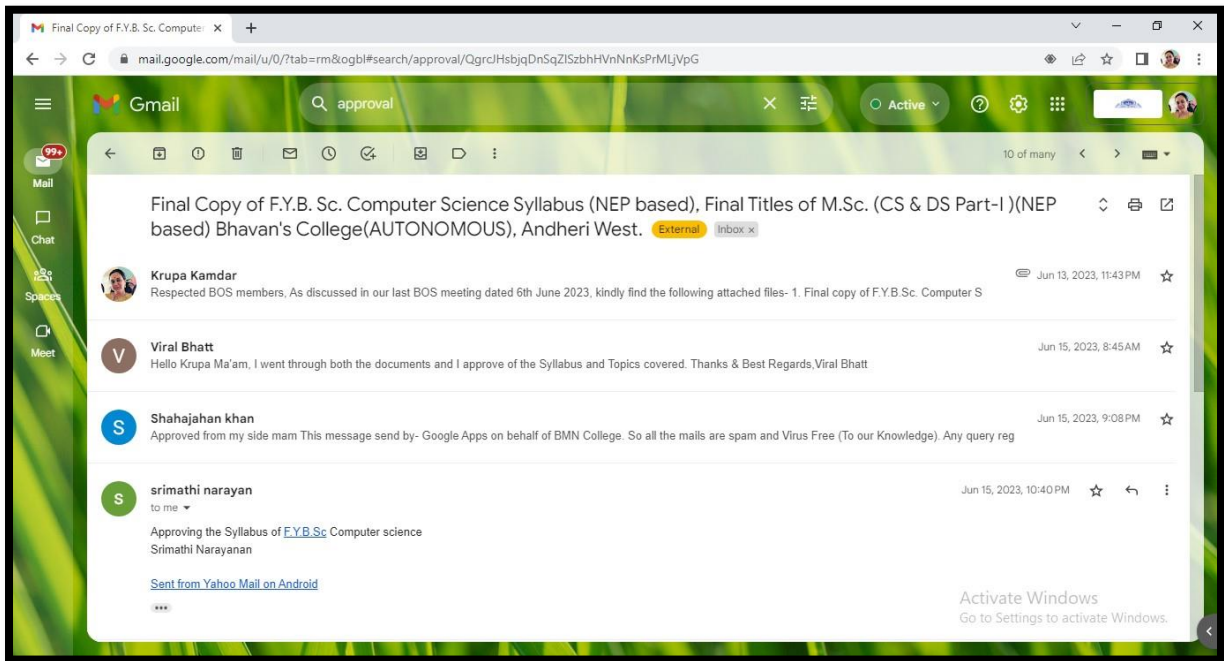
Approval from BOS Members

Mr. Shahajahan khan
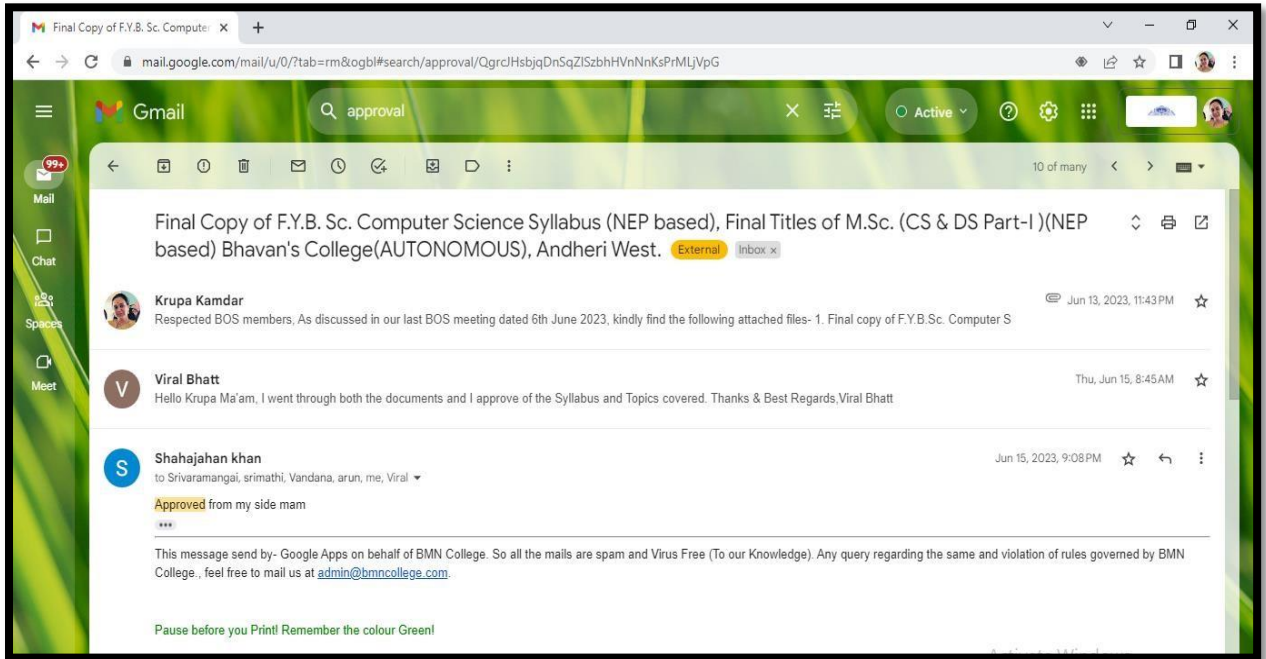
Mr. Viral Bhatt

Mrs. Srimathi Narayan

Mrs. Vandana Bharadi