S. Z. S. P. Mandal's

SHRI PANCHAM KHEMRAJ MAHAVIDYALAYA SAWANTWADI

DIST: SINDHUDURG- 416 510, MAHARASHTRA

Syllabus for Approval

Programme:- F. Y. B. Sc. COMPUTER SCIENCE

(Major Course)

SEMESTER-I & II

w.e.f. Academic Year 2023-24

Choice Based Credit System F.Y.B.Sc. Computer Science Syllabus

University of Mumbai

S. Z. S. P. Mandal's

SHRI PANCHAM KHEMRAJ MAHAVIDYALAYA

SAWANTWADI

(An Autonomous College)

DIST: SINDHUDURG- 416 510, MAHARASHTRA

DEPARTMENT OF COMPUTER SCIENCE

Syllabus for Approval

Sr. No.	Heading	Particulars
1.	Title of the Course	Science - COMPUTER SCIENCE
2.	Eligibility	12th Science of all recognized Board
3.	Duration of Program	1- Certificate 2- Diploma 3- Advance Diploma 4- Research Degree
4.	Scheme of Examination	External : 60 Internal: 40 Separate passing in External and Internal examination
5.	Standard of Passing	40.00%
6.	Program Academic Level	4.5 Certificate 5.0 Diploma 5.5 Advance Diploma 6.0 Research Degree
7.	Pattern	Semester Pattern
8.	Status	New
9.	To be implemented from Academic Year	4.6 Certificate 2023-2024 6.0 Diploma 2024-2025 5.5 Advance Diploma 2025-2026

		6.0 Research Degree 2026-2027

Date:

Signature
HoD,
Dept. of Computer Science

Shri Pancham Khemraj Mahavidyalaya, Sawantwadi
Proposed First Year Curriculum as per NEP 2020
Department of Computer Science
Proposed Structure for Major / Minor/OE/VSE/SEC/VEC/IKS/VEC

Semester	Paper Code	Paper Title	Type	Credits
I (Level 4.5)	**S101CST (Major)**	Digital Systems & Architecture	**Theory**	**2**
	S102CST (Major)	Introduction to Programming with Python	**Theory**	**2**
	S103CSP (Major)	Practical - Digital Systems & Architecture	**Practical**	**1**
		Practical - Intro. to Python Programming	**Practical**	**1**
	S104CST (Minor)	Frontend Web application development	**Theory**	**2**
	CSOE01T (OE)	Google Office Automation	**Theory**	**2**
	CSOE02T (OE)	Multimedia	**Theory**	**2**
	CSVS01T (VSC)	Descriptive Statistics	**Theory**	**2**
	CSSE01T (SEC)	Programming with C	**Theory**	**2**
	CSAE01T (AEC)	Introduction to Soft & Hard Skills	**Theory**	**2**
	CSVE01P (VEC)	Practical - Frontend Web application development	**Practical**	**1**
		Practical -Programming with C	**Practical**	**1**
	CSIK01T (IKS)	Vedic Mathematics	**Theory**	**2**
II (Level 4.5)	**S105CST (Major)**	Advanced Python Programming	**Theory**	**2**

	S106CST (Major)	DBMS	**Theory**	**2**
	S107CSP (Major)	Practical - Adv Python Programming	**Practical**	**1**
		Practical - DBMS	**Practical**	**1**
	S108CST (Minor)	Client Side Scripting	**Theory**	**2**
	CSOE03T (OE)	E-Commerce & Digital Marketing	**Theory**	**2**
	CSOE04T (OE)	Computer Hardware	**Theory**	**2**
	CSVS02T (VSC)	Calculus	**Theory**	**2**
	CSSE02T (SEC)	Introduction to OOPs using C++	**Theory**	**2**
	CSAE02T (AEC)	Academic & Professional Skills	**Theory**	**2**
	CSVE03P (VEC)	Practical -Client Side Scripting	**Practical**	**1**
		Practical -R Programming	**Practical**	**1**
	CSCC01P (CC)	Practical- Introduction to OOPs using C++	**Practical**	**1**
		Practical - Numerical computing with Numpy	**Practical**	**1**

PREAMBLE:

S. P. K. Mahavidyalaya, Sawantwadi (Autonomous) believes in implementing several measures to bring equity, efficiency and excellence in higher education system in conformity to the guidelines laid down by the University Grants Commission (UGC). In order to achieve these goals, all efforts are made to ensure high standards of education by implementing several steps to enhance the teaching- learning process, examination and evaluation techniques and ensuring the all-round development of learners.

The four-year course in B.Sc. Computer Science has been designed to have a progressive and innovative curriculum in order to equip our learners to face the future challenges in the field of higher education. To develop this ability, students will be exposed to multiple programming languages, tools, paradigms and technologies as well as the fundamental underlying principles throughout this programme.The programme offers required courses such as programming languages, data structures, computer architecture and organization, algorithms, database systems, operating systems, and software engineering; as well as specialized courses in artificial intelligence, computer-based communication networks, distributed computing, information security, graphics, human-computer interaction, multimedia, scientific computing, web technology, and other current topics in computer science. In semester I & II, basic foundation of important skills required for software development is laid. The syllabus proposes to have two Major core subjects of Computer science and one Minor core Subject of Application Development.

The syllabus design for further semesters encompasses more advanced and specialized courses of Computer Science. We sincerely believe that any student taking this programme will get very strong foundation and exposure to basics, advanced and emerging trends of the subject.

OBJECTIVES:

- To develop an understanding and knowledge of the basic theory of Computer Science

- with good foundation on theory, systems and applications.
- To fosternecessary skills and analytical abilities for developing computer based solutions
- of real-life problems.
- To provide training in emergent computing technologies which lead to innovative
- solutions for industry and academia.
- To develop the necessary study skills and knowledge to pursue further post-graduate
- study in computer science or other related fields.
- To develop the professional skillset required for a career in an information technology
- oriented business or industry.
- To enable students to work independently and collaboratively, communicate effectively,
- and become responsible, competent, confident, insightful, and creative users of
- computing technology

Program Outcome:

After successful completion of this programme learners will be able to

- At the end of three year Bachelor of Computer Science the students will be able:
- To formulate, to model, to design solutions, procedure and to use software tools to solve real world problems.
- To design and develop computer programs/computer -based systems in the areas such as networking, web design, security, cloud computing, IoT, data science and other emerging technologies.
- To familiarise with the modern-day trends in industry and research based settings and thereby innovate novel solutions to existing problems.
- To apply concepts, principles, and theories relating to computer science to new situations.
- To use current techniques, skills, and tools necessary for computing practice

Program Specific Outcome:

After successful completion of this programme learners are able to

- To apply standard Software Engineering practices and strategies in real-time software project development
- To pursue higher studies of specialisation and to take up technical employment.
- To work independently or collaboratively as an effective tame member on a substantial software project.
- To communicate and present their work effectively and coherently.
- To display ethical code of conduct in usage of Internet and Cyber systems.
- To engage in independent and life-long learning in the background of rapid changing IT industry.

Semester - I

Course Code	Course Title	Credits	Lectures /Week
S101CST	Digital Systems & Architecture	2	2

Desire Objectives:

- To have an understanding of Digital systems and operation of a digital computer. • To learn different architectures & organisations of memory systems, processor organisation and control unit.
- To understand the working principles of multiprocessor and parallel organisation's as advanced computer architectures

Desire Outcomes:

After successful completion of this course, students would be able to

- To learn about how computer systems work and underlying principles
- To understand the basics of digital electronics needed for computers
- To understand the basics of instruction set architecture for reduced and complex instruction sets
- To understand the basics of processor structure and operation

Unit	Topics	No of Lectures
I (Unit name)	**Fundamentals of Digital Logic:** Boolean algebra, Logic Gates, Simplification of Logic Circuits: Algebraic Simplification, Karnaugh Maps. Combinational Circuits: Adders, Mux, De-Mux, Sequential Circuits: Flip Flops (SR, JK & D), Counters: synchronous and asynchronous Counter **Computer System:** Comparison of Computer Organization & Architecture, Computer Components and Functions, Interconnection Structures. Bus Interconnections	10
II	**Memory System Organization:** Classification and design parameters, Memory Hierarchy, Internal Memory: RAM, SRAM and DRAM, Interleaved and Associative Memory. Cache Memory: Design Principles, Memory mappings, Replacement Algorithms, Cache performance, Cache Coherence. Virtual Memory, External Memory: Magnetic Discs, Optical Memory, Flash Memories, RAID Levels **Processor Organization:** Instruction Formats, Instruction Sets, Addressing Modes, Addressing Modes Examples with Assembly Language [8085/8086 CPU], Processor Organization, Structure and Function. Register Organization,	10

III	**Fundamentals of Advanced Computer Architecture:** Parallel Architecture: Classification of Parallel Systems, Flynn's Taxonomy, Array Processors, Clusters, and NUMA Computers. Multiprocessor Systems: Structure & Interconnection Networks, Multi-Core Computers: Introduction, Organization and Performance.	**10**

Textbooks:

1. M. Mano, Computer System Architecture 3rd edition, Pearson
2. Carl Hamacher et al., Computer Organization and Embedded Systems, 6 ed., McGraw-Hill 2012
3. R P Jain, Modern Digital Electronics, Tata McGraw Hill Education Pvt. Ltd. , 4th Edition, 2010

Additional References:

1. William Stallings (2010), Computer Organization and Architecture- designing for performance,8th edition, Prentice Hall, New Jersy.
2. Anrew S. Tanenbaum (2006), Structured Computer Organization, 5th edition, PearsonEducation Inc,

Course Code	Course Title	Credits	Lectures /Week
S103CSP	**Digital Systems & Architecture – Practical**	**1**	**2**
1	Study and verify the truth table of various logic gates (NOT, AND, OR, NAND, NOR, EX-OR, and EX-NOR).		
2	Simplify given Boolean expression and realise it.		
3	Design and verify a half adder		
4	Design and verify a full adder		
5	Design and verify half subtractor		
6	Design and verify full subtractor		
7	Design a 4 bit magnitude comparator using combinational circuits.		
8	Design and verify the operation of flip-flops using logic gates.		
9	Verify the operation of a counter.		
10	Verify the operation of a 4 bit shift register		
11	Design and implement expressions using multiplexers / demultiplexers.		
12	Design and implement 3-bit binary ripple counter using JK flip flops.		
Note	Practical can be performed using any open source simulator (like Logisim)		

Course Code	Course Title	Credits	Lectures /Week
S102CST	**Intro. to Python Programming**	2	2

Desire Objectives:

Desire Objectives:

To learn how to design and program Python applications.

To explore the innards of Python Programming and understand components of Python Program

To define the structure and components of a Python program.

To learn how to write loops and decision statements inPython

To learn about inbuilt input/output operations and compound data types in Python

Desire Outcomes:

After successful completion of this course, students would be able to:
Ability to store, manipulate and access data in Python
Ability to implement basic Input / Output operations in Python
Ability to define the structure and components of a Python program.
Ability to learn how to write loops and decision statements inPython.
Ability to learn how to write functions and pass arguments inPython.
Ability to create and use Compound data types in Python

Unit	Topics	No of Lectures
I	**Overview of Python:** History & Versions, Features of Python, Execution of a Python Program, Flavours of Python, Innards of Python, Python Interpreter, Memory Management in Python, Garbage Collection in Python, Comparison of Python with C and Java, Installing Python, Writing and Executing First Python Program, Getting Help, IDLE **Data Types, Variables and Other Basic Elements:** Comments, Docstrings, Data types- Numeric Data type, Compound Data Type, Boolean Data type, Dictionary, Sets, Mapping, Basic Elements of Python, Variables **Control Statements:** The if statement, The if ... else Statement, The „if ...elif ... else‟ Statement, Loop Statement- while loop, for loop, Infinite loop,Nested loop, The else suite, break statement, continue statement, pass statement, assert statement, return statement	10

II	**Operators:** Arithmetic operators, Assignment operators, Unary minus operator, Relational operators, Logical operators, Bitwise operators, Membership operators, Identity operators, Precedence of Operators, Associativity of Operators **Arrays:** Creating Arrays, Indexing and Slicing of Arrays, Basic Array Operations, Arrays Processing, Mathematical Operations on Array, Aliasing Arrays, Slicing and Indexing in NumPy Arrays, Basic slicing, Advanced Indexing, Dimensions of Arrays, Attributes of an Array, The ndim Attribute, The shape Attribute, The size Attribute, The itemsize Attribute **Functions:** Function definition and call, Returning Results, Returning Multiple Values from a Function, Built-in Functions, Difference between a Function and a Method, Pass Value by Object Reference, Parameters and Arguments, Formal and Actual Arguments, Positional Arguments, Keyword Arguments, Default Arguments, Arbitrary Arguments, Recursive Functions, Anonymous or Lambda Functions, Using Lambda with the filter() Function, Using Lambda with the map() Function, Using Lambda with the reduce() Function	**10**
III	**Strings:** Creating Strings, Functions of Strings, Working with Strings, Length of a String, Indexing and Slicing, Repeating and Concatenating Strings, Checking Membership, Comparing Strings, Removing Spaces, Finding Substrings, Counting Substrings, Immutability, Splitting and Joining Strings, Changing Case, Checking Starting and Ending of a String, Sorting Strings, Searching in the Strings, Testing Methods, Formatting Strings, Finding the Number of Characters and Words, Inserting Substrings into a String **List and Tuples:** Lists, List Functions and Methods, List Operations, List Slices, Nested Lists, Tuples, Functions in Tuple **Dictionaries:** Creating a Dictionary, Operators in Dictionary, Dictionary Methods, Using for Loop with Dictionaries, Operations on Dictionaries, Converting Lists into Dictionary, Converting Strings into Dictionary, Passing Dictionaries to Functions, Sorting the Elements of a Dictionary using Lambda, Ordered Dictionaries	**10**

Textbooks:

1. Practical Programming: An Introduction to Computer Science Using Python 3, Paul Gries , Jennifer Campbell, Jason Montojo, Pragmatic Bookshelf, 2nd Edition, 2014
2. Programming through Python, M. T Savaliya, R. K. Maurya& G M Magar, Sybgen Learning India, 2020

Additional References:

1. Python: The Complete Reference, Martin C. Brown, McGraw Hill, 2018
2. Beginning Python: From Novice to Professional, Magnus Lie Hetland, Apress, 2017
3. Programming in Python 3, Mark Summerfield, Pearson Education, 2nd Ed, 2018
4. Python Programming: Using Problem Solving Approach, ReemaThareja, Oxford Univeristy Press, 2017
5. Let Us Python, Yashwant. B. Kanetkar, BPB Publication, 2019

Course Code	Course Title	Credits	Lectures /Week
S103CSP	**Practical - Python Programming**	**1**	**2**
1	Write a program to implement Input Output operations		
2	Write a program to design and develop python program to implement various control statement using suitable examples		
3	Write a program to design and develop python program to implement Looping statements		
4	Write program in Python to define and call functions for suitable problem.		
5	Write Python program to demonstrate different types of function arguments.		
6	Write a Python program to demonstrate the precedence and associativity of operators.		
7	Write suitable Python program to implement recursion for problems such as Fibonacci series, Factorial, Tower of Hanoi etc.		
8	Write Python program to implement and use lambda function in python		
9	Write a python program to create and manipulate arrays in Python. Also demonstrate use of slicing and indexing for accessing elements from the array.		
10	Write a program to implement a list in Python for suitable problems. Demonstrate various operations on it.		
11	Write a program to implement tuples in Python for suitable problems. Demonstrate various operations on it.		
12	Write a program to implement a dictionary in Python for suitable problems. Demonstrate various operations on it.		

Course Code	Course Title	Credits	Lectures /Week
S104CST	**Frontend Web Application Development**	**2**	**2**
About the Course: The course provides an insight into emerging technologies to design and develop state of the art web applications using client-side scripting,			
Desire Objectives: ● To understand the concepts of HyperText Markup Language and Cascading Style Sheets. ● Learn the fundamentals of HTML5, including tags and document structure. ● Gain proficiency in CSS for styling and layout of web pages. ● Understand responsive web design principles using Bootstrap framework.			

- Create interactive and visually appealing websites.
- Familiarize yourself with modern web development best practices.
- Develop the skills to build basic web pages from scratch.
- Prepare for more advanced web development courses or projects.

Desire Outcomes:

After successful completion of this course, students would be able to

- Design valid, well-formed, scalable, and meaningful pages using emerging technologies.
- Understand the various platforms, devices, display resolutions, viewports, and browsers that
- render websites
- Develop and implement client-side and server-side scripting language programs.

Unit	Topics	No of Lectures
I	**HTML:** Overview, Basic Tags, Elements, Attributes, Formatting, Phrase Tags, Meta Tags, Comments, Images, Tables, Lists, Links, Frames, Iframes, Blocks, Backgrounds, Colors, Fonts, Forms, Embed Multimedia, Marquees, Header, Style Sheet, Javascript, Layouts. **HTML5:** Overview, Syntax, Attributes, Events, Web Forms 2.0, SVG, MathML, Web Storage	**10**
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. **Bootstrap With CSS:** Introduction to Bootstrap, Grid System, Text/Typography, Code, Table, Forms, Buttons, Image, Helper Classes, Responsive utilities	**10**
III	**Bootstrap Layout Component:** Glyphicons, Dropdowns,Button Groups, Button Dropdowns, Input Groups, Navigation Elements, Navbar, Breadcrumb, Pagination, Labels, Badges, Jumbotron, Page Header, thumbnails, Alerts, Progress Bars, Media Object, List Group, Panels, Wells **Bootstrap Plugins:** Plugins Overview, Transition Plugin, Modal Plugin, Dropdown Plugin, Scrollspy Plugin, Tab Plugin, Tooltip Plugin, Popover Plugin, Alert Plugin, Button Plugin, Collapse Plugin, Carousel Plugin, Affix Plugin	**10**

Textbooks:

1. HTML 5 Black Book, Covers CSS 3, JavaScript, XML, XHTML, AJAX, PHP and jQuery, 2ed, Dreamtech Press, 2016
2. Web Programming and Interactive Technologies, scriptDemics, StarEdu Solutions India, 2018

Additional References:

1. HTML, XHTML, and CSS Bible Fifth Edition, Steven M. Schafer, WILEY, 2011
2. Learning PHP, MySQL, JavaScript, CSS & HTML5, Robin Nixon, O'Reilly, 2018

Course Code	Course Title	Credits	Lectures /Week
CSOE01T	**Google Office Automation**	2	2

Desire Objectives: Master Google office automation tools for improved productivity and collaboration.

Desire Outcomes:

- Proficiency in Google Workspace Applications: Gain a thorough understanding of various Google Workspace applications, including Google Docs, Google Sheets, Google Slides, Google Drive, Google Calendar, Gmail, and other relevant tools.
- Document Creation and Formatting: Learn to create, format, and edit documents efficiently using Google Docs. Understand how to collaborate in real-time with colleagues on documents.
- Data Analysis and Management: Develop skills in data analysis, organization, and management using Google Sheets. Learn to use formulas, functions, and data visualization techniques to analyze and interpret data effectively.
- Presentation Skills: Acquire the ability to create engaging and professional presentations using Google Slides. Learn to use multimedia elements, themes, and animations to deliver impactful presentations.
- Email Management: Master the art of efficient email communication, organization, and productivity using Gmail. Learn to use labels, filters, and other features to manage emails effectively.
- Mobile Productivity: Understand how to use Google Workspace applications on mobile devices to stay productive while on the go.

Unit	Topics	No of Lectures
I	**Google Docs:** Introduction to Google Docs, Creating and Editing Documents, Organizing and Managing Documents, Advanced Formatting Techniques, Collaboration and Communication, Add-ons and Templates, Working Offline and Synchronization, Advanced Features (Optional, depending on the course level) **Google Sheets:** Introduction to Google Sheets, Data Entry and Formatting, Basic Formulas and Functions, Data Analysis and Manipulation, Data Visualization, Collaboration and Sharing, Importing and Exporting Data	10
II	**Google Slides:** Introduction to Google Slides, Working with Content, Enhancing Presentations, Collaboration and Sharing, Advanced Features, Final Project and Presentation **Gmail / Outlook:** Introduction to Microsoft Outlook, Managing Email, Contacts and Address Book, Calendar and Scheduling, Tasks and To-Do List, Notes and Journal, Outlook Data Management, Advanced Outlook Features, Outlook on Mobile Devices, Troubleshooting and Tips	10
III	**Google Form:** Introduction to Google Form, Creating a Form,Adding Questions, Form Customization, Form Settings, Response Collection, Form Sharing, Collaborating on Forms, Advanced Form Features.	10

	Google Keep: Introduction to Google Keep, Creating and Managing Notes, Note Organization, Collaboration and Sharing, Advanced Features, Integrations, Tips and Tricks, Tips and Tricks, Troubleshooting and Support.	
Additional References:		

Course Code	Course Title	Credits	Lectures /Week
CSOE02T	**Multimedia**	**2**	**2**

Desire Objectives:
This course aims to introduce the fundamental elements of multimedia. It will provide an understanding of the fundamental elements in multimedia. The emphasis will be on learning the representations, perceptions and applications of multimedia. Software skills and hands on work on digital media will also be emphasized.

Desire Outcomes:
On completion of the subject, the students will understand the technologies behind multimedia applications and master the skills for developing multimedia projects. After successfully completing the module student should be able to:
- Summarize the key concepts in current multimedia technology.
- Create quality multimedia software titles.

Unit	Topics	No of Lectures
I	**Introduction to Multimedia:** What is multimedia, Components of multimedia, Web and Internet multimedia applications, Transition from conventional media to digital media. **Computer Fonts and Hypertext:** Usage o f text in Multimedia, Families and faces of fonts, outline fonts, bitmap fonts International character sets and hypertext, Digital fonts techniques.	**10**

II	**Audio fundamentals and representations** Digitization of sound, frequency and bandwidth, decibel system, data rate, audio file format, Sound synthesis, MIDI, wavetable, Compression and transmission of audio on Internet, Adding sound to your multimedia project, Audio software and hardware. **Image fundamentals and representations** Colour Science , Colour, Colour Models, Colour palettes, Dithering, 2D Graphics, Image Compression and File Formats :GIF, JPEG, JPEG 2000, PNG, TIFF, EXIF, PS, PDF, Basic Image Processing [Can Use Photoshop], Use of image editing software, White balance correction, Dynamic range correction, Gamma correction, Photo Retouching	**10**
III	**Video and Animation** Video Basics , How Video Works, Broadcast Video Standards, Analog video, Digital video, Video Recording and Tape formats, Shooting and Editing Video (Use Adobe Premier for editing), Video Compression and File Formats. Video compression based on motion compensation, MPEG-1, MPEG-2, MPEG-4, MPEG-7, MPEG-21, Animation: CellAnimation, Computer Animation, Morphing. **Multimedia Authoring** Multimedia Authoring Basics, Some Authoring Tools, Macromedia Director & Flash.	**10**

References:

1. Tay Vaughan, “Multimedia making it work”, Tata McGraw-Hill, 2008.
2. Rajneesh Aggarwal & B. B Tiwari, “ Multimedia Systems”, Excel Publication, New Delhi, 2007.
3. Li & Drew, “ Fundamentals of Multimedia” , Pearson Education, 2009.

Course Code	Course Title	Credits	Lectures /Week
CSVS01T	**Descriptive Statistics**	**2**	**2**

Desire Objectives:

1. To develop the learners ability to deal with different types of data.
2. To enable the use of different measures of central tendency and dispersion wherever relevant.
3. To make learner aware about the techniques to check the Skewness and Kurtosis of data.
4. To make learner enable to find the correlation between different variables and further apply the regression analysis to find the exact relation between them.
5. To develop ability to analyze statistical data through R software.

Desire Outcomes:

After successful completion of this course, learners would be able to

1. Organize, manage and present data.
2. Analyze Statistical data using measures of central tendency and dispersion.
3. Analyze Statistical data using basics techniques of R.
4. Study the relationship between variables using techniques of correlation and regression.

Unit	Topics	No of Lectures
I	**Data Types and Data Presentation:** Data types: Attribute, Variable, Discrete and Continuous variable **Data presentation:** Frequency distribution, Histogram, Ogive curves. **Introduction to R:** Data input, Arithmetic Operators, Vector Operations, Matrix Operations, Data Frames, Built-in Functions. Frequency Distribution, Grouped Frequency Distribution **Measures of Central tendency:** Concept of average/central tendency, characteristics of good measure of central tendency. Arithmetic Mean (A.M.), Median, Mode - Definition, examples for ungrouped and grouped data, effect of shift of origin and change of scale, merits and demerits. Combined arithmetic mean. Partition Values: Quartiles, Deciles and Percentiles - examples for ungrouped and grouped data	**10**
II	**Measures dispersion:** Concept of dispersion, Absolute and Relative measure of dispersion, characteristics of good measure of dispersion. Range, Semi-interquartile range, Quartile deviation, Standard deviation - Definition, examples for ungrouped and grouped data, effect of shift of origin and change of scale, merits and demerits. Combined standard deviation, Variance. Coefficient of range, Coefficient of quartile deviation and Coefficient of variation (C.V.) **Moments**: Concept of Moments, Raw moments **Measures of Skewness and Kurtosis:** Concept of Skewness and Kurtosis	**10**
III	**Correlation:** Concept of correlation, Types and interpretation, Measure of Correlation: Scatter diagram and interpretation; Karl Pearson‟s coefficient of correlation (r): Definition, examples for ungrouped and grouped data, effect of shift of origin and change of scale, properties **Regression:** Concept of dependent (response) and independent (predictor) variables, concept of regression, Types and prediction, difference between correlation and regression, Linear Regression - Definition, examples using least square method and regression coefficient.	**10**

Textbooks:

1. Goon, A. M., Gupta, M. K. and Dasgupta, B. (1983). Fundamentals of Statistics, Vol. 1, Sixth Revised Edition, The World Press Pvt. Ltd., Calcutta.
2. Gupta, S.C. and Kapoor, V.K. (1987): Fundamentals of Mathematical Statistics, S. Chand and Sons, New Delhi

Additional References:

1. Sarma, K. V. S. (2001). Statistics Made it Simple: Do it yourself on PC. Prentce Hall of India, NewDelhi.

2. Agarwal, B. L. (2003). Programmed Statistics, Second Edition, New Age International Publishers, NewDelhi.
3. Purohit, S. G., Gore S. D., Deshmukh S. R. (2008). Statistics Using R, Narosa Publishing House, NewDelhi.
4. Schaum‟s Outline Of Theory And Problems Of Beginning Statistics, Larry J. Stephens, Schaum‟s Outline Series Mcgraw-Hill

Course Code	Course Title	Credits	Lectures /Week
CSSE01T	**Programming with C**	**2**	**2**

Desire Objectives:

•The objective of this course is to provide a comprehensive study of the C programming language, stressing upon the strengths of C, which provide the students with the means of writing modular, efficient, maintainable, and portable code.

Desire Outcomes:

1) Students should be able to write, compile and debug programs in C language. 2) Students should be able to use different data types in a computer program.
3) Students should be able to design programs involving decision structures, loops and functions. 4) Students should be able to explain the difference between call by value and call by reference 5) Students should be able to understand the dynamics of memory by the use of pointers. 6) Students should be able to use different data structures and create/update basic data files

Unit	Topics	No of Lectures
I	**Structure of C program:** Header and body, Use of comments. Interpreters vs compilers, Python vs C. Compilation of a program. **Formatted I/O:** printf(), scanf(). Data: Variables, Constants, data types like: int, float char, double and void, short and long size qualifiers, signed and unsigned qualifiers. Compare with datatypes in Python. Compare static typing in C vs dynamic typing in Python **Variables:** Declaring variables, scope of the variables according to block, hierarchy of data types. Compare explicit declarations in C with implicit declarations in Python. **Types of operators:** Arithmetic, relational, logical, compound assignment, increment and decrement, conditional or ternary, bitwise and comma operators. Precedence and order of evaluation, statements and Expressions. Automatic and explicit type conversion	**10**

II	**Iterations:** Control statements for decision making: (i) Branching: if statement, else.. if statement, (does the writer mean if-else or nested ifs)switch statement. (ii) Looping: while loop, do.. while, for loop. (iii) Jump statements: break, continue and goto. **Arrays:** (One and two dimensional), declaring array variables, initialization of arrays, accessing array elements. Compare array types of C with list and tuple types of Python. **Manipulating Strings:** Declaring and initializing String variables, Character and string handling functions. Compare with Python strings. Functions: Function declaration, function definition, Global and local variables, return statement, Calling a function by passing values.Recursive functions	**10**
III	**Pointer:** Fundamentals, Pointer variables, Referencing and de-referencing, Pointer Arithmetic, Using Pointers with Arrays, Using Pointers with Strings, Array of Pointers, Pointers as function arguments, Functions returning pointers **Dynamic Memory Allocation:** malloc(), calloc(), realloc(), free() and sizeof operator. Compare with automatic garbage collection in Python. **Structure & Unions:** Declaration of structure, reading and assignment of structure variables, Array of structures, arrays within structures, structures within structures. Compare C structures with Python tuples. Defining and working with unions. File handling: Different types of files like text and binary, Different types of functions: fopen(), fclose(), fgetc(), fputc(), fgets(), fputs(), fscanf(), fprintf(), getw(), putw(), fread(), fwrite(), fseek().	**10**
Text books: 1. Programming in ANSI C (Third Edition) : E Balagurusamy, TMH Additional **References:** 1. Pradip Dey, Manas Ghosh, "Programming in C", second edition, Oxford University Press 2. Yashavant P. Kanetkar. " Let Us C", BPB Publications		

Course Code	Course Title	Credits	Lectures /Week
CSAE01T	**Introduction to Soft & Hard Skills**	**2**	**2**

Desire Objectives:

- Understand the significance and essence of a wide range of soft skills.
- Learn how to apply soft skills in a wide range of routine social and professional settings
- Learn how to employ soft skills to improve interpersonal relationships
- Learn how to employ soft skills to enhance employability and ensure workplace and career
- success

Desire Outcomes:

- Learners will be able to understand the importance and types soft skills
- Learners will develop skills for Academic and Professional Presentations.
- Learners will able to understand Leadership Qualities and Ethics.
- Ability to understand the importance of stress management in their academic & professional life.

Unit	Topics	No of Lectures
I	**Soft Skills:** An Introduction – Definition and Significance of Soft Skills; Process, Importance and Measurement of Soft Skill Development. **Personality Development:** Knowing Yourself, Positive Thinking, Johari‟s Window, 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	**10**
II	**Positivity and Motivation:** Developing Positive Thinking and Attitude; Driving out Negativity; Meaning and Theories of Motivation; Enhancing Motivation Levels **Etiquette and Mannerism:** Introduction, Professional Etiquette, Technology Etiquette **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	**10**
III	**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 **Components of effective communication**: Communication process and handling them, Composing effective messages, Non – Verbal **Communication: its importance and nuances:** Facial Expression, Posture, Gesture, Eye contact, appearance (dress code). Communication Skills: Spoken English, Phonetics, Accent, Intonation	**10**

Textbooks:

1. Managing Soft Skills for Personality Development – edited by B.N.Ghosh, McGraw Hill India, 2017.
2. Soft Skills: An Integrated Approach to Maximise Personality, Gajendra S. Chauhan, Sangeeta Sharma, Wiley India

Additional References:

1. Personality Development and Soft Skills, Barun K. Mitra, Oxford Press
2. Business Communication, ShaliniKalia, Shailja Agrawal, Wiley India

3. Cornerstone: Developing Soft Skills, Sherfield, Pearson India

Course Code	Course Title	Credits	Lectures /Week
CSVE01P	**Practical - Frontend Web Application Development**	**1**	**2**
1	**Personal Portfolio Website:** Create a personal portfolio website showcasing your skills, projects, and achievements. Use HTML5 to structure the content, include headings, paragraphs, lists, and images. Apply CSS to style the layout and add responsiveness to make it look great on different devices.		
2	Design a webpage that makes use of a. Table tags c. Navigation across multiple pages d. Embedded Multimedia elements		
3	Design a webpage that makes use of HTML5 Document		
4	**Event Registration Form:** Build an event registration form using HTML5 form elements like input fields, radio buttons, checkboxes, and select dropdowns. Use CSS to style the form, making it visually appealing and easy to use.		
5	**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		
6	**Photo Gallery:** Develop a photo gallery webpage that showcases a collection of images. Use HTML5 to create a grid layout and display the images in a visually appealing manner. Utilize CSS to add hover effects and transitions to enhance the user experience.		
7	**Product Shopping Page:** Design a product Shopping page for a fictional or real product. Use HTML5 to build the layout, include product descriptions, images, and pricing details. Apply CSS to make it visually appealing and add interactive elements like buttons and forms.		
8	**Responsive Portfolio Website:** Create a personal portfolio website that showcases your projects, skills, and contact information. Focus on making it responsive, ensuring it looks great on various devices like desktops, tablets, and smartphones.		
9	**Flexbox and Grid Layouts:** Build a layout for a blog or a news website using CSS Flexbox and Grid. This will help you understand how to create dynamic, responsive, and modern page layouts.		
10	**CSS Animations:** Experiment with CSS animations to bring elements on your webpage to life. You can create hover effects, loading spinners, image sliders, or even more complex animations to engage users.		
11	**Styling Forms:** Design and style various form elements, such as input fields, checkboxes, radio buttons, and buttons, to improve the overall look and user experience of your web forms.		

12	**CSS Transitions:** Create smooth transitions for various elements on your website. For example, you can apply transitions to buttons, navigation menus, or images to make them change color, size, or position smoothly when interacting with them.

Course Code	Course Title	Credits	Lectures /Week
CSVE02P	**Programming with C – Practical**	**1**	**2**
1	Programs to understand the basic data types and I/O.		
2	Programs on Operators and Expressions		
3	Programs on decision statements.		
4	Programs on looping.		
5	Programs on arrays.		
6	Programs on functions		
7	Programs on recursive function		
8	Programs on structures		
9	Programs on unions		
10	Programs on pointers.		
11	Programs on basic file operations.		
12	Programs on dynamic memory allocation		

Course Code	Course Title	Credits	Lectures /Week
CSIK01T	**Vedic Mathematics**	**2**	**2**

Desire Objectives:

- To enable the learners to explore the power of VedicMaths.
- To make learners strong in NumericalMaths.
- To enable learners to recognize and understand simple techniques of ArithmeticCalculations.
- To train learners to use the ideas of Vedic Maths in daily calculations and make those calculations with accuracy and speed

Desire Outcomes:

By successfully completing this course, the learner will be able to:

- Perform simple arithmetic calculations with speed and accuracy
- Will be able to generate tables of any number
- To perform products of large numbers quickly
- Develop confidence in calculating square roots and cube roots of integers
- Perform difficult calculations speedily.
- Face Numerical Aptitude part of any Competitive Examination confidently.

Unit	Topics	No of Lectures
I	Introduction to Vedas, History of Vedas History and Evolution of Vedic Mathematics Introduction of Basic Vedic Mathematics Techniques in Multiplication (Special Case, Series of 9, Series of 1 etc.), Tables etc.,Various techniques to carry out basic operations covering Addition, Subtraction, Multiplication, Division, Complements and Bases, Vinculum number. Comparison of Standard Methods with Vedic Methods.	**10**
II	General multiplication (Vertically Cross- wise), Multiplications by numbers near base. Verifying answers by use of digital roots, Divisibility tests, Division of numbers near base, Comparison of fractions.	**10**
III	Different methods of Squares (General method, Base method, Duplex method etc.)Cubes, Cube roots, Square Roots, General division. Quadratic Equations, Simultaneous Equations, Use of various Vedic Techniques for answering numerical aptitude questions from Competitive Examinations	**10**

Additional References:

1. Bhatiya Dhaval, Vedic Mathematics Made Easy, Jaico PublishingHouse
2. Thakur Rajesh Kumar, Vedic Mathematics for students taking Competitive Examinations. Unicorn Books 2015 or LaterEdition
3. Gupta Atul, Power of Vedic Mathematics with Trigonometry,JaicoBooks
4. V. G. Unkalkar, Magical World of Mathematics(Vedic Mathematics), Vandana Publishers,Bangalore

Semester - II

Course Code	Course Title	Credits	Lectures /Week
S105CST	**Advanced Python Programming**	**2**	**2**

Desire Objectives:

- To learn how to design object‑oriented programs with Python classes.
- To learn about reading, writing and implementing other operation on files inPython.
- To implement threading concept and multithreading on Python
- To design GUI Programs and implement database interaction using Python.
- To know about use of regular expression and handling exceptions for writing robust python programs.

Desire Outcomes:

- After successful completion of this course, students would be able to
- Ability to implement OOP concepts in Python including Inheritance and Polymorphism Ability to work with files and perform operations on it using Python.
- Ability to implement regular expression and concept of threads for developing efficient program
- Ability to implement exception handling in Python applications for error handling. Knowledge of working with databases, designing GUI in Python and implement networking in Python

Unit	Topics	No of Lectures
I	**Working with files:** Files, opening and closing a file, working with text files containing strings, knowing whether a file exists or not, working with binary files, the „with“ statement, the seek() and tell() methods, random accessing of binary files, zipping and unzipping files, working with directories, running other programs from python program **Regular expressions**: What is a regular expression?, sequence characters in regular expressions, quantifiers in regular expressions, special characters in regular expressions, using regular expression on files, retrieving information from an html file, **Date and time in python:** Date and time now, combining date and time, formatting dates and times, finding durations using “time delta”, comparing two dates, sorting dates, stopping execution temporarily, knowing the time taken by a program, calendar module	**10**
II	**Database in python:** Using SQL with python, retrieving rows from a table,inserting rows into a table, deleting rows from a table, updating rows in a table, creating database tables through python, Exception handling in databases. **Exceptions in python:** Errors in a python program, compile & run-time errors, logical error, exceptions-exception handling, types of	**10**

	exceptions, the except block, the assert statement, user-defined exceptions, logging the exceptions **Graphical user interface:** Creating a GUI in python, Widget classes, Working with Fonts and Colours, working with Frames, Layout manager, Event handling	
III	**OOPs in python:** Features of Object Oriented Programming system (oops)-classes and objects, encapsulation, abstraction, inheritance, polymorphism, constructors and destructors **Classes and objects:** Creating a class, the self-variable, types of variables, namespaces, types of methods, instance methods, class methods, static methods, passing members of one class to another class, inner classes **Inheritance and polymorphism**: Inheritance in python, types of inheritance- single inheritance, multilevel inheritance, hierarchical inheritance, multiple inheritance, constructors in inheritance, overriding superclass constructors and methods, the super() method, method resolution order (mro), polymorphism, duck typing, operator overloading, method overloading, method overriding Abstract class, abstract method,interfaces in python, abstract classes vs. Interfaces	**10**
Textbooks: 1. Paul Gries , Jennifer Campbell, Jason Montojo, Practical Programming: An Introduction to Computer Science Using Python 3, Pragmatic Bookshelf, 3rd Edition, 2018 2. Programming through Python, M. T Savaliya, R. K. Maurya, G M Magar, Revised Edition, Sybgen Learning India, 2020 **Additional References:** 1. Advanced Python Programming, Dr. Gabriele Lanaro, Quan Nguyen, SakisKasampalis, Packt Publishing, 2019 2. Programming in Python 3, Mark Summerfield, Pearson Education, 2nd Ed, 2018 3. Python: The Complete Reference, Martin C. Brown, McGraw Hill, 2018 4. Beginning Python: From Novice to Professional, Magnus Lie Hetland, Apress, 2017 5. Programming in Python 3, Mark Summerfield, Pearson Education, 2nd Ed, 2018		

Course Code	Course Title	Credits	Lectures /Week
S107CSP	**Practical - Practical - Adv Python Programming**	**1**	**2**
1	Write a program to Python program to implement various file operations.		

2	Write a Python program to demonstrate use of regular expression for suitable application.
3	Write a Python Program to work with databases in Python to perform operations such as a. Connecting to database b. Creating and dropping tables
4	Write a Python Program to work with databases in Python to perform operations such As a. Inserting and updating into tables. b. Deleting table
5	Write a Python Program to demonstrate different types of exception handling.
6	Write a GUI Program in Python to design an application that demonstrates a. Different Layout Managers b. Event Handling
7	Write a Python Program to create an application which uses date and time in Python.
8	Write a program to Python program to implement concepts of OOP such as Class and Object
9	Write a program to Python program to implement concepts of OOP such as Inheritance
10	Write a program to Python program to implement concepts of OOP such as Polymorphism
11	Write a program to Python program to implement concepts of OOP such as Abstract methods and classes
12	Write a program to Python program to implement concepts of OOP such as Interfaces

Course Code	**Course Title**	**Credits**	**Lectures /Week**
S106CST	**DBMS**	**2**	**2**

Desire Objectives:
To make students aware fundamentals of database system.
To give idea how ERD components helpful in database design and implementation.
To experience the students working with database usingMySQL.
To familiarize the student with normalization, database protection anddifferent DCL Statements.
To make students aware about importance of protecting data from unauthorized u**sers.**
To make students aware of granting and revoking rights of data manipulation.

Desire Outcomes:

After successful completion of this course, students would be able to

To appreciate the importance of database design.

Analyze database requirements and determine the entities involved in the system and their relationship to one another.

Write simple queries to MySQL related to String, Maths and Date Functions.

Create tables and insert/update/delete data, and query data in a relational DBMS using MySQL commands.

Understand the normalization and its role in the database design process.

Handle data permissions.

Create indexes and understands the role of Indexes in optimization search.

Unit	Topics	No of Lectures
I	**Introduction to DBMS** – Database, DBMS – Definition, Overview of DBMS, 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) **Entity Relationship Model** - Entities, attributes, entity sets, relations, relationship sets, Additional constraints (key constraints, participation constraints, weak entities, aggregation / generalization, Conceptual Designusing ER (entities VS attributes, Entity Vs relationship, binary Vs ternary,constraints beyond ER) ER to Table- Entity to Table, Relationship to tables with and without key constraints. **DDL Statements** - Creating Databases, Using Databases, datatypes, Creating Tables (with integrity constraints – primary key, default, check, not null), Altering Tables, Renaming Tables, Dropping Tables, Truncating Tables **DML Statements** – Viewing the structure of a table insert, update, delete,Select all columns, specific columns, unique records, conditional select, inclause, between clause, limit, aggregate functions (count, min, max, avg,sum), group by clause, having clause	**10**
II	**Relational data model–** Domains, attributes, Tuples and Relations, Relational Model Notation, Characteristics of Relations, Relational Constraints - primary key, referential integrity, unique constraint, Null constraint, Check constraint **Relational Algebr**a operations (selection, projection, set operations union,intersection, difference, cross product, Joins –conditional, equi join andnatural joins, division) **Functions** – String Functions (concat, instr, left, right, mid, length, lcase/lower, ucase/upper, replace, strcmp, trim, ltrim, rtrim), Math Functions (abs, ceil, floor, mod, pow, sqrt, round, truncate) Date	**10**

	Functions (adddate, datediff, day, month, year, hour, min, sec, now, reverse) **Joining Tables** – inner join, outer join (left outer, right outer, full outer) Subqueries – subqueries with IN, EXISTS, subqueries restrictions, Nested subqueries, ANY/ALL clause, correlated subqueries	
III	**Schema refinement and Normal forms:** Functional dependencies, first, second, third, and BCNF normal forms based on primary keys, lossless join decomposition. **Database Protection:** Security Issues, Threats to Databases, Security Mechanisms, Role of DBA, Discretionary Access Control, Backing Up and Restoring databases **Views** (creating, altering dropping, renaming and manipulating views) **DCL Statements** (creating/dropping users, privileges introduction, granting/revoking privileges, viewing privileges), Transaction control commands – Commit, Rollback **Index Structures of Files:** Introduction, Primary index, Clustering Index,Multilevel indexes	**10**

Textbooks:

1. “Fundamentals of Database System”, ElmasriRamez, NavatheShamkant, Pearson Education, Seventh edition, 2017
2. “Database Management Systems”, Raghu Ramakrishnan and Johannes Gehrke, 3rd Edition, 2014
3. “Murach's MySQL”, Joel Murach, 3rd Edition, 3rd Edition, 2019

Additional References:

1. “Database System Concepts”, Abraham Silberschatz,HenryF.Korth,S.Sudarshan, McGraw Hill, 2017
2. “MySQL: The Complete Reference”, VikramVaswani , McGraw Hill, 2017
3. “Learn SQL with MySQL: Retrieve and Manipulate Data Using SQL Commands with Ease”, AshwinPajankar, BPB Publications, 2020

Course Code	Course Title	Credits	Lectures /Week
S107CSP	**Practical - DBMS**	**1**	**2**
1	Conceptual Designing using ER Diagrams (Identifying entities, attributes, keys and relationships between entities, cardinalities, generalization, specialization etc.)		
2	Perform the following: Viewing all databases		

	Creating a Database Viewing all Tables in a Database
3	Perform the following: Creating Tables (With and Without Constraints) Inserting/Updating/Deleting Records in a Table
4	Perform the following: Altering a Table Dropping/Truncating/Renaming Tables Backing up / Restoring a Database
5	Perform the following: Simple Queries Simple Queries with Aggregate functions
6	Queries involving Date Functions String Functions Math Functions
7	Join Queries Inner Join Outer Join
8	Subqueries With IN clause With EXISTS clause
9	Converting ER Model to Relational Model and apply Normalization on database. (Represent entities and relationships in Tabular form, Represent attributes as columns, identifying keys and normalization up to 3rd Normal Form).
10	Views Creating Views (with and without check option) Dropping views Selecting from a view
11	DCL statements Granting and revoking permissions Saving (Commit) and Undoing (rollback)
12	Creating Indexes on data tables.

Course Code	**Course Title**	**Credits**	**Lectures /Week**
	Client-Side Scripting	**2**	**2**
Desire Objectives: ● Understand fundamental JavaScript concepts: variables, data types, operators, and control			

structures.

- Learn how to manipulate the Document Object Model (DOM) using JavaScript.
- Master essential jQuery functions for DOM manipulation and event handling.
- Develop interactive web elements and animations using jQuery.
- Acquire knowledge of AJAX to make asynchronous server requests and handle responses.
- Gain proficiency in using JavaScript and jQuery to create responsive and dynamic web applications.
- Learn best practices for writing clean and efficient JavaScript and jQuery code.
- Build practical projects to apply acquired skills and reinforce learning.

Desire Outcomes:

After successful completion of this course, students would be able to

- Understand the fundamental concepts of JavaScript programming.
- Create and manipulate variables to store data and perform calculations.
- Utilize conditional statements (if/else) to make decisions in code.
- Implement loops (for/while) to repeat tasks and iterate over data.
- Understand the purpose and benefits of using jQuery as a JavaScript library.
- Select and manipulate DOM elements more efficiently using jQuery selectors.
- Perform basic animations and effects to enhance user experience.
- Handle events using jQuery's event handling methods.

Unit	Topics	No of Lectures
I	**javascript Basics :** introduction, Fundamentals, Code quality, basics Objects, Data types, Advanced working with functions,Object properties configuration, Prototypes, inheritance, Classes, Error handling **javascript Advance:** Promises, async/await, Generators, advanced iteration, Modules, Miscellaneous, Document, Introduction to Events, UI Events, Forms-controls, Document and resource loading, Miscellaneous	**10**
II	**Javascript Additional :** Frames and windows, Binary data, files, Storing data in the browser, Animation, Regular expressions, Web component **jQuery Basics:** Introduction, Overview, Syntax, Selectors, Events, Attributes, jQuery with AJAX, DOM Manipulation, CSS Manipulation, jQuery Effects, Traversing	**10**
III	**jQuery UI :** Overview, Interactions, Widgets, Effects, Utilities **XML :** Comparing XML with HTML, Advantages and Disadvantages of XML, Structure of XML Document, XML Entity Reference, DTD, XSLT Element and Attributes **AJAX:** AJAX Web Application Model, How AJAX Works, XMLHttpRequest Object – Properties and Methods, handling asynchronous requests using AJAX	**10**

Textbooks:

1. HTML 5 Black Book, Covers CSS 3, JavaScript, XML, XHTML, AJAX, PHP and jQuery, 2ed, Dreamtech Press, 2016
2. Web Programming and Interactive Technologies, scriptDemics, StarEdu Solutions India, 2018

Additional References:

1. HTML, XHTML, and CSS Bible Fifth Edition, Steven M. Schafer, WILEY, 2011
2. Learning PHP, MySQL, JavaScript, CSS & HTML5, Robin Nixon, O'Reilly, 2018
3. JavaScript & HTML5 All-in-one for Dummies, Steve Suehring, Janet Valade
Wiley, 2018

Course Code	Course Title	Credits	Lectures /Week
CSOE03T	**E-Commerce & Digital Marketing**	**2**	**2**

Desire Objectives:
To understand increasing significance of E-Commerce and its applications in Business and Various Sectors
To provide an insight on Digital Marketing activities on various Social Media platforms and its emerging significance in Business
To understand Latest Trends and Practices in E-Commerce and Digital Marketing, along with its Challenges and Opportunities for an Organization

Desire Outcomes:
After successful completion of this course, students would be able to
Understand the core concepts of E-Commerce.
Understand the various online payment techniques
Understand the core concepts of digital marketing and the role of digital marketing inbusiness.
Apply digital marketing strategies to increase sales and growth of business
Apply digital marketing through different channels and platforms
Understand the significance of Web Analytics and Google Analytics and apply the same.

Unit	Topics	No of Lectures
I	**Introduction to E-Commerce and E- Business**: Definition and competing in the digital economy, Impact of E-Commerce on Business Models, Factors Driving e-commerce and e-Business Models, Economics and social impact of e-Business, opportunities and Challenges, e-Commerce vs m- Commerce,Different e-Commerce Models (B2B, B2C, C2B, C2C, B2E), e-Commerce Applications: e-Trading, e-Learning, e-Shopping, Virtual Reality & Consumer Experience, Legal and Ethical issues in e-Commerce. **Overview of Electronic Payment systems:** Types of Electronic payment schemes (Credit cards, Debit cards, Smartcards, Internet banking), E-checks, E-Cash Concepts and applications of EDI and Limitation **Introduction & origin of Digital Marketing:** Traditional v/s Digital Marketing. Digital Marketing Strategy, The P-O-E-M Framework, Segmenting & Customizing Messages, The Digital landscape, Digital Advertising Market in India. Skills required in Digital Marketing. Digital Marketing Plan.	**10**

II	**Social Media Marketing:** Meaning, Purpose, types of social media websites, Social Media Engagement, Target audience, Facebook Marketing:Business through Facebook Marketing, Creating Advertising Campaigns,Adverts, Facebook Marketing Tools, LinkedIn Marketing: Importance ofLinkedIn Marketing, Framing LinkedIn Strategy, Lead Generation throughLinkedIn, Content Strategy, Analytics and Targeting, Twitter Marketing:Framing content strategy, Twitter Advertising Campaigns, YouTubeMarketing: Video optimization, Promoting on YouTube, Monetization,YouTube Analytics **Email Marketing:** Types of Emails, Mailing List, Email Marketing tools, Email Deliverability & Email Marketing automation **Mobile Marketing:** Introduction, Mobile Usage, Mobile Advertising, Mobile Marketing Types, Mobile Marketing Features, Mobile Campaign Development, Mobile Advertising Analytics **Content Marketing:** Introduction, Content marketing statistics, Types of Content, Types of Blog posts, Content Creation, Content optimization, Content Management & Distribution, Content Marketing Strategy, Content creation tools and apps, Challenges of Content Marketing.	**10**
III	**Search Engine Optimization:** Meaning, Common SEO techniques, Understanding Search Engines, basics of Keyword search, Google rankings, Link Building, Steps to optimise website, On-page and off-page optimization **Search Engine Marketing:** Introduction to SEM, Introduction to Ad Words - Google Ad Words, Ad Words fundamentals, Ad Placement, Ad Ranks, Creating Ad Campaigns, Campaign Report Generation, Display marketing, Buying Models: Cost per Click (CPC), Cost per Milli (CPM), Cost per Lead (CPL), Cost per Acquisition (CPA). **Web Analytics:** Purpose, History, Goals & objectives, Web Analytic tools & Methods. Web Analytics Mistakes and Pitfalls. **Google Analytics:** Basics of Google Analytics, Installing Google Analytics in website, Parameters of Google Analytics, Reporting and Analysis	**10**

Textbooks:

1. “E-Commerce Strategy, Technologies and Applications”, Whitley, David, Tata McGraw Hill, 2017
2. Digital Marketing, Seema Gupta, McGraw Hill Education, 2nd Edition

Additional References:

1. E-Commerce by S. Pankaj, A.P.H. Publication, New Delhi
2. Fundamentals of Digital Marketing, Punit Singh Bhatia, Pearson, 2nd Edition
3. “Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation”, Damian Ryan, Calvin Jone. Kogan Page, 4th Edition

Course Code	Course Title	Credits	Lectures /Week
CSOE04T	Computer Hardware	2	2

Desire Objectives:

In order to evidence success in this course, the students will be able to:

1. Students will be able to identify the essential components of a computer;
2. Students will be able to describe the function of the essential components of a computer;
3. Students will be able to recommend hardware;
4. Students will be able to develop a computer system proposal/presentation for a client;
5. Students will be able to troubleshoot hardware components;
6. Students will be able to assemble a computer with essential components;

Learning Outcomes:

Indicate the names and functions of hardware ports and the parts of the motherboard.

Identify the names and distinguishing features of different kinds of input and output devices.

Describe how the CPU processes data and instructions and controls the operation of all other devices.

Identify the names, distinguishing features, and units for measuring different kinds of memory and storage devices.

Search your personal computer for the various hardware components it contains.

Unit	Topics	No of Lectures
I	**Motherboards Introduction** – Functions – Types – Forms Factors – Modern Motherboards – Sockets – Slots – Motherboards 440BX-810, 810E, 815, 815E-820-Athlon – P4 – Dual PIII – Maintenance **Supporting chips:** Introduction – Types – Clocks Generator – Bus Conductor – PIC-DMAC- PIT-PPI-RTC	10
II	**Memory:** Introduction – Organization – Primary – Secondary – DRAM – SRAM-Modules – SIMM – SIPP –DIMM – Asynchronous DRAM – Synchronous DRAM – Memory Requirement – Memory Upgrade – Errors – Parity Checking – Trouble shooting **Logical Memory:** Introduction – Real Mode Memory – Conventional Memory – UMA – Extended Memory – HMA – EMS – ROM – Shadowing – Optimization – Performance Improvement	10
III	**Display Adapters**: Introduction – Display Subsystem – Evolution – Types – Components – Interfaces – Modes – MDA – CGA – EGA – VGA – PGA – XGA – SVGA – VESA – SVGA Standardization **Graphic Accelerators:** Introduction – Cards – Accelerated Graphic Ports – 3D Cards – Upgrading – Troubleshooting	10

References:

1. Upgrading and Repairing PCs by Scott Mueller.
2. PC Hardware: The Complete Reference by Craig Zacker

Course Code	Course Title	Credits	Lectures /Week
CSVS02T	Calculus	2	2

Desire Objectives:

The primary objective of this course is to introduce the basic tools of Calculus which are helpful in understanding their applications to the real world problems.
The course is designed to have a grasp of important concepts of Calculus in a scientific way.
It covers topics from as basic as definition of functions to partial derivatives of functions in a gradual and logical way.
The learner is expected to solve as many examples as possible to a get compete clarity and understanding of the topics covered.

Desire Outcomes:

After successful completion of this course, learners would be able to:
Develop mathematical skills and enhance thinking power of learners.
Understand mathematical concepts like limit, continuity, derivative, integration of functions, partial derivatives.
Appreciate real world applications which use the learned concepts.
Skill to formulate a problem through Mathematical modelling and simulation.

Unit	Topics	No of Lectures
I	**DERIVATIVES AND ITS APPLICATIONS:** **Review of Basic Concepts**: Functions, limit of a function, continuity of a function, derivative function. **Derivative In Graphing And Applications:** Increase, Decrease, Concavity, Relative Extreme; Graphing Polynomials, Rational Functions, Cusps and Vertical Tangents. Absolute Maxima and Minima, Applied Maximum and Minimum Problems, Newton‟sMethod.	10
II	**INTEGRATION AND ITS APPLICATIONS:** **Integration:** An Overview of the Area Problem, Indefinite Integral, Definition of Area as a Limit; Sigma Notation, Definite Integral, Evaluating Definite Integrals by Substitution, Numerical Integration: Simpson‟s Rule. **Applications of Integration:** Area between two curves, Length of a plane curve. **Mathematical Modeling with Differential Equations:** Modeling with Differential Equations, Separation of Variables, Slope Fields, Euler‟s Method	10

III	**PARTIAL DERIVATIVES AND ITSAPPLICATIONS:** **Functions of Several Variables:** Functions of two or more variables, Limits and Continuity of functions of two or three variables. **Partial Derivatives**: Partial Derivatives, Differentiability, Differentials **Applications ofPartial Derivatives:** Maxima and Minima of Functions of Two Variables.	**10**

Textbooks:
1. Calculus: Early transcendental (10th Edition): Howard Anton, IrlBivens, Stephen Davis, John Wiley & sons, 2012.

Additional References:
1. Calculus and analytic geometry (9th edition): George B Thomas, Ross L Finney, Addison Wesley, 1995
2. Calculus: Early Transcendentals (8th Edition): James Stewart, Brooks Cole, 2015.
3. Calculus (10th Edition): Ron Larson, Bruce H. Edwards, Cengage Learning, 2013.
4. Thomas' Calculus (13th Edition): George B. Thomas, Maurice D. Weir, Joel R. Hass, Pearson, 2014.

Course Code	Course Title	Credits	Lectures /Week
CSSE02T	Object Oriented Programming Using C++	**2**	**2**

Desire Objectives:
The course aims to introduce a new programming paradigm called Object Oriented Programming. This will be covered using C++ programming language.
C++ is a versatile programming language, which supports a variety of programming styles, including procedural, object-oriented, and functional programming.
This makes C++ powerful as well as flexible.
It can be used to develop software such as operating systems, databases, and compilers.

Desire Outcomes:
After successful completion of this course, students would be able to
- Work with numeric, character and textual data and arrays.
- Understand the importance of OOP approach over procedural language.
- Understand how to model classes and relationships using UML.
- Apply the concepts of OOPS like encapsulation, inheritance and polymorphism.
- Handle basic file operations.

Unit	Topics	No of Lectures
I	**Introduction to Programming Concepts:** Introduction to object oriented programming, user defined types, structures, unions, polymorphism, encapsulation. Getting started with C++ syntax, data-type, variables, strings, functions, default values in	**10**

	functions, recursion, namespaces, operators, flow control, arrays and pointers.	
II	**Abstraction mechanism:** Classes, private, public, constructors, destructors, member data, member functions, inline function, friend functions, static members, and references. **Inheritance:** Class hierarchy, derived classes, single inheritance, multiple, multilevel, hybrid inheritance, role of virtual base class, constructor and destructor execution, base initialization using derived class constructors. **Polymorphism:** Binding, Static binding, Dynamic binding, **Static polymorphism:** Function Overloading, Ambiguity in function overloading, **Dynamic polymorphism:** Base class pointer, object slicing, late binding, method overriding with virtual functions, pure virtual functions, abstract classes. **Operator Overloading:** This pointer, applications of this pointer, Operator function, member and non member operator function, operator overloading, I/O operators. **Exception handling:** Try, throw, and catch, exceptions and derived classes, function exception declaration, unexpected exceptions, exception when handling exceptions, resource capture and release	**10**
III	**Dynamic memory management**, new and delete operators, object copying, copy constructor, assignment operator, virtual destructor. **Template:** template classes, template functions. Standard Template Library: Fundamental idea about string, iterators, hashes, iostreams and other types. **Namespaces:** user defined namespaces, namespaces provided by library. Object Oriented Design, design and programming, role of classes.	**10**

Textbook(s):

1. Object Oriented Programming with C++ by E. Balagurusamy, McGraw-Hill Education (India)
2. ANSI and Turbo C++ by Ashoke N. Kamthane, Pearson Education

Reference(s):

1. Big C++ - Wiley India

2. C++: The Complete Reference- Schildt, McGraw-Hill Education (India)

3. C++ and Object Oriented Programming – Jana, PHI Learning.

4. Object Oriented Programming with C++ - Rajiv Sahay, Oxford

5. Mastering C++ - Venugopal, McGraw-Hill Education (India)

Course Code	Course Title	Credits	Lectures /Week
CSAE02T	**Academic & Professional Skills**	**2**	**2**

Desire Objectives:
To help learners develop their soft skills and develop their personality together with their technical skills.Developing professional, social and academic skills to harness hidden strengths, capabilities and knowledge equip them to excel in real work environment and corporate life. Understand various issues in personal and profession communication and learn to overcome them

Desire Outcomes:

1) To know about various aspects of soft skills and learn ways to develop personality
2) Understand the importance and type of communication in personal and professional environment.
3) To provide insight into much needed technical and non-technical qualities in career planning.
4) Learn about Leadership, team building, decision making and stress management

Unit	Topics	No of Lectures
I	**Employment Communication**: Introduction, Resume, Curriculum Vitae, Scannable Resume, Developing an Impressive Resume, Formats of Resume, Job Application or Cover Letter **Job Interviews**: Introduction, Importance of Resume, Definition of Interview, Background Information, Types of Interviews, Preparatory Steps for Job Interviews, Interview Skill Tips, Changes in the Interview Process,FAQ During Interviews **Group Discussion**: Introduction, Ambience/Seating Arrangement for Group Discussion, Importance of Group Discussions, Difference between Group Discussion, Panel Discussion and Debate, Traits, Types of Group Discussions, topic based and Case based Group Discussion, Individual Traits	**10**
II	**Academic and Professional Skills:** Professional Presentation: Nature of Oral Presentation, planning a Presentation, Preparing the Presentation, Delivering the Presentation **Creativity at Workplace:** Introduction, Current Workplaces, Creativity, Motivation, Nurturing Hobbies at Work, The Six Thinking Hat Method. **Capacity Building:** Learn, Unlearn and Relearn: Capacity Building, Elements of Capacity Building, Zones of Learning, Ideas for Learning, Strategies for Capacity Building	**10**
III	**Leadership and Team Building:** Leader and Leadership, Leadership Traits, Culture and Leadership, Leadership Styles and Trends, Team Building, Types of Teams.	**10**

	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	

Text book:
1. Soft Skills: an Integrated Approach to Maximise Personality, Gajendra S. Chauhan, Sangeeta Sharma,Wiley India

Additional References:
1. Personality Development and Soft Skills, Barun K. Mitra, Oxford Press
2. Business Communication, Shalini Kalia, Shailja Agrawal, Wiley India
3. Soft Skills - Enhancing Employability, M. S. Rao, I. K. International
4. Cornerstone: Developing Soft Skills, Sherfield, Pearson India

Course Code	Course Title	Credits	Lectures /Week
CSVE03P	**Practical - Client Side Scripting**	**1**	**2**
1	**Basic Calculator:** Create a simple calculator that takes two numbers as input from the user and performs basic arithmetic operations such as addition, subtraction, multiplication, and division. Display the result on the webpage.		
2	**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		
3	**Interactive Form Validation:** Create a form with various input fields (e.g., name, email, password) and implement real-time validation to check if the user's inputs meet specific criteria. Provide helpful error messages to guide the user in correcting their inputs.		
4	**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		
5	**Accordion Menu:** Create an accordion-style menu where only one section is expanded at a time. Use jQuery to handle the show/hide functionality and add smooth animations for a polished user experience.		
6	Design a webpage to handle asynchronous requests using AJAX on a. Mouseover b. button click		
7	**Slider or Carousel:** Build an image slider or carousel using jQuery, allowing users to view multiple images or content items in a rotating manner. Add navigation controls to move between items.		
8	**AJAX Content Loading:** Practise using AJAX with jQuery to load content		

	dynamically from a server without requiring a full page refresh. For example, create a "Load More" button to fetch additional content or update parts of a page without reloading the entire page.
9	Create a XML file with Internal / External DTD and display it using a. CSS b. XSL
10	**Datepicker:** Implement a date picker widget that allows users to select dates easily. This is commonly used in booking forms, event registrations, and other date-related interactions.
11	**Dialog Box:** Create a modal dialog box that displays additional information or prompts the user for input. Use this to show messages, confirmations, or gather user feedback.
12	**Creating a User Class:** You can use a class to represent a user object with properties like name, email, and age, and methods for updating the user information.

Course Code	**Course Title**	**Credits**	**Lectures /Week**
CSVE04P	Practical- Object Oriented Programming Using C++	**1**	**2**
1	Program to demonstrate use of data members & member functions.		
2	Programs based on branching and looping statements using classes.		
3	Program to demonstrate one and two dimensional arrays using classes		
4	Program to use scope resolution operator. Display the various values of the same		
5	Programs to demonstrate various types of constructors and destructors.		
6	Programs to demonstrate use of public, protected & private scope specifiers.		
7	Programs to demonstrate single and multilevel inheritance		
8	Programs to demonstrate multiple inheritance and hierarchical inheritance		
9	Programs to demonstrate inheritance and derived class constructors		
10	Programs to demonstrate friend function, inline function, this pointer		
11	Programs to demonstrate function overloading and overriding.		
12	Programs to demonstrate use of pointers		

Course Code	**Course Title**	**Credits**	**Lectures /Week**

CSCC01P	Practical - Numerical computing with Numpy	1	2
1	Write a NumPy program to add, subtract, multiply, divide arguments element-wise		
2	Write a NumPy program to get the powers of an array values element-wise.		
3	Write a NumPy program to calculate the absolute value element-wise.		
4	Write a NumPy program to get the floor, ceiling and truncated values of the elements of a numpy array		
5	Write a NumPy program to multiply a 5x3 matrix by a 3x2 matrix and create a real matrix product.		
6	Write a NumPy program to find the roots of the following polynomial.		
7	Write a NumPy program to calculate mean across dimension, in a 2D numpy array.		
8	Write a NumPy program to compute the trigonometric sine, cosine and tangent array of angles given in degrees.		
9	Write a NumPy program to convert angles from radians to degrees for all elements in a given array.		
10	Write a NumPy program to compute the multiplication of two given matrixes.		
11	Write a NumPy program to add one polynomial to another, subtract one polynomial from another, multiply one polynomial by another and divide one polynomial by another.		
12	Write a NumPy program to compute ex, element-wise of a given array.		

Course Code	Course Title		Credits	Lect

				u re s / W e e k
CSCC0 2P	**Practical - R Programming**		**1**	**2**
Problem solving and implementation using R programming				
1	Basics of R- a. Data input, Arithmetic Operators b. Vector Operations, Matrix Operations			
2	Basics of R- a. Data Frames, Built-in Functions b. Frequency Distribution, Grouped Frequency Distribution c. Diagrams and Graphs			
3	Frequency distribution and data presentation- a. Frequency Distribution (Univariate data/ Bivariate data) b. Diagrams c. Graphs			
4	Measures of Central Tendency- a. Arithmetic Mean b. Median			
5	Measures of Central Tendency- a. Mode b. Partition Values			
6	Measures dispersion- a. Range and Coefficient of range b. Quartile deviation and Coefficient of quartile deviation c. Standard deviation, Variance and Coefficient of variation (C.V.)			
7	Moments- a. Raw moments b. Central moments			
8	Measures of Skewness - a. Karl Pearson‟s measure of Skewness b. Bowley‟s measure of Skewness c. Moment coefficient of Skewness			
9	Measures of Kurtosis- a. Moment coefficient of Kurtosis (Absolute measure) b. Moment coefficient of Kurtosis (Relative measure)			
10	Correlation- a. Karl Pearson‟s correlation coefficient			

	b. Spearman‟s Rank correlation
11	Regression- a. Method of least squares b. Using regression coefficients c. Properties of regression lines & regression coefficients
12	Summary Statistics using R- a. Summary statistics for raw data b. Summary statistics for grouped frequency distribution c. Simple Correlation & Regression using R

EXAMINATION PATTERN FOR MAJOR & MINOR SUBJECTS

A) Continuous Internal Assessment (40 Marks):

Sr No.	Particulars	Marks
1	**Assignment / Presentations**	**10**
2	**Mid-Term Class Test**	**20**
3	**Active Participation in routine class**	**10**

B)External Examination for Theory Courses – 60 Marks

- **Duration: 2 Hours**
- **All questions shall be compulsory with internal choice within the questions.**
- **Each Question may be subdivided into sub questions as a, b, c, d, etc. & the allocation of Marks depends on the weightage of the topic.**

Theory question paper pattern:

All questions are compulsory.			
Question	Based on	Options	Marks
Q.1	Unit - I	Any 3 out of 6	15
Q.2	Unit - II	Any 3 out of 6	15
Q.3	Unit - III	Any 3 out of 6	15
Q.4	Unit -I ,II & III	Any 3 out of 6	15

C) Semester End Practical Examination (100 marks):

- **Major subject carries 100 Marks**
- **80 marks + 10 marks (journal) + 10 marks (viva)**
- **Duration: 3 Hours for practical course.**
- **Certified Journal is compulsory for appearing at the time of Practical Exam**
- **The Marking Scheme for each of the Level is given below:**

Level 4.5	Part-A	Part-B	Total Marks
Major	Experiment-40+Journal-5 +viva-5 Total:50M	Experiment-40+Journal-5+viva-5 Total:50M	100 M

EXAMINATION PATTERN FOR OE,VSC,SEC,AEC,AEC SUBJECTS

A) Continuous Internal Assessment (20 Marks):

Sr No.	Particulars	Marks
1	**Assignment / Presentations**	**05**
2	**Mid-Term Class Test**	**10**
3	**Active Participation in routine class**	**05**

B)External Examination for Theory Courses – 30 Marks

- **Duration: 1 Hours**
- **All questions shall be compulsory with internal choice within the questions.**
- **Each Question may be subdivided into sub questions as a, b, c, d, etc. & the allocation of Marks depends on the weightage of the topic.**

Theory question paper pattern:

All questions are compulsory.			
Question	Based on	Options	Marks
Q.1	Unit - I	Any 2 out of 4	10
Q.2	Unit - II	Any 2 out of 4	10
Q.3	Unit - III	Any 2 out of 4	10

PRACTICAL EXAMINATION PATTERN FOR VEC & CC SUBJECTS

- **Each Subject carries 50 Marks**
- **30 marks + 10 marks (Journal) + 10 marks (Viva)**
- **Duration: 2 Hours for practical course.**
- **Certified Journal is compulsory for appearing at the time of Practical Exam**
- **The Marking Scheme for each of the Level is given below:**

Level 4.5	Part-A	Part-B	Total Marks
VEC & CC	Experiment-15+Journal-5 +viva-5 Total:25M	Experiment-15+Journal-5+viva-5 Total:25M	50 M