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Dr. Babasaheb Ambedkar Marathwada University

Chhatrapati Sambhajnagar- 431001



B.Sc. Degree Programme

(Three Year / Four Years (Hons) / Four Years (Hons with Research))

Course Structure and Syllabus for B. Sc. First Year

(AS PER NEP-2020)

Subject (Major): Data Science

(Single Major)

Effective from 2024-25

PREFACE

As we stand on the threshold of a new era in education, the dawn of the National Education Policy 2020 illuminates our path toward a holistic, inclusive, and progressive educational landscape. The Bachelor of Science (B. Sc.) curriculum outlined herein reflects the ethos and aspirations of this transformative policy, aiming to equip learners with the knowledge, skills, and values necessary to thrive in the dynamic world of the 21st century.

At its core, the National Education Policy 2020 envisions an educational framework that is learner-centric, multidisciplinary, and geared towards fostering creativity, critical thinking, and innovation. It emphasizes the integration of knowledge across disciplines, breaking down traditional silos to encourage holistic understanding and application of concepts. The Bachelor of Science (B. Sc.) curriculum embodies these principles by offering a diverse array of courses spanning various scientific domains, while also incorporating interdisciplinary studies to nurture well-rounded graduates capable of addressing complex challenges with agility and insight.

Furthermore, the curriculum is designed to promote experiential learning, research, and hands-on exploration, recognizing the importance of practical engagement in deepening understanding and cultivating real-world skills. Through laboratory work, field experiences, internships, and project-based learning opportunities, students will have the chance to apply theoretical knowledge in practical settings, develop problem-solving abilities, and cultivate a spirit of inquiry and discovery.

Integral to the National Education Policy 2020 is the commitment to inclusivity, equity, and access to quality education for all. The Bachelor of Science (B. Sc.) curriculum reflects this commitment by embracing diversity in perspectives, backgrounds, and experiences, and by fostering an inclusive learning environment where every student feels valued, supported, and empowered to succeed.

Moreover, the curriculum emphasizes the cultivation of ethical values, social responsibility, and global citizenship, instilling in students a sense of accountability towards society and the environment. By integrating courses on ethics, sustainability, and social sciences, the Bachelor of Science (B. Sc.) program aims to produce graduates who are not only proficient in their respective fields but also compassionate, ethical leaders committed to making a positive impact on the world.

As we embark on this journey of educational transformation guided by the National Education Policy 2020, the Bachelor of Science (B. Sc.) curriculum stands as a testament to our collective vision of a more equitable, inclusive, and enlightened society. It is our hope that through rigorous academics, innovative pedagogy, and unwavering dedication to excellence, we can inspire the next generation of scientists, scholars, and change-makers to realize their full potential and contribute meaningfully to the advancement of knowledge and the betterment of humanity.



Introduction to Undergraduate Degree course in Data Science:

As per the recommendations of the NEP-2020, the undergraduate degree course in Data Science is a six/ eight semester course spread over three/ four academic years. The teaching – learning process is student-centric and it involves both theory and practical components. It offers a flexibility of programme structure while ensuring that the student gets a strong foundation in the subject and gains in-depth knowledge. Besides the Discipline Specific Core (DSC) courses, a student can opt courses from the syllabus comprising of Discipline Specific Electives (DSEs), Generic Electives (GEs), Skill Enhancement Courses (SECs), Ability Enhancement courses (AECs) and Value Addition Courses (VACs). Thereby, bringing out the multidisciplinary approach and adherence to innovative ways within the curriculum framework. Moreover, it allows a student maximum flexibility in pursuing his/her studies at the undergraduate level to the extent of having the liberty to eventually design the degree with multiple exit options depending upon the needs and aspirations of the student in terms of his/her goals of life, without compromising on the teaching learning, both in qualitative and quantitative terms. This will suit the present day needs of students in terms of securing their paths towards higher studies or employment.

Courses of Study: Courses of the study indicate pursuance of study in a particular discipline. Every discipline shall offer four categories of courses of study, viz. Discipline Specific Core (DSC) courses, Discipline Specific Electives (DSEs), Skill Enhancement Courses (SECs) and Generic Electives (GEs). Besides these four courses, a student will select Ability Enhancement Courses (AECs) and Value-Added Courses (VACs) from the respective pool of courses offered by the University.

a) Discipline Specific Core (DSC): Discipline Specific Core is a course of study, which should be pursued by a student as a mandatory requirement of his/ her programme of study. In Bachelor of Science (Hons.) Mathematics programme, DSCs are the core credit courses of Mathematics which will be appropriately graded and arranged across the semesters of study, being undertaken by the student, with multiple exit options as per NEP 2020.

b) Discipline Specific Elective (DSE): The Discipline Specific Electives (DSEs) are a pool of credit courses of Mathematics from which a student will choose to study based on his/ her interest.

c) Generic Elective (GE): Generic Electives is a pool of courses offered by various disciplines of study (excluding the GEs offered by the parent discipline) which is meant to provide multidisciplinary or interdisciplinary education to students. In case a student opts for DSEs beyond his/ her discipline specific course(s) of study, such DSEs shall be treated as GEs for that student.

d) Ability Enhancement course (AEC), Skill Enhancement Course (SEC) and Value Addition Course (VAC): These three courses are a pool of courses offered by all the Departments in groups of odd and even semesters from which a student can choose.



Structure of B. Sc. (Three / Four Years Honours / Honours with Research Degree) Programme with Multiple Entry and Exit Options

Subject (Major): Data Science

BSc First Year: 1st Semester



Course Type	Course Code	Course Name	Teaching Scheme (Hrs / Week)		Credits Assigned		Total Credits
			Theory	Practical	Theory	Practical	
Major (Core) M1 Mandatory	DSC-1	Fundamentals of Excel	2		2		2+2 = 4
	DSC-2	Practical based on DSC-1		4		2	
Major (Core) M2 Mandatory	DSC-3	C Programming	2		2		2+2 = 4
	DSC-4	Practical based on DSC-3		4		2	
Major (Core) M3 Mandatory	DSC-5	Operating System	2		2		2+2 = 4
	DSC-6	Practical based on DSC-5		4		2	
Generic / Open Elective (GE/OE) (Choose any two from pool of courses) It should be chosen compulsorily from the faculty other than that of Major	GE/OE-1	(To be chosen from other faculty)	2		2		2
SEC (Skill Enhancement Courses) (Choose any one from pool of courses)	SEC-1	1) PC Maintanance-1 2) HTML	1		1		2
	SEC-2	Practicals based on SEC-1- A Practicals based on SEC-1- B		2		1	
	AEC-1	English (Common for all the faculty)	2		2		

AEC, VEC, IKS	IKS-1	Choose any one from pool of courses	2		2		2+2=4
OJT/ FP/CEP/CC/RP	CC-1	Health and Wellness (Common for all the faculty)		4		2	2
			13	18	13	09	22

GE/OE-1 : Power Point Presentation and AI (This course will be available for the students from other faculty)

B.Sc. First Year:2nd Semester



Course Type	Course Code	Course Name	Teaching Scheme (Hrs / Week)		Credits Assigned		Total Credits
			Theory	Practical	Theory	Practical	
Major (Core) M1 Mandatory	DSC-7	Advance Excel	2		2		2+2 = 4
	DSC-8	Practical based on DSC-7		4		2	
Major (Core) M2 Mandatory	DSC-9	Introduction to SQL	2		2		2+2 = 4
	DSC-10	Practical based on DSC-9		4		2	
Major (Core) M3 Mandatory	DSC-11	Computational Statistics	2		2		2+2 = 4
	DSC-12	Practical based on DSC-11		4		2	
Generic / Open Elective (GE/OE) (Choose any two from pool of courses) It should be chosen compulsorily from the faculty other than that of Major	GE/OE-2	(To be chosen from other faculty)	2		2		2
VSC (Vocational Skill Courses) (Choose any one from pool of courses)	VSC-1	1) PC Maintenance -II 2) CSS	1		1		2
	VSC-2	Practicals based on VSC-1-A , Practicals based on VSC-1-B		2		1	
	AEC-1	English (Common for all the faculty)	2		2		

AEC, VEC, IKS	VEC-1	Constitution of India (Common for all the faculty)	2		2		2+2=4
OJT/ FP/CEP/CC/RP	CC-2	Yoga Education / Sports and Fitness (Common for all the faculty)		4		2	2
			13	18	13	09	22
Exit Option : Award of UG Certificate in 3 Majors with 44 credits and an additional 4 credits of core NSQF course / Internship OR continue with Major and Minor							

GE/OE-2 : **Technical Writing using Word and AI** (This course will be available for the students from other faculty)

Detailed Illustration of Courses included in 1st and 2nd semester:

- 1) **Major (Core)** subject are mandatory.

DSC-1 : This is a 2 credit theory course corresponding to Major (core) subject

DSC-2 : This is a 2 credit practical course based on DSC-1

DSC-3 : This is a 2 credit theory course corresponding to Major (core) subject

DSC-4 : This is a 2 credit practical course based on DSC-3

- 2) **Generic / Open Elective (GE/OE)**: (Needs to be chosen (any two) from pool of courses available at respective college). **These courses should be chosen compulsorily from faculty other than that of Major.**

GE/OE -1 : This is a 2 credit theory course should be chosen compulsorily from faculty other than that of Major.

GE/OE -2 : This is a 2 credit theory course should be chosen compulsorily from faculty other than that of Major.

- 3) **SEC (Skill Enhancement Courses)** : Choose any one from pool of courses. These courses needs to be designed to enhance the technical skills of the students in specific area.

SEC-1 : This is a 1 credit theory course to enhance the technical skills of the students in specific area.

SEC-2 : This is a 1 credit practical course based on SEC-1.

- 4) **VSC (Vocational Skill Courses)** : Choose any one from pool of courses. These courses should be based on Hands on Training corresponding to Major (core) subject.

VSC-1 : This is a 1 credit theory course based Hands on Training corresponding to Major (core) subject.

VSC-2 : This is a 1 credit practical course based on VSC-1

- 5) **AEC (Ability Enhancement courses)**: The focus of these courses should be based on linguistic and communication skills.

AEC-1 : English

This is a 2 credit theory course based on linguistic proficiency. It will be common for all the faculty.

AEC-2 : English

This is a 2 credit theory course based on linguistic proficiency. It will be common for all the faculty.

- 6) **IKS (Indian Knowledge System)** : The courses related to traditional and ancient culture of India will be included in this section. The respective college will have to choose one of the courses from the pool of courses designed by the University.

IKS-1 : To be chosen from the pool of courses designed by the University

This is a 2 credit theory course based on Indian Knowledge System. It will be common for all the faculty

- 7) **VEC (Value Education Courses)**: The courses such as understanding India, Environmental Science / Education, Digital and Technological solutions etc will be part of Value Education Courses.

VEC-1 : Constitution of India

This is a 2 credit theory course based on value education. It will be common for all the faculty

- 8) **CC (Curricular Courses)**: The courses such as Health and wellness, Yoga education, Sports and Fitness, Cultural activities, NSS/NCC, Performing Arts.

CC-1 : Health and Wellness

This is a 2 credit practical course based on Co-curricular activities. It will be common for all the faculty

CC-2 : Yoga education / Sports and Fitness

This is a 2 credit practical course based on Co-curricular activities. It will be common for all the faculty



Programme Educational Objectives (PEOs) :

Programme Educational Objectives (PEOs) for the Bachelor of Science Curriculum under the National Education Policy 2020:

- 1. Mastery of Discipline-Specific Knowledge:** Graduates of the Bachelor of Science program will demonstrate a deep understanding of fundamental principles, theories, and methodologies in their chosen scientific discipline, enabling them to analyze complex problems, propose innovative solutions, and contribute to advancements in their field.
- 2. Interdisciplinary Proficiency:** Graduates will possess the ability to integrate knowledge and skills from multiple scientific disciplines, fostering a holistic approach to problem solving and innovation. They will be equipped to address multifaceted challenges by drawing upon diverse perspectives and methodologies.
- 3. Critical Thinking and Analytical Skills:** Graduates will develop strong critical thinking abilities, enabling them to evaluate information rigorously, analyze data effectively, and make informed decisions based on evidence. They will demonstrate proficiency in applying logical reasoning and scientific methods to solve problems and generate new knowledge.
- 4. Leadership and Innovation:** Graduates will demonstrate leadership qualities and entrepreneurial mindset, capable of initiating and driving positive change in their organizations and communities. They will exhibit creativity, resilience, and adaptability, harnessing innovation to address complex challenges and seize opportunities for growth and advancement.
- 5. Global Citizenship and Cultural Sensitivity:** Graduates will possess a global perspective and cultural sensitivity, recognizing the inter connectedness of diverse communities and the importance of collaboration across borders. They will engage in cross-cultural dialogue, embrace diversity, and contribute to the advancement of knowledge and understanding on a global scale.

These Programme Educational Objectives serve as guiding principles for the Bachelor of Science curriculum, reflecting our commitment to nurturing well-rounded graduates who are prepared to excel in their careers, contribute to society, and lead meaningful lives in a rapidly changing world.



Programme Outcomes (POs) :

The National Education Policy (NEP) 2020 for India emphasizes several key aspects for Bachelor of Science (B.Sc.) programs, aiming to produce graduates who are not only well-versed in their respective disciplines but also equipped with skills necessary for holistic development and employability. While specific program outcomes may vary between institutions and disciplines within B.Sc. programs, here are some common outcomes aligned with NEP 2020:

- **PO1. The citizenship and society:** Apply broad understanding of ethical and professional skill in science subjects in the context of global, economic, environmental and societal realities while encompassing relevant contemporary issues.
- **PO2. Environment and sustainability:** Apply broad understanding of impact of science subjects in a global, economic, environmental and societal context and demonstrate the knowledge of, and need for sustainable development.
- **PO3. Ethics:** Apply ability to develop sustainable practical solutions for science subject related problems within positive professional and ethical boundaries.
- **PO4. Individual and team work:** Function effectively as a leader and as well as team member in diverse/ multidisciplinary environments.
- **PO5. Communication:** Communicate effectively on complex science subject related activities with the scientific community in particular and with the 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.
- **PO6. Project management and finance:** Demonstrate knowledge and understanding of the first principles of science and apply these to one's own work as a member and leader in a team, to complete project in any environment.
- **PO7. Life-long learning:** Recognize the need for lifelong learning and have the ability to engage in independent and life-long learning in the broadest context of technological change.

These program outcomes align with the broader goals of NEP 2020 to transform higher education in India and prepare students for the challenges and opportunities of the 21st century. Board of Studies designing B.Sc. curricula are encouraged to incorporate these outcomes into their program objectives and learning outcomes.



Programme Specific Outcomes (PSOs):

On completion of the 03/ 04 years Degree in B.Sc. (Data Science) students will be able to:

- **PSO1. Develop Proficiency in Data Manipulation and Analysis:** The first objective of the data science course is to enable students to acquire the necessary skills and techniques for effectively manipulating and analyzing data. Students will learn various methods for data cleaning, preprocessing, and transformation to ensure data quality and suitability for analysis.
- **PSO2. Master Statistical Concepts and Methods:** The course aims to provide students with a solid understanding of statistical concepts and methods relevant to data science. Students will learn how to apply descriptive and inferential statistics to draw meaningful conclusions from data. They will also explore concepts such as hypothesis testing, regression analysis, and experimental design to make statistically sound decisions.
- **PSO3. Gain Proficiency in Programming and Data Visualization:** An essential objective of the course is to develop students' programming skills, particularly in languages commonly used in data science such as Python or R. Students will learn how to leverage programming tools to manipulate data, implement algorithms, and create visualizations to effectively communicate insights.
- **PSO4. Explore Machine Learning Techniques:** The course aims to introduce students to a range of machine learning algorithms and techniques. Students will gain hands-on experience in implementing and evaluating various supervised and unsupervised learning algorithms. They will understand the principles behind these algorithms and learn how to select and tune models for different types of problems.
- **PSO5. Apply Data Science Concepts to Real-World Problems:** The course will provide students with opportunities to apply data science concepts, tools, and techniques to real-world problems. Through practical projects and case studies, students will gain experience in extracting insights, building predictive models, and deriving actionable recommendations from data.



B.Sc. (Data Science)

Semester - I



Paper No. : DSC-1	Paper Title: Fundamental of Ms-Excel
Total Credit: 02	Marks: 50
Total Contact Hours: 30 Hrs	
Prerequisites: There are no prerequisites for attending this course	
Learning Objectives <ul style="list-style-type: none"> • Indicate the names and functions of the Excel interface components. • Enter and edit data. • Format data and cells. • Construct formulas, including the use of built-in functions, and relative and absolute references. • Create and modify charts. • Preview and print worksheets. • Use the Excel online Help feature. 	
Course Outcomes <ol style="list-style-type: none"> 1. Demonstrating the basic mechanics and navigation of an Excel spreadsheet. 2. Formatting techniques and presentation styles. 3. Learning the use and utility of functions and formulas on excel spreadsheet. 4. Working knowledge of organizing and displaying large amounts and complex data. 5. Using clip art to enhance ideas and information in Excel worksheets. 6. Understanding the need and use of using Excel templates. 	
UNIT – I: Excel Introduction (Total Contact Hours: 10 Hrs.) Content: Getting Started with Excel, Identify the Elements of the Excel Interface, Navigate and Select Cells in Worksheets, Customize the Excel Interface, Create a Basic Worksheet, Performing Calculations in an Excel Worksheet, Create Formulas in a Worksheet, Insert ,Functions in a Worksheet, Reuse Formulas, Modifying an Excel Worksheet, Edit Worksheet Data, Find and Replace Data, Manipulate Worksheet Elements Content: Modifying the Appearance of a Worksheet, Apply Font Properties, Add Borders and Colors to Cells, Align Content in a Cell, Apply Number Formatting, Apply Cell Styles, Managing an Excel Workbook, Manage Worksheets, View Worksheets and Workbooks, Printing Excel Workbooks, Define the Page Layout, Print a Workbook	
UNIT – II: Excel Workbooks (Total Contact Hours: 10 Hrs.) Content: Managing Workbooks, Using Workbook Views, Selecting and Switching Between Worksheets, Inserting and Deleting Worksheets, Renaming, Moving, and Copying Worksheets, Splitting and Freezing a Window, Creating Headers and Footers, Hiding Rows, Columns,	

Worksheets, and Windows, Setting the Print Area, Adjusting Page ,Margins and Orientation, Adding Print Titles, Gridlines, and Row and Column Headings, Adjusting Paper Size and Print Scale, Printing a Selection, Multiple Worksheets, and Workbooks, Working with Multiple Workbook Windows, Creating a Template

UNIT – III: Excel Functions (Total Contact Hours: 10 Hrs.)

Content: More Functions and Formulas, Formulas with Multiple Operators, Inserting and Editing a Function, Auto Calculate and Manual Calculation, Defining Names, Using and Managing Defined Names, Displaying and Tracing Formulas, Understanding Formula Errors

Working with Objects, Inserting Clip Art, Inserting Pictures and Graphics Files, Formatting Pictures and Graphics, Inserting Shapes, Formatting Shapes, Resize, Move, Copy , Delete Objects, Applying Special Effects to Objects, Grouping Objects, Aligning Objects, Flipping and Rotating Objects, Layering Objects, Inserting Smart Art, Working with Smart Art Elements, Formatting Smart Art, Using Word Art, Inserting an Embedded Object, Inserting Symbols

Textbook

1. "Excel 2019 Bible" by Michael Alexander and Richard Kusleika
2. "Excel 2019 For Dummies" by Greg Harvey
3. "Microsoft Excel 2019 Step by Step" by Curtis Frye
4. "Excel 2019 All-in-One For Dummies" by Greg Harvey

Reference Books:

1. "Excel 2019 Pivot Table Data Crunching" by Bill Jelen and Michael Alexander
2. "Excel 2019 VBA and Macros" by Bill Jelen and Tracy Syrstad
3. "Microsoft Excel 2019 Step by Step" by Curtis Frye
4. "Excel 2019 Power Pivot and Power BI" by Michael Alexander and Avi Singh
5. "Excel 2019 For Dummies Quick Reference" by John Walkenbach



Course Code: DSC-2	Course Title : Practical based on DSC-1
TotalCredit:02	Marks:50
Total Contact Hours: 60 Hrs	
Sample List of experiments to be carried out based on the course DSC-1	
<ol style="list-style-type: none"> 1. Introduction to Excel 2. Getting Started 3. Working with Worksheets 4. Data Entry and Formatting 5. Basic Formulas and Functions 6. Working with Charts 7. Sorting and Filtering Data 8. Conditional Formatting 9. Data Validation 10. Printing and Page Setup <p>Minimum 5 more practical on the basis of syllabus to improve the practical knowledge of students.</p>	

Course code: DSC-3	Course Title: C- Programming
Total Credit: 02	Marks: 50
Total Contact Hours: 30 Hrs	
Prerequisites: There are no prerequisites for attending this course	
Learning Objectives <ul style="list-style-type: none"> To Provide Students with a solid foundation in the basic concepts and syntax of the C Programming Language. 	
Course Outcomes <ol style="list-style-type: none"> Students will be able to write simple C programs to perform arithmetic operations, display messages, and read user input. Students will understand the structure of a C program, including headers, main function, and statements. 	
UNIT – I: Introduction (Total Contact Hours: 10 Hrs.) An Overview of C , History of C language, C as a Structured Language, Features of C. Basic Elements & Operators Character set, C Token, Identifier & Keywords, Variables Constant and its types. Integer constant, floating point constant, character constant, string constants. Operators: Arithmetic, Relational, Logical, Unary operators: Increment & decrement Assignment and Conditional operator. Precedence & Associativity of Operators, Data Types, Data Types: int, char, float, double. Declaration & Initialization. Type modifier: long, short, signed & unsigned	
UNIT – II: C Programs and IO Statements (Total Contact Hours: 10 Hrs.) Structure of C Program, Compilation & Execution of C program I/O: Introduction, Formatted Input / Output function: scanf & printf, Escape sequence characters. Library functions: General & Maths.	
UNIT – III: Control and Iterative Statements (Total Contact Hours: 10 Hrs.) Simple if, nested if, if-else, else if ladder, Switch-case statement, The conditional expression (? : operator) while and do-while loop, and for loop, break & continue statement, go to statement Array: Introduction, Declaration and initialization Accessing array elements, Memory representation of array One dimension and multidimensional array, character array, Introduction to string.	
Textbook 1.Let us C: Y. P. Kanetkar [bpb publication] 2.Programming in C: E. Balaguruswamy [Tata macgraw hill] 3.Programming inC: Goterfried [Shaums' Series]	
References: Spirit of "C" : Moolish Kooper.	



Course code: DSC-4	Course Title : Practical based on DSC-3
Total Credit:2	Marks:50
Total Contact Hours: 60 Hrs	
<ol style="list-style-type: none"> 1. Write a program to find average of three numbers 2. Write a program to check entered number is even or odd 3. Write a program to print grade of students based on percentage 4. Write a program to check entered character is vowel or not 5. Write a program to find sum of first 10 natural numbers 6. Write a program to print odd numbers of 1 to N 7. Write a program to print following series 1 2 3 4 5 6 8. Write a program to find largest element in an array 9. Write a program to find sum of Two matrices. 10. Write a program to perform transpose of matrix <p>Minimum 5 more practical on the basis of syllabus to improve the practical knowledge of students.</p>	



Course Code: DSC-5	Course Title: Operating System
Total Credit: 02	Marks: 50
Total Contact Hours: 30 Hrs	
Prerequisites: There are no prerequisites for attending this course	
Learning Objectives <ul style="list-style-type: none"> To introduce students the basic functioning of operating systems as resource manager and its salient features. To acquaint students about Process States, CPU Scheduling, Inter Process Communication, Synchronization, Deadlocks. 	
Course Outcomes Upon successful completion of the course, the students will: <ol style="list-style-type: none"> Gain knowledge of System Software, Program and Process. Understand Types of Operating System, Basic functions of O.S. and Evolution of O.S. Understand the concept of Process, Process Control Block and Threads. Understand the CPU scheduling Non-Pre-emptive and Pre-emptive Scheduling algorithms Understand the concept of Synchronization and Deadlock. 	
UNIT – I: Introduction to Operating System (Total Contact Hours: 10 Hrs.) Introduction to Software: Definition, Classification of software, Operating system as the main component of system software, Program and Process. Operating System Fundamental: O.S. as a resource manager, Structure of O.S., Types of O.S.- Single user and multiuser O.S., Basic functions of O.S., Characteristics of modern O.S. Evolution of O.S. : Early systems, Simple batch systems, Multiprogramming batch systems, Time sharing system, Operating system for Personal Computers, workstations and Hand held devices, Parallel systems, Distributed systems, Real time systems, Advantages and Disadvantages of each system.	
UNIT – II: Process Management (Total Contact Hours: 10 Hrs.) Concept of Process: Process States, Process Control Block, Operations on Processes, Threads. CPU Scheduling: Types of schedulers, Criteria for scheduling, Non-Pre-emptive Scheduling Algorithms – First-come First-served Scheduling and Shortest Job First Scheduling, Pre-emptive Scheduling Algorithms- Priority Scheduling, Round Robin.	
UNIT – III: Inter Process Communication and Synchronization (Total Contact Hours: 10 Hrs.)	

Concurrent and dependent process, need for synchronization, introduction of Critical Section and Semaphores, method of inter process communication, process synchronization, synchronization problem.

Textbook

1. "Operating System", By S. R. Sathe & Anil S. Mokhade, MacMillan Publication.
2. A Silberschatz, P.B. Galvin, G. Gagne, Operating Systems Concepts, 8th Edition, John Wiley Publications 2008.
3. A. S. Tanenbaum, Modern Operating System, 3rd Edition, Pearson Education 2007.
4. G. Nutt, Operating System: A Modern Perspective, 2nd Edition Pearson Edition 1997.
5. W. Stallings, Operating Systems, Internals & Design Principles 2008 5th Edition, Prentice Hall of India.

References:

- 1." M. Milenkovic, Operating Systems- Concepts and design, Tata McGraw Hill 1992.:



Course Code: DSC-6	Course Title : Practical based on DSC-5
Total Credit: 02	Marks: 50
Total Contact Hours: 60 Hrs	
<p>Sample List of experiments to be carried out based on the course DSC-3</p> <ol style="list-style-type: none"> 1. Introduction to Operating Systems 2. Getting Started with the Operating System 3. File Management 4. User Management and Permissions 5. Process Management 6. Memory Management 7. Input /Output Management 8. Networking Basics 9. Security and Authentication 10. System Maintenance and Troubleshooting <p>Minimum 5 more practical on the basis of syllabus to improve the practical knowledge of students.</p>	

Course code: SEC-1A	Course Title: PC Maintenance-I
Total Credit: 1	Marks:50
Total Contact Hours :15 Hrs	
Prerequisites: There are no prerequisites for attending this course	
Learning Objectives <ul style="list-style-type: none"> To Provide Students with a solid foundation in the basic concepts and PC hardware maintenance 	
Course Outcomes <ol style="list-style-type: none"> Increase knowledge about How Computer works. Identify and describe functions of common hardware parts that make up a computer. Install and configure Window Operating System. Install useful application software. Troubleshoot hardware and software issue. Install Printer, Scanner and troubleshoot their fault. Aims to provide knowledge of personal computer hardware and Operating System. Successful completion of this course will enable learners to install a computer system unit and operating system and conduct troubleshooting 	
UNIT – I: Introduction to PC Hardware (Total Contact Hours: 15 Hrs.) Study of basic I/O systems, Types of Memories- Static RAM and Dynamic RAM, ROM, PROM, EPROM, EEPROM, CPU (Central Processing Unit)- ALU and control Study of different types of Motherboards, Motherboard Configuration, Identifying Internal and External connectors, Types of data cables, Types of Processor- Intel Pentium IV, Dual core, Core 2 Duo, Quad processor etc, Study of BIOS Set-up- Advance set-up, Boot configuration, Boot Menu. Various software for Make Bootable USB. Make Bootable USB (Single and Dual boot). Create Dual boot System.	
Textbook : <ol style="list-style-type: none"> "CompTIA A+ Certification All-in-One Exam Guide, Tenth Edition (Exams 220-1001 & 220-1002)" by Mike Meyers "The PC and Gadget Help Desk: A Do-It-Yourself Guide To Troubleshooting and Repairing" by Mark Edward Soper "Upgrading and Repairing PCs" by Scott Mueller 	
References: <ol style="list-style-type: none"> "Troubleshooting and Maintaining Your PC All-in-One For Dummies" by Dan Gookin "CompTIA A+ Complete Study Guide: Exam Core 1 220-1001 and Exam Core 2 220-1002" by Quentin Docter, Jon Buhagiar, and Jeff T. Parker "PC Technician Street Smarts: A Real World Guide to CompTIA A+ Skills" by James Pyles 	

Course Code: SEC-2A	Course Title : Practical based on SEC-1A
Total Credit:01	Marks:50
Total Contact Hours: 30 Hrs	
<p>Sample List of experiments to be carried out based on the course SEC-1A</p> <ol style="list-style-type: none"> 1. Cleaning Dust and Debris 2. Hard Drive Cleanup 3. Disk Defragmentation 4. Software Updates 5. Antivirus Scan 6. Backup and Restore 7. Hardware Diagnostics 8. Driver Updates 9. System Optimization 10. Physical Component Installation/Replacement 	

Course Code: SEC-1B	Course Title: HTML
Total Credit:01	Marks: 50
Total Contact Hours:15 Hrs	
Prerequisites: There are no prerequisite for this course	
Learning Objectives <ul style="list-style-type: none"> • Understanding the basic concepts and principles of web technologies, including HTML, CSS, and java script • Gain practical skills in creating responsive and accessible web designs. • Learn how to validate web pages and follow web standards set by W3C. • Develop proficiency in manipulating the document object model (DOM) using Java script. 	
Course Outcomes After completion of the course students will be able to <ol style="list-style-type: none"> 1. Develop functional and visually appealing web pages using HTML 2. Design responsive web layouts that adapt to different devices and screen sizes. 3. Implement client-side scripts using java script to add interactivity and dynamic behavior to web pages. 4. Validate and optimize web pages for accessibility, performance, and compliance with web standards. 	
UNIT-I: Introduction (Total Contact Hours: 15 Hrs.) <ol style="list-style-type: none"> 1. Web browsers: Introduction to web browsers, types of browsers, how they work. 2. Web servers: Introduction to web servers, types of web servers, how they work. 3. Client side vs server side: Understanding the difference between client-side and server-side processing. 4. Webs standards: Introduction to web standards, W3C, HTML validation, CSS validation. 5. HTML syntax and basic tags: Study the basic syntax of an HTML document, including the doc type declaration, openings and closing tags, and nesting of elements, we will also explore fundamental HTML tags like <head>, <body>, <h1>, <h6>, <p>, <a> and . 6. Structure of an HTML document: delve into the standard structure of an HTML document, including the <!doc type > declaration, the <html> element, and the <head> and<body> sections. How to use comments and the proper organization of elements within the document. 7. HTML Elements and Attributes: learn about the different types of HTML elements, including block-level and inline elements. cover how to use attributes to provide additional information about an element, such as the 'src' attribute for images or the 'hie attribute for links. 8. Semantic HTML: explore the importance of using semantic elements in HTML5, such as <article>, <section>. <header>, <nav>, and <footer>, and how these elements can enhance the accessibility and search engine optimization of web pages. 9. HTML5: study the new features and improvements introduced in HTML5, including multimedia elements like <video> and <audio>, new form input types and attributes, and JavaScript APIs for advanced functionality. 10. Lists: learn how to create ordered and unordered lists using the and <ub elements, 11. Links and Navigation: study how to create different types of links using the <a> element. external, and anchor links as well as email and telephone links. 	



Course Code: SEC-2B	Course Title : Practical based on SEC-1B
Total Credit:01	Marks:50
Total Contact Hours: 30 Hrs	
Sample List of experiments to be carried out based on the course SEC-1B <ol style="list-style-type: none">1. Introduction to HTML2. Basic HTML Structure3. Text Formatting4. Links and Anchors5. Images and Multimedia6. Lists7. Tables8. Forms9. Semantic HTML10. CSS Integration with HTML	



This course will be available for the students from other faculty	
Course code: GE/OE-1	Course Title: Power Point Presentation and AI
Total Credit: 02	Marks: 50
Periods: 30 Hrs	
Prerequisites: There are no prerequisites for attending this course	
Learning Objectives <ul style="list-style-type: none"> To Provide Students with a solid foundation in the basic working of office.. 	
Course Outcomes <ol style="list-style-type: none"> This course provides an overview of commonly used office suite software application The basic features and skills of creating, editing, inserting tables, graphics as well as presentation tools along with spreadsheet data handling are covered. Students will gain hands on experience with presentation design and collaboration tools 	
UNIT – I (Total Contact Hours: 10 Hrs.) The Title Bar ,The Ribbon ,The Microsoft Office Button ,The Quick Access Toolbar , The Scroll Bars ,The Presentation View Buttons ,The Zoom Slider , The Status Bar , The Mini Toolbar ,Keyboard Shortcut- Opening Presentations , Closing Presentations ,Creating New Presentations , Saving Presentations ,Inserting New Slides , Applying Slide Layouts ,Working with PowerPoint File Format , Normal View , Slide Sorter View , Notes Page View ,Slide Show View.	
UNIT – II (Total Contact Hours: 10 Hrs.) Basic Object Manipulation ,Font Formatting ,Paragraph Formatting ,Applying Custom Bullets and Numbering ,Using Tabs , Setting Text Box Options ,Checking Spelling ,Inserting Clip Art and Pictures ,Basic Graphic Manipulation ,Using Picture Tools ,The Format Picture Dialog Box ,Inserting and Manipulating Smart Art ,Formatting Smart Art ,Running a Slide Show , Using Custom Shows	
UNIT – III (Total Contact Hours: 10 Hrs.) Introduction to AI-powered tools and platforms Exploring AI-driven design suggestions in PowerPoint, Automated slide layout and content generation, AI-powered image and multimedia selection	
Textbook : <ol style="list-style-type: none"> "Slide:ology: The Art and Science of Creating Great Presentations" by Nancy Duarte "Resonate: Present Visual Stories that Transform Audiences" by Nancy Duarte "Presentation Zen: Simple Ideas on Presentation Design and Delivery" by Garr Reynolds "The Visual Slide Revolution: Transforming Overloaded Text Slides into Persuasive Presentations" by Dave Paradi 	
References: <ol style="list-style-type: none"> "Beyond Bullet Points: Using Microsoft PowerPoint to Create Presentations That Inform, Motivate, and Inspire" by Cliff Atkinson "Illuminate: Ignite Change Through Speeches, Stories, Ceremonies, and Symbols" by Nancy Duarte and Patti Sanchez "PowerPoint 2019 For Dummies" by Doug Lowe "The Non-Designer's Presentation Book: Principles for Effective Presentation Design" by Robin Williams and John Tollett 	



B.Sc. (Data Science)

Semester - II



Course Code: DSC-7	Course Title: Advance MS-Excel
Total Credit: 02	Marks:50
Total Contact Hours: 30 Hrs	
Prerequisites: There are no prerequisites for attending this course	
Learning Objectives <ul style="list-style-type: none"> To teach students how to use complex Excel formulas and functions to solve sophisticated problems and automate tasks. 	
Course Outcomes <ol style="list-style-type: none"> After completion of the Advanced Excel course you will be able to: Use advanced functions and productivity tools to assist in developing worksheets. Manipulate data lists using Outline, Auto filter and PivotTables. Use Consolidation to summaries and report results from multiple worksheets. 	
UNIT – I: Excel Advanced Level-1 (Total Contact Hours: 10 Hrs.) Working with the Web and External Data, Inserting a Hyperlink, Creating a Web Page from a Workbook, Importing Data from an Access Database or Text File, Importing Data from the Web and Other Sources, Working with Existing Data Connections.	
UNIT – II: Excel Advanced Level-2 (Total Contact Hours: 10 Hrs.) Working with Macros, Recording a Macro, Playing and Deleting a Macro, Adding a Macro to the Quick Access Toolbar, Editing a Macro's Visual Basic Code, Inserting Copied Code in a Macro, Declaring Variables and Adding Remarks to VBA Code, Prompting for User Input, Using the If...Then...Else Statement.	
UNIT – III: Excel Advanced Level-3 (Total Contact Hours: 10 Hrs.) Using Logical Functions (IF), Lookup& Reference Functions ,Using Financial Functions (PMT),Using Database Functions (DSUM),Using Lookup Functions (VLOOKUP),User Defined and Compatibility Functions, Financial Functions, Date & Time Functions, Math & Trig Functions Using Data Validation, Summarizing a Table with a PivotTable, Converting to a Range, Creating a Custom Auto Fill List, Creating a Custom Number Format.	
Textbook <ol style="list-style-type: none"> "Excel 2019 Bible" by Michael Alexander and Richard Kusleika "Excel 2019 For Dummies" by Greg Harvey "Microsoft Excel 2019 Step by Step" by Curtis Frye "Excel 2019 All-in-One For Dummies" by Greg Harvey 	
References: <ol style="list-style-type: none"> "Excel 2019 Pivot Table Data Crunching" by Bill Jelen and Michael Alexander "Excel 2019 VBA and Macros" by Bill Jelen and Tracy Syrstad "Microsoft Excel 2019 Step by Step" by Curtis Frye "Excel 2019 Power Pivot and Power BI" by Michael Alexander and Avi Singh "Excel 2019 For Dummies Quick Reference" by John Walkenbach 	

Course Code: DSC-8	Course Title : Practical based on DSC-7
Total Credit: 2	Marks: 50
Total Contact Hours: 60 Hrs	
<p>Sample List of experiments to be carried out based on the course DSC-1</p> <ol style="list-style-type: none"> 1. Introduction to External Data in Excel 2. Importing Data from an Access Database 3. Importing Data from the Web and Other Sources 4. Working with Macros 5. Adding a Macro to the Quick Access Toolbar 6. Using the If...Then...Else Statement. 7. Lookup& Reference Functions 8. Using Database Functions (DSUM) 9. Using Lookup Functions (VLOOKUP) 10. Summarizing a Table with a PivotTable <p>Minimum 5 more practical on the basis of syllabus to improve the practical knowledge of students.</p>	



Course code: DSC-9	Course Title: Introduction to SQL
Total Credit: 02	Marks: 50
Total Contact Hours:30 Hrs	
Prerequisites: Basic knowledge of set theory and set operations, computer file management	
Learning Objectives <ul style="list-style-type: none"> • Learn what is data, database and DBMS • Understand the basics of database designing. • Learn different SQL statements 	
Course Outcomes Upon successful completion of the course, the students will be able to: <ol style="list-style-type: none"> 1. Design a database. 2. Normalize a database. 3. Create a database perform various operations on database 	
UNIT – I: (Total Contact Hours: 10 Hrs.) Introduction to Databases, Types of Data, Record and Files, File based System, What is database system, application and purpose of database system, Three-Level of data abstraction, instance and schema, data independence, database users, structure of a DBMS, Advantages and disadvantages of DBMS.	
UNIT – II: (Total Contact Hours: 10 Hrs.) Database Design, Design Phases, Normal Forms 1NF,2NF, 3NF and BCNF. ER-Model entity set, relationship set, attributes, constraints, ER-Diagram basic structure, mapping cardinality, Roles, weak entity set. Symbols used in ER-notations. ERD Issues, 12 Codd's rules.	
UNIT – III: (Total Contact Hours: 10 Hrs.) SQL: SQL Languages DDL, DML, DCL, TCL, DDL Statements to Create and Manage Tables using Create & Alter, Manipulating Data using Insert, Update & Delete Statement., Retrieving Data Using SQL Select, Restricting and Sorting Data, Using Single Row functions, Conversion Functions and Conditional Expressions, Aggregated Data Using Group Function, Displaying data from Multiple tables, Sub queries, Set Operators	
Textbook 1.Database system concepts(6 th edition) AviSilverschatz, Henry F. Korth, S.Sudarshan 2.An introduction to database systems by Bipin C. Desai	
References: <ol style="list-style-type: none"> 1. "SQL Cookbook: Query Solutions and Techniques for Database Developers" by Anthony Molinaro 2. "SQL Pocket Guide: A Guide to SQL Usage" by Jonathan Gennick 3. "Learning SQL" by Alan Beaulieu 	

Course Code: DSC-10	Course Title : Practical based on DSC-9
Total Credit: 2	Marks: 50
Total Contact Hours:60 Hrs	
<p>Sample List of experiments to be carried out based on the course DSC-2</p> <ol style="list-style-type: none"> 1. Design schema for school, college, company 2. Design schema for travel agency, library, shop, and hotel 3. Explain ER-diagram and symbols used in ER- diagram. 4. Explain Entity, types of attributes and their relationships 5. Draw a Simple ER- diagram For College and Company. 6. Perform all DDL commands 7. Perform all DML commands 8. Perform all DcL commands 9. Perform practical on Order By clause to order and retrieve data. 10. Perform all Set Operations on tables 11. Draw ER Diagram for school. <p>Minimum 5 more practical on the basis of syllabus to improve the practical knowledge of students.</p>	



Course code: DSC-11	Course Title: Computational Statistics
Total Credit: 02	Marks:50
Total Contact Hours:30 Hrs	
Prerequisites: Programming language basics.	
Learning Objectives <ul style="list-style-type: none"> To introduce students to the fundamentals of statistics and their applications in various fields. To develop proficiency in using the R programming language for data analysis and visualization. To teach students essential statistical techniques, including descriptive statistics, inferential statistics, and regression analysis. To enable students to apply statistical methods to real-world datasets and interpret the results. 	
Course Outcomes By the end of the course, students will be able to: <ol style="list-style-type: none"> Understand the core concepts and methods in statistics and recognize their importance in various disciplines. Effectively use R Programming language to manage, analyze and visualize data. Apply appropriate statistical techniques such as hypothesis testing and regression analysis to answer research questions and make data driven decisions. Analyze real-world datasets using statistical methods and R, interpret the results, and communicate their findings to both technical and non-technical audiences 	
UNIT – I: Introduction to Statistics and R Programming Language (Total Contact Hours: 10 Hrs.) <ol style="list-style-type: none"> Importance of Statistics in Various Fields: Definition and purpose of statistics, Applications of statistics in different fields, such as: Business and economics (e.g., market research, financial analysis), Healthcare (e.g., clinical trials, epidemiology), Social sciences (e.g., psychology, sociology, political science), Natural sciences (e.g., physics, chemistry, biology), Engineering (e.g., quality control, reliability engineering). Introduction to R Programming Language and R Studio: Overview of R and its advantages: Installing R and R Studio, Navigating the R Studio interface (console, script editor, environment, plots, and help), R packages and CRAN repository, Basic R Syntax, Data Types, and Operations, R syntax and expressions, Data types: numeric, character, logical, factor, and date/time, Data structures: vector, matrix, list, and data frame, Basic R operations: arithmetic, relational, and logical, Control structures: if-else, for loops, and while loops, Functions: built-in and user-defined. Measures of Central Tendency (Mean, Median, Mode): Definition and properties of mean, median, and mode. Calculation of mean, median, and mode using R functions: mean, median, and mode, Measures of Dispersion (Range, Variance, Standard Deviation): Definition and properties of range, variance, and standard deviation, Calculation of range, variance, and standard deviation using R functions: range, var, and sd. Introduction to Data Visualization: Importance of data visualization, Types of data visualizations (e.g., bar chart, pie chart, line chart, scatter plot, histogram, box plot), Basic principles of good data 	

visualization.

UNIT – II: Probability and Data Distributions (Total Contact Hours: 10 Hrs.)

1. Basics of Probability Theory: Definition of probability and its properties, Sample space, events, and outcomes, Basic rules of probability: addition rule, multiplication rule, and conditional probability, Independent and dependent events, Bayes' theorem
2. Discrete Probability Distributions: Introduction to discrete probability distributions, Probability mass function (PMF), Expected value and variance of discrete random variables, Binomial distribution: definition, properties, and applications, R functions: dbinom, pbinom, qbinom, rbinom, Poisson distribution: definition, properties, and applications, R functions: dpois, ppois, qpois, rpois.
3. Continuous Probability Distributions: Introduction to continuous probability distributions, Probability density function (PDF) and cumulative distribution function (CDF), Expected value and variance of continuous random variables, Normal distribution: definition, properties, and applications, R functions: dnorm, pnorm, qnorm, rnorm, Exponential distribution: definition, properties, and applications, R functions: dexp, pexp, qexp, rexp

UNIT – III: Basic Inferential Statistics (Total Contact Hours: 10 Hrs.)

1. Sampling and Sampling Distributions: Definition and importance of sampling, Types of sampling methods (e.g., simple random sampling, stratified sampling, cluster sampling), Sampling distribution and its properties, Central Limit Theorem and its implications, Standard error of the mean and its calculation using R: sd and length functions.
2. Confidence Intervals: Definition and purpose of confidence intervals, Interpretation of confidence intervals. Calculation of confidence intervals for population mean (using t-distribution), R functions: t.test, qt, and manual calculation, Calculation of confidence intervals for population proportion, R functions: prop.test and manual calculation.
3. Introduction to Linear Regression: Definition and purpose of linear regression, Simple linear regression model: assumptions and parameters, Estimation of parameters using the least-squares method

Textbook

1. "Introductory Statistics with R" by Peter Dalgaard (Springer, 2nd Edition, 2008)
2. "Discovering Statistics Using R" by Andy Field, Jeremy Miles, and Zoë Field (SAGE Publications, 2012)

References:

1. "Statistics for Business and Economics" by Paul Newbold, William L. Carlson, and Betty Thorne
2. "Statistics" by David Freedman, Robert Pisani, and Roger Purves
3. "Introduction to the Practice of Statistics" by David S. Moore, George P. McCabe, and Bruce A. Craig



Course Code: DSC-12	Course Title : Practical based on DSC-11
Total Credit: 2	Marks: 50
Total Contact Hours : 60 Hrs	
<p>Sample List of experiments to be carried out based on the course DSC-3</p> <ol style="list-style-type: none"> 1. Create and manipulate vectors in R and perform different arithmetic operations 2. Create and manipulate matrices and perform different arithmetic operations in R. 3. Create and manipulate dataframe and perform different operations in R. 4. Create a dataset and perform measures of central tendencies and measures of dispersions on the given dataset in R language. 5. Create a list in R and manipulate it using various list operations' and conversions. 6. Write a program in R to implement binomial probability distribution using rbinorm and pbinorm, qbinorm and dbinorm function. 7. implement poisson distribution using function pois function ppois and dpois function in R. 8. Implement data visualization in R using Histogram, barplot, plot, piechart. 9. Write a program in R to implement normal distribution and exponential distribution. 10. Write a program in R to implement factorial of number using readline(). <p>Minimum 5 more practical on the basis of syllabus to improve the practical knowledge of students.</p>	



Course code: VSC-1A	Course Title: PC Maintenance-II
Total Credit: 01	Marks: 50
Total Contact Hours:15 Hrs	
Prerequisites: There are no prerequisites for attending this course	
Learning Objectives <ul style="list-style-type: none"> To Provide Students with a solid foundation in the basic concepts and PC hardware maintenance 	
Course Outcomes <ol style="list-style-type: none"> Increase knowledge about How Computer works. Identify and describe functions of common hardware parts that make up a computer. Install and configure Window Operating System. Install useful application software. Troubleshoot hardware and software issue. Install Printer, Scanner and troubleshoot their fault. Aims to provide knowledge of personal computer hardware and Operating System. Successful completion of this course will enable learners to install a computer system unit and operating system and conduct troubleshooting 	
UNIT – I: (Total Contact Hours: 15 Hrs.) Hrs Windows XP, installation of different types of Service Packs, Vista and Windows-7 etc. Formatting of Hard disk, Partitioning of Hard disk in different logical drives, Disk defragmentation, Disk clean up, Scan disk etc, Installation of Device Drivers Types of Printer. Printer Installation and configuration. Scanner Installation and configuration, Performing test print out, Printing of document etc, Scanner set-up, Webcam, Bluetooth device, Memory card reader etc POST (Power on Self Test), identifying problems by Beep codes errors, checking power supply using Multi-meter, Replacement of components etc..	
Textbook <ol style="list-style-type: none"> R. Taxali, "Computer Course", McGraw- Hill, 2010. Prof. S.P.S. Saini, "Troubleshooting and Maintenance of Computers", Vayu Education of India, 2009. B Govindarajalu, IBM PC and Clones – "Hardware, Troubleshooting and Maintenance", Second Edition, Tata McGraw – Hill, 1991. 	
References: <ol style="list-style-type: none"> "Troubleshooting and Maintaining Your PC All-in-One For Dummies" by Dan Gookin "CompTIA A+ Complete Study Guide: Exam Core 1 220-1001 and Exam Core 2 220-1002" by Quentin Docter, Jon Buhagiar, and Jeff T. Parker "PC Technician Street Smarts: A Real World Guide to CompTIA A+ Skills" by James Pyles 	

Course Code: VSC-2A	Course Title : Practical based on VSC-1A
TotalCredit:01	Marks:50
Total Contact Hours: 30 Hrs	
<p>Sample List of experiments to be carried out based on the course vsc-1</p> <ol style="list-style-type: none"> 1. Basic PC Components 2. Essential Tools for PC Maintenance 3. Diagnostic Tools 4. Safety Precautions 5. Cleaning the PC Interior 6. Data Backup Procedures 7. Troubleshooting Common Issues 8. Disassembling and Reassembling a PC 9. Advanced Maintenance Techniques 10. Advanced Cooling Solutions 	

Course code: VSC-1B	Course Title: CSS
Total Credit: 01	Marks: 50
Total Contact Hours: 15 Hrs	
Prerequisites: There are no prerequisite for this course	
Learning Objectives <ul style="list-style-type: none"> • Understanding the basic concepts and principles of web technologies, including HTML, CSS, and java script • Gain practical skills in creating responsive and accessible web designs. • Learn how to validate web pages and follow web standards set by W3C. • Develop proficiency in manipulating the document object model (DOM) using Java script. 	
Course Outcomes After completion of the course students will be able to <ol style="list-style-type: none"> 1. Develop functional and visually appealing web pages using HTML and CSS 2. Design responsive web layouts that adapt to different devices and screen sizes. 3. Implement client-side scripts using java script to add interactively and dynamic behavior to web pages. 4. Validate and optimize web pages for accessibility, performance, and compliance with web standards. 	
UNIT-I: (Total Contact Hours: 15 Hrs.) Introduction to CSS Understanding the purpose of CSS Syntax and structure of CSS rules Applying CSS: inline, internal, and external style sheets Linking a CSS file to an HTML document using the <link> element Basic Selectors Element, class, and ID selectors Universal and attribute selectors Grouping and chaining selectors Understanding selector specificity <ul style="list-style-type: none"> • Advanced Selectors and Combinators Descendant, child, and sibling combinators Pseudo-classes: :hover, :active, :visited, :first-child, :last-child, and :nth-child Pseudo-elements: ::before, ::after, and ::first-letter Attribute selectors with various matching patterns • Box Model: Basics Understanding the CSS box model (content, padding, border, margin) Setting width and height of elements Managing overflow and scrollbars • Box Model: Padding, Margin, and Border Setting padding, margin, and border properties Using shorthand notation for padding, margin, and border, box-sizing property and its values (content-box, border-box) • Layout and Positioning: Display Property Understanding the display property (block, inline, inline-block) Using the display property to create layouts Controlling element visibility with display: none and visibility: hidden • Layout and Positioning: floats and Positioning Creating multi-column layouts with float Clearing floats with the clear property Static, relative, absolute, and fixed positioning • Layout and Positioning: Flexbox Introduction to the CSS Flexbox layout system Defining 	

a flex container and flex items Controlling the direction, alignment, and order of flex items
Handling flexible sizes and growing/shrinking of items

- Layout and Positioning: CSS Grid Introduction to the CSS Grid layout system Defining a grid container and grid items Setting up grid columns, rows, and gaps Positioning grid items and controlling their size

Textbook

1. Textbook I. WEB TECHNOLOGIES 2010 by Uttam K.
2. Learning Web Design: A Beginner's Guide to HTML, CSS, JavaScript, and Web Graphics" 5th Edition by Jennifer Niederst Robbins
3. "Responsive Web Design with HTML5 and CSS" by Ben Frain
<https://vdoc.oub/download/responsive-web-design-with-html5-and-css3-5vkOjcsnmdv0>

References:

1. "HTML and CSS: Design and Build Websites" by Jon Duckett
2. "Web Design with HTML, CSS, JavaScript and jQuery Set" by Jon Duckett
3. "Web Development and Design Foundations with HTML5" by Terry Felke-Morris
4. "Head First HTML and CSS: A Learner's Guide to Creating Standards-Based Web Pages" by Elisabeth Robson and Eric Freeman.



Course Code: VSC-2B	Course Title : Practical based on VSC-1B
Total Credit: 01	Marks:50
Total Contact Hours: 30 Hrs	

Sample List of experiments to be carried out based on the course vsc-1

1. Create a simple webpage with HTML and style it using CSS. Include elements like headings, paragraphs, links, and images. Apply basic styles such as font size, color, background color, and margins.
2. Design a horizontal or vertical navigation menu using CSS. Style the menu items to change appearance on hover and click.
3. Build a webpage layout that adjusts based on the screen size. Utilize CSS media queries to create a responsive design that looks good on both desktop and mobile devices.
4. Create a CSS animation such as a rotating image carousel, fading slideshow, or moving elements. Experiment with key frames and transitions to add dynamic effects to your webpage.
5. Design a webpage layout using CSS Flexbox. Practice aligning and distributing items within containers to create flexible and responsive designs.
6. Implement a webpage layout using CSS Grid. Create a grid structure with rows and columns to organize content in a visually appealing way.
7. Explore different typography techniques using CSS. Experiment with font families, sizes, weights, styles, and spacing to enhance the readability and aesthetics of text on your webpage.
8. Customize the appearance of HTML form elements using CSS. Style form fields, labels, buttons, and validation messages to create visually appealing and user-friendly forms.
9. Choose a CSS framework such as Bootstrap, Foundation, or Bulma. Build a webpage layout or components using the framework's predefined styles and components.
10. Test your CSS skills by ensuring that your webpage displays correctly across different web browsers (e.g., Chrome, Firefox, Safari, Edge). Identify and fix any compatibility issues using CSS techniques such as vendor prefixes and feature detection.

This course will be available for the students from other faculty	
Course code: OE-2	Course Title: Technical Writing Using Word
Total Credit: 02	Marks: 50
Total Contact Hours:30 Hrs	
Prerequisites: There are no prerequisites for attending this course	
Learning Objectives <ul style="list-style-type: none"> • This course offers students a comprehensive understanding of office suite software applications commonly used in modern workplaces. Through practical exercises and projects, • students will develop proficiency in word processing. 	
Course Outcomes <ol style="list-style-type: none"> 1. Students will be able to handle office work 2. Students will understand the format of a documents, including mail etc. 	
UNIT – I: (Total Contact Hours: 10 Hrs.) Inserting Paragraphs and Texts: <ul style="list-style-type: none"> • Find and replace text • Cut, copy, and paste text • Use AutoCorrect to replace text • Special characters insertion Formatting Paragraphs and Texts: <ul style="list-style-type: none"> • Applying font formatting • Formatting with Format Painter • Adjusting line and paragraph spacing and indentation • Clearing formatting • Applying a text highlight color to text selections • Applying built-in styles to text • Converting text to WordArt Ordering and Grouping Paragraphs and Texts: <ul style="list-style-type: none"> • Formatting text in many columns • Inserting page breaks, section breaks, and column breaks • Changing a section's page configuration options. 	
UNIT – II: (Total Contact Hours: 10 Hrs.) Document and Template Management: <ul style="list-style-type: none"> • Managing document versions • Comparing and merging multiple papers • Linking to external document content • Enabling macros in a document • Displaying hidden ribbon tabs • Changing the default font of the program Prepare Documents for reviewing: <ul style="list-style-type: none"> • Reduce editing 	



- Make a document definitive
- Encrypt a document with a password

Manage the changes in Word Document:

- Tracking modifications
- Managing recorded modifications
- Lock or unlock tracking
- Adding remarks
- Managing remarks

UNIT – III: (Total Contact Hours: 10 Hrs.)

- Introduction to AI-powered writing tools and platforms
- Exploring grammar checking tools such as Grammarly and ProWritingAid
- Utilizing style analysis tools for consistency and clarity
- Hands-on exercises and demonstrations with AI-driven writing assistants
- Generating content using AI-based text generators
- Summarizing complex information with AI-powered summarization tools
- Evaluating the quality and coherence of AI-generated content

Textbook :

1. "Technical Writing: Process and Product" by Sharon Gerson and Steven Gerson
2. "Technical Communication" by Mike Markel
3. "Microsoft Manual of Style for Technical Publications" by Microsoft Corporation

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