B.Sc.,
COMPUTER SCIENCE

SYLLABUS

FROM THE ACADEMIC YEAR
2023 - 2024

TAMILNADU STATE COUNCIL FOR HIGHER EDUCATION, CHENNAI – 600 005

1. Introduction

B.Sc. Computer Science

Education is the key to development of any society. Role of higher education is crucial for securing right kind of employment and also to pursue further studies in best available world class institutes elsewhere within and outside India. Quality education in general and higher education in particular deserves high priority to enable the young and future generation of students to acquire skill, training and knowledge in order to enhance their thinking, creativity, comprehension and application abilities and prepare them to compete, succeed and excel globally. Learning Outcomes-based Curriculum Framework (LOCF) which makes it student-centric, interactive and outcome-oriented with well-defined aims, objectives and goals to achieve. LOCF also aims at ensuring uniform education standard and content delivery across the state which will help the students to ensure similar quality of education irrespective of the institute and location.

Computer Science is the study of quantity, structure, space and change, focusing on problem solving, application development with wider scope of application in science, engineering, technology, social sciences etc. throughout the world in last couple of decades and it has carved out a space for itself like any other disciplines of basic science and engineering. Computer science is a discipline that spans theory and practice and it requires thinking both in abstract terms and in concrete terms. Nowadays, practically everyone is a computer user, and many people are even computer programmers. Computer Science can be seen on a higher level, as a science of problem solving and problem solving requires precision, creativity, and careful reasoning. The ever-evolving discipline of computer science also has strong connections to other disciplines. Many problems in science, engineering, health care, business, and other areas can be solved effectively with computers, but finding a solution requires both computer science expertise and knowledge of the particular application domain. Computer science has a wide range of specialties. These include Computer Architecture, Software Systems, Graphics, Artificial Intelligence, Computational Science, and Software Engineering. Drawing from a common core of computer science knowledge, each specialty area focuses on specific challenges. Computer Science is practiced by mathematicians, scientists and engineers. Mathematics, the origins of Computer Science, provides reason and logic. Science provides the methodology for learning and refinement. Engineering provides the techniques for building hardware and software.

Programme Outcome, Programme Specific Outcome and Course Outcome

Computer Science is the study of quantity, structure, space and change, focusing on problem solving, application development with wider scope of application in science, engineering, technology, social sciences etc. The key core areas of study in Mathematics include Algebra, Analysis (Real & Complex), Differential Equations, Geometry, and Mechanics. The

Students completing this programme will be able to present Software application clearly and precisely, make abstract ideas precise by formulating them in the Computer languages. Completion of this programme will also enable the learners to join teaching profession, enhance their employability for government jobs, jobs in software industry, banking, insurance and investment sectors, data analyst jobs and jobs in various other public and private enterprises.

2. Programme Outcomes (PO) of B.Sc. degree programme in Computer Science

- ➢ Scientific aptitude will be developed in Students
- ➢ Students will acquire basic Practical skills & Technical knowledge along with domain knowledge of different subjects in the Computer Science & humanities stream.
- ➢ Students will become employable; Students will be eligible for career opportunities in education field, Industry, or will be able to opt for entrepreneurship.
- ➢ Students will possess basic subject knowledge required for higher studies, professional and applied courses.
- ➢ Students will be aware of and able to develop solution oriented approach towards various Social and Environmental issues.
- ➢ Ability to acquire in-depth knowledge of several branches of Computer Science and aligned areas. This Programme helps learners in building a solid foundation for higher studies in Computer Science and applications.
- ➢ The skills and knowledge gained leads to proficiency in analytical reasoning, which can be utilized in modelling and solving real life problems.
- ➢ Utilize computer programming skills to solve theoretical and applied problems by critical understanding, analysis and synthesis.
- ➢ To recognize patterns and to identify essential and relevant aspects of problems.
- ➢ Ability to share ideas and insights while seeking and benefitting from knowledge and insight of others.
- ➢ Mould the students into responsible citizens in a rapidly changing interdependent society.

The above expectations generally can be pooled into 6 broad categories and can be modified according to institutional requirements:

PO1: Knowledge

PO2: Problem Analysis

PO3: Design / Development of Solutions

PO4: Conduct investigations of complex problems

PO5: Modern tool usage

PO6: Applying to society

3. Programme Specific Outcomes of B.Sc. Degree Programme in Computer Science

PSO1: Think in a critical and logical based manner

PSO2: Familiarize the students with suitable software tools of computer science and industrial applications to handle issues and solve problems in mathematics or statistics and realtime application related sciences.

PSO3: Know when there is a need for information, to be able to identify, locate, evaluate, and effectively use that information for the issue or problem at hand.

PSO4: Understand, formulate, develop programming model with logical approaches to a Address issues arising in social science, business and other contexts.

PSO5: Acquire good knowledge and understanding to solve specific theoretical and applied

problems in advanced areas of Computer science and Industrial statistics.

PSO6: Provide students/learners sufficient knowledge and skills enabling them to undertake

further studies in Computer Science or Applications or Information Technology and its allied areas on multiple disciplines linked with Computer Science.

PSO7: Equip with Computer science technical ability, problem solving skills, creative talent

and power of communication necessary for various forms of employment.

PSO8: Develop a range of generic skills helpful in employment, internships& societal activities.

PSO9: Get adequate exposure to global and local concerns that provides platform for further exploration into multi-dimensional aspects of computing sciences.

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs) and Programme Specific Outcomes (PSOs) can be carried out accordingly, assigning the appropriate level in the grids: (put tick mark in each row)

PO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
PO1	✓					
PO2		✓				
PO3			✓			
PO4				✓		
PO5					✓	
PO6						✓

4. Highlights of the Revamped Curriculum

➢ Student-centric, meeting the demands of industry & society, incorporating industrial components, hands-on training, skill enhancement modules, industrial project, project with viva-voce, exposure to entrepreneurial skills, training for competitive examinations, sustaining the quality of the core components and incorporating application oriented content wherever required.

➢ The Core subjects include latest developments in the education and scientific front, advanced programming packages allied with the discipline topics, practical training, devising mathematical models and algorithms for providing solutions to industry / real life situations. The curriculum also facilitates peer learning with advanced mathematical topics in the final semester, catering to the needs of stakeholders with research aptitude.

➢ The General Studies and Computer Science based problem solving skills are included as mandatory components in the 'Training for Competitive Examinations' course at the final semester, a first of its kind.

➢ The curriculum is designed so as to strengthen the Industry-Academia interface and provide more job opportunities for the students.

➢ The Industrial Statistics course is newly introduced in the fourth semester, to expose the students to real life problems and train the students on designing a mathematical model to provide solutions to the industrial problems.

- The Internship during the second year vacation will help the students gain valuable work experience that connects classroom knowledge to real world experience and to narrow down and focus on the career path.
- Project with viva-voce component in the fifth semester enables the student, application of conceptual knowledge to practical situations. The state of art technologies in conducting a Explain in a scientific and systematic way and arriving at a precise solution is ensured. Such innovative provisions of the industrial training, project and internships will give students an edge over the counterparts in the job market.
- State-of Art techniques from the streams of multi-disciplinary, cross disciplinary and inter disciplinary nature are incorporated as Elective courses, covering conventional topics to the latest – Statistics with R Programming, Data Science, Machine learing. Internet of Things and Artificial Intelligence etc..

5. Value additions in the Revamped Curriculum:

Semester	Newly introduced Components	Outcome / Benefits
I	**Foundation Course** To ease the transition of learning from higher secondary to higher education, providing an overview of the pedagogy of learning abstract Mathematics and simulating mathematical concepts to real world.	• Instil confidence among students • Create interest for the subject
I, II, III, IV	**Skill Enhancement papers** (Discipline centric / Generic / Entrepreneurial)	• Industry ready graduates • Skilled human resource • Students are equipped with essential skills to make them employable
		• Training on Computing / Computational skills enable the students gain knowledge and exposure on latest computational aspects
		• Data analytical skills will enable students gain internships, apprenticeships, field work involving data collection, compilation, analysis etc.
		• Entrepreneurial skill training will provide an opportunity for independent livelihood • Generates self – employment • Create small scale entrepreneurs • Training to girls leads to women empowerment
		• Discipline centric skill will improve the Technical knowhow of solving real life problems using ICT tools
III, IV, V & VI	Elective papers- An open choice of topics categorized under Generic and Discipline Centric	• Strengthening the domain knowledge • Introducing the stakeholders to the State-of Art techniques from the streams of multi-disciplinary, cross disciplinary and inter disciplinary nature • Students are exposed to Latest

		• topics on Computer Science / IT, that require strong mathematical background • Emerging topics in higher education / industry / communication network / health sector etc. are introduced with hands-on-training, facilitates designing of mathematical models in the respective sectors
IV	Industrial Statistics	• Exposure to industry moulds students into solution providers • Generates Industry ready graduates • Employment opportunities enhanced
II year Vacation activity	Internship / Industrial Training	• Practical training at the Industry/ Banking Sector / Private/ Public sector organizations / Educational institutions, enable the students gain professional experience and also become responsible citizens.
V Semester	Project with Viva – voce	• Self-learning is enhanced • Application of the concept to real situation is conceived resulting in tangible outcome
VI Semester	Introduction of Professional Competency component	• Curriculum design accommodates all category of learners; 'Mathematics for Advanced Explain' component will comprise of advanced topics in Mathematics and allied fields, for those in the peer group / aspiring researchers; • 'Training for Competitive Examinations' –caters to the needs of the aspirants towards most sought - after services of the nation viz, UPSC, CDS, NDA, Banking Services, CAT, TNPSC group services, etc.
Extra Credits: For Advanced Learners / Honors degree		• To cater to the needs of peer learners / research aspirants

Skills acquired from the Courses	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

B.Sc., Computer Science
Programme structure

Sem.	Part	Course Code	Courses	List of Courses	T/P	Credit	Hours /week (L/T/P)	Int.	Ext.	Total
I	Part-I	2311T	T/OL	தமிழ் இலக்கிய வரலாறு-I/other Language-I	T	3	6	25	75	100
	Part-II	2312E	E	General English-I	T	3	6	25	75	100
	Part-III	23BCE1C1	CC 1	Programming In C	T	5	5	25	75	100
		23BCE1P1	CC 2	Practical : Programming In C Lab	P	3	4	25	75	100
		-	Generic Elective (Allied)	BCA/ B.Sc., IT/ Maths/Electronics/ software	T	3	3	25	75	100
		-		Respective Allied Theory - Practical	P	2	2	25	75	100
	Part-IV	23BCE1S1	SEC-I	Fundamentals of Information Technology	T	2	2	25	75	100
		23BCE1FC	FC	Problem Solving Techniques	T	2	2	25	75	100
				TOTAL	-	**23**	**30**	**200**	**600**	**800**
II	Part- I	**2321T**	T/OL	தமிழ் இலக்கிய வரலாறு-II /Other Languages-II	T	3	6	25	75	100
	Part-II	**2322E**	E	General English - II	T	3	6	25	75	100
	Part-III	**23BCE2C1**	CC-III	Object Oriented Programming Concepts Using C++	T	4	5	25	75	100
		23BCE2P1	CC-IV	Object Oriented Programming Concepts Using C++ Lab	P	4	4	25	75	100
		-	Generic Elective (Allied)	B.Sc IT / BCA/Maths/ Electronics /Software	T	3	3	25	75	100
				Respective Allied Theory - Practical	P	2	2	25	75	100
	Part-IV	**23BCE2S1**	SEC -II	Office Automation	T	2	2	25	75	100
		23BCE2S2	SEC-III	Introduction to HTML	T	2	2	25	75	100
		--		Naan Mudhalvan Course						
						23	**30**	**200**	**600**	**800**
III	Part- I	**2331T**	T/OL	தமிழக வரலாறும் பண்பாடும் / Other Languages-III	T	3	6	25	75	100
	Part-II	**2332E**	E	General English – III	T	3	6	25	75	100
	Part-III	**23BCE3C1**	CC-V	Data Structure and Algorithms	T	4	5	25	75	100
		23BCE3P1	CC-VI	Data Structure and Algorithms Lab	P	4	4	25	75	100
		--	Generic Elective (Allied)	B.Sc IT / BCA/Maths/ Electronics /Software	T	3	3	25	75	100
		--		Respective Allied Theory - Practical	P	2	2	25	75	100
	Part-IV	**23BCE3S1**	SEC-IV	Web Designing	T	2	2	25	75	100
		233AT/ 23BCE3S2	SEC-V	Adipadai Tamil/ Mutltimedia Systems	T	2	2	25	75	100
		--		Naan Mudhalvan Course						
				Total		**23**	**30**	**200**	**600**	**800**
IV	Part- I	**2341T**	T/OL	தமிழும் அறிவியலும்/ Other Languages -IV	T	3	6	25	75	100

	Part-II	**2342E**	E	General English – IV	T	3	6	25	75	100
	Part-III	**23BCE4C1**	CC-VII	Java Programming	T	4	4	25	75	100
		23BCE4P1	CC-VIII	Java Programming Lab	P	3	4	25	75	100
		--	Generic Elective (Allied)	B.Sc IT / BCA/Maths /Electronics/Software	T	3	3	25	75	100
		--		Respective Allied Theory - Practical	P	2	2	25	75	100
	Part-IV	**23BCE4S1**	SEC-VI	PHP Programming	T	2	2	25	75	100
		234AT/ 23BCE4S2	SEC-VII	Adipadai Tamil/ Software Testing	T	2	2	25	75	100
		23BES4	E.V.S	Environmental Studies	T	2	2	25	75	100
		--		Naan Mudhalvan Course						
				Total		**24**	**30**	**225**	**675**	**900**
V	Part-III	**23BCE5C1**	CC-IX	Operating Systems	T	4	5	25	75	100
		23BCE5C2	CC-X	Database Management System	T	4	5	25	75	100
		23BCE5P1	CC-XI	Database Management System Lab	P	4	5	25	75	100
		23BCE5C3	CC-XII	Software Engineering	T	4	5	25	75	100
		23BCE5E1/ 23BCE5E2	DSE-I	Artificial Intelligence / Natural Language Processing	T	3	4	25	75	100
		23BCE5E3/ 23BCE5E4	DSE-II	Introduction to Data Science / Big Data Analytics.	T	3	4	25	75	100
	Part - IV	**23BVE5**		Value Education	T	2	2	25	75	100
		23BCE5IV		Internship/Industrial Visit/ Field Visit		2	-	25	75	100
		--		Naan Mudhalvan Course						
				Total		**26**	**30**	**200**	**600**	**800**
VI	Part-III	**23BCE6C1**	CC-XIII	Computer Networks	T	4	6	25	75	100
		23BCE6D	CC-XIV	Dissertation		8	12	50	150	200
		23BCE6E1/ 23BCE6E2	DSE-III	.Net Programming / Python Programming	T	3	5	25	75	100
		23BCE6E3/ 23BCE6E4	DSE-IV	Computer Graphics / Mobile Computing	T	3	5	25	75	100
	Part-IV	--		Extension Activity / Industrial Visit		1	-	-	-	-
		23BCE6S1		Essential Reasoning and Quantitative Aptitude	**T**	2	2	25	75	100
		--		Naan Mudhalvan Course						
				Total		**21**	**30**	**150**	**450**	**600**
				Grand Total		**140**	**--**	**1175**	**3525**	**4700**

> TOL-Tamil/Other Languages,
> E – English
> CC - Core course –Core competency, critical thinking, analytical reasoning, research skill &teamwork
> Generic Elective(Allied)
> SEC-Skill Enhancement Course - Exposure beyond the discipline (Value Education ,Entrepreneurship Course, Computer application for Science, etc.,
> FC-Foundation Course
> DSE-Discipline Specific Elective
> T/P- T-Theory, P-Practical

Chairperson details: Mrs.R.Indra, Government Arts College for Women, Sivagangai.Mobile No: 9442722566

CORE COURSE 1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	CIA	External	Total
									Marks		
23BCE1C1	PROGRAMMING IN C	Core -I	5	-	-	-	5	5	25	75	100

	Learning Objective
LO1	To familiarize the students with the Programming basics and the fundamentals of C, Datatypes in C, Mathematical and logical operations.
LO2	To understand the concept using if statements and loops
LO3	This unit covers the concept of Arrays
LO4	This unit covers the concept of Functions, Structurs and unions
LO5	To understand the concept of implementing pointers and Files.

	Contents	
UNIT I	Overview of C: History of C – Importance of C – Basic Structure of C Programs – Programming Style – Character Set – C Tokens – Keywords and Identifiers – Constants, Variables and Data Types – Declaration of Variables – Defining Symbolic Constants – Declaring a variable as a constant – overflow and underflow of data – Operators and Expressions: Arithmetic, relational, logical, assignment operators – increment and decrement operators, conditional operators, bitwise operators, special operators – Arithmetic Expressions- Evaluation of Expressions – Precedence of Arithmetic Operators – Type Conversions in Expressions – Operator Precedence and Associativity Mathematical functions.	
UNIT II	Managing I/O Operations: Reading and Writing a Character – Formatted Input, Output – Decision Making & Branching: if statement - if else statement - nesting of if else statements - else if ladder – switch statement – the ?: operator – goto statement – the while statement – do statement – the for statement – jumps in loops.	
UNIT III	Arrays: One-Dimensional Arrays – Declaration, Initialization – Two-Dimensional Arrays – Multi-dimensional Arrays – Dynamic Arrays – Initialization. Strings: Declaration, Initialization of string variables – reading and writing strings – string handling functions	
UNIT IV	User-defined functions: need – multi-function programs – elements of user defined functions – definition – return values and their types – function calls, declaration, category – all types of arguments and return values – nesting of functions – recursion – passing arrays, strings to functions – scope visibility and life time of variables. Structures and Unions: Defining a structure – declaring a structure variable – accessing structure members – initialization – copying and comparing – operation on individual members – array of structures – arrays within structures – structures within structures – structures and functions –unions – size of structures – bit fields.	
UNIT V	**Pointers:** the address of a variable – declaring, initialization of pointer variables – accessing a variable through its pointer – chain of pointers – pointer increments and scale factors – pointers and character strings – pointers as function arguments – pointers and structures. **Files**: Defining, opening, closing a file – IO Operations on files – Error handling during IO operations – command line arguments.	

Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
CO1	Remember the program structure of C with its syntax and semantics	PO1,PO3,PO5
CO2	Understand the programming principles in C (data types, operators, branching and looping, arrays, functions, structures, pointers and files)	PO2,PO3,PO6
CO3	Apply the programming principles learnt in real-time problems	PO3,PO4,PO5
CO4	Analyze the various methods of solving a problem and choose the best method	PO4,PO5,PO6
CO5	Code, debug and test the programs with appropriate test cases	PO5,PO6

Text Book

1	E.Balagurusamy , 2012, *Programming in ANSI C*, , 6th Edition, Tata McGraw Hill Publishing Company. UNIT I: Chapters 1 (Except 1.3-1.7, 1.10-1.12), 2 (Except 2.9, 2.13), 3 (Except 3.13) UNIT II: Chapters 4 – 6 UNIT III: Chapters 7, 8 (Except 8.5, 8.6, 8.7, 8.9, 8.10) UNIT IV: Chapters 9 (Except 9.20), 10 UNIT V: Chapters 11 (Except 11.8, 11.10, 11.12, 11.14, 11.15, 11.17), 12 (Except 12.6)

Reference Books

1.	Byron Gottfried, Schaum's Outline Programming with C, Fourth Edition, Tata McGraw-Hill, 2018.
2.	Kernighan and Ritchie, The C Programming Language, Second Edition, Prentice Hall, 1998
3.	YashavantKanetkar, Let Us C, Eighteenth Edition, BPB Publications,2021

Web Resources

1.	https://codeforwin.org/
2.	https://www.geeksforgeeks.org/c-programming-language/
3.	http://en.cppreference.com/w/c
4.	http://learn-c.org/
5.	https://www.cprogramming.com/

CORE PRACTICAL

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
23BCE1P1	PROGRAMMING IN C LAB	Core Practical -I	-	-	3	-	3	4	25	75	100

Course Objective	
LO1	To familiarize the students with the Programming basics and the fundamentals of C, Datatypes in C, Mathematical and logical operations.
LO2	To understand the concept using if statements and loops
LO3	This unit covers the concept of Arrays and Functions
LO4	This unit covers the concept of Structurs and unions and Preprocessors
LO5	To understand the concept of implementing pointers and files

	List of Excercises
Group A	1. Write a C Program to find the sum of digits. 2. Write a C Program to check whether a given number is Armstrong or not. 3. Write a C Program to check whether a given number is Prime or not. 4. Write a C Program to generate the Fibonacci series. 5. Write a C Program to display the given number is Adam number or not. 6. Write a C Program to print reverse of the given number and string. 7. Write a C Program to find minimum and maximum of 'n' numbers using array. 8. Write a C Program to arrange the given number in ascending order. 9. Write a C Program to add and multiply two matrices. 10. Write a C Program to calculate NCR and NPR.
Group B	1. Write a C Program to find the grade of a student using else if ladder. 2. Write a C Program to implement the various string handling function. 3. Write a C Program to create an integer file and displaying the even numbers only. 4. Write a C Program to calculate quadratic equation using switch-case. 5. Write a C Program to count number of characters, words and lines in a text file. 6. Write a C Program to generate student mark list using array of structures. 7. Write a C Program to create and process the student mark list using file 8. Write a C Program to create and process pay bill using file 9. Write a C Program to create and process inventory control using file 10. Write a C Program to create and process electricity bill using file

Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
1	Remember the program structure of C with its syntax and semantics	PO1,PO3,PO5
2	Understand the programming principles in C (data	PO2,PO3,PO6

	types, operators, branching and looping, arrays, functions, structures, pointers and files)	
3	Apply the programming principles learnt in real-time problems	PO3,PO4
4	Analyze the various methods of solving a problem and choose the best method	PO4,PO5,PO6
5	Code, debug and test the programs with appropriate test cases	PO4,PO6

Text Book	
1	E. Balagurusamy, Programming in ANSI C, Fifth Edition, Tata McGraw-Hill, 2010.

Reference Books	
1.	Byron Gottfried, Schaum's Outline Programming with C, Fourth Edition, Tata McGraw-Hill, 2018.
2.	Kernighan and Ritchie, The C Programming Language, Second Edition, Prentice Hall, 1998
3.	YashavantKanetkar, Let Us C, Eighteenth Edition, BPB Publications,2021

Web Resources	
1.	https://codeforwin.org/
2.	https://www.geeksforgeeks.org/c-programming-language/
3.	http://en.cppreference.com/w/c
4.	http://learn-c.org/
5.	https://www.cprogramming.com/

SKILL ENHANCEMENT COURSE

Subject Code	Subject Name	Category	L	T	P	S	Inst. hours	Credits	Marks		
									CIA	External	Total
23BCE1S1	**Fundamentals of Information Technology**	(SEC-I)	2	-	-	-	2	2	25	75	100

	Learning Objectives	

LO1		Understand basic concepts and terminology of information technology.
LO2		Have a basic understanding of personal computers and their operation
LO3		Be able to identify data storage and its usage
LO4		Get great knowledge of software and its functionalities
LO5		Understand about operating system and their uses
	Contents	

Unit I	**Introduction to Computers:** Introduction, Definition, .Characteristics of computer, Evolution of Computer, Block Diagram Of a computer, Generations of Computer, Classification Of Computers, Applications of Computer, Capabilities and limitations of computer
Unit II	**Basic Computer Organization:** Role of I/O devices in a computer system. Input Units: Keyboard, Terminals and its types. Pointing Devices, Scanners and its types, Voice Recognition Systems, Vision Input System, Touch Screen, Output Units: Monitors and its types. Printers: Impact Printers and its types. Non Impact Printers and its types, Plotters, types of plotters, Sound cards, Speakers.
Unit III	**Storage Fundamentals:** Primary Vs Secondary Storage, Data storage & retrieval methods. Primary Storage: RAM ROM, PROM, EPROM, EEPROM. Secondary Storage: Magnetic Tapes, Magnetic Disks. Cartridge tape, hard disks, Floppy disks Optical Disks, Compact Disks, Zip Drive, Flash Drives
Unit IV	**Software:** Software and its needs, Types of S/W. System Software: Operating System, Utility Programs Programming Language: Machine Language, Assembly Language, High Level Language their advantages & disadvantages. Application S/W and its types: Word Processing, Spread Sheets Presentation, Graphics, DBMS s/w
Unit V	**Operating System:** Functions, Measuring System Performance, Assemblers, Compilers and Interpreters.Batch Processing, Multiprogramming, Multi Tasking, Multiprocessing, Time Sharing, DOS, Windows, Unix/Linux.

	Course Outcomes	**Programme Outcomes**
CO	On completion of this course, students will	
CO1	Learn the basics of computer, Construct the structure of the required things in computer, learn how to use it.	PO1, PO2, PO3, PO4, PO5, PO6
CO2	Develop organizational structure using for the devices present currently	PO1, PO2,

		under input or output unit.	PO3, PO4, PO5, PO6
CO3		Concept of storing data in computer using two header namely RAM and ROM with different types of ROM with advancement in storage basis.	PO1, PO2, PO3, PO4, PO5, PO6
CO4		Work with different software, Write program in the software and applications of software.	PO1, PO2, PO3, PO4, PO5, PO6
CO5		Usage of Operating system in information technology which really acts as a interpreter between software and hardware.	PO1, PO2, PO3, PO4, PO5, PO6

	Textbooks	
1		Anoop Mathew, S. KavithaMurugeshan (2009), " Fundamental of Information Technology", Majestic Books.
2		Alexis Leon, Mathews Leon," Fundamental of Information Technology", 2nd Edition.
3		S. K Bansal, "Fundamental of Information Technology".

	Reference Books	
1.		BhardwajSushilPuneet Kumar, "Fundamental of Information Technology"
2.		GG WILKINSON, "Fundamentals of Information Technology", Wiley-Blackwell
3.		A Ravichandran , "Fundamentals of Information Technology", Khanna Book Publishing

	Web Resources	
1.		https://testbook.com/learn/computer-fundamentals
2.		https://www.tutorialsmate.com/2020/04/computer-fundamentals-tutorial.html
3.		https://www.javatpoint.com/computer-fundamentals-tutorial
4.		https://www.tutorialspoint.com/computer_fundamentals/index.htm
5.		https://www.nios.ac.in/media/documents/sec229new/Lesson1.pdf

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
23BCE1FC	**Problem Solving Techniques**	FC	2	-	-	-	2	2	25	75	100

	Learning Objectives
LO1	Familiarize with writing of algorithms, fundamentals of C and philosophy of problem solving.
LO2	Implement different programming constructs and decomposition of problems into functions.
LO3	Use data flow diagram, Pseudo code to implement solutions.
LO4	Define and use of arrays with simple applications
LO5	Understand about operating system and their uses

	Contents	
UNIT I	**Introduction:** History, characteristics and limitations of Computer. Hardware/Anatomy of Computer: CPU, Memory, Secondary storage devices, Input Devices and Output devices. Types of Computers: PC, Workstation, Minicomputer, Main frame and Supercomputer. Software: System software and Application software. **Programming Languages:** Machine language, Assembly language, High-level language,4 GL and 5GL-Features of good programming language. Translators: Interpreters and Compilers.	
UNIT II	**Data:** Data types, Input, Processing of data, Arithmetic Operators, Hierarchy of operations and Output. Different phases in Program Development Cycle (PDC).**Structured Programming: Algorithm:** Features of good algorithm, Benefits and drawbacks of algorithm. **Flowcharts:** Advantages and limitations of flowcharts, when to use flowcharts, flowchart symbols and types of flowcharts.**Pseudocode:** Writing a pseudocode. Coding, documenting and testing a program: Comment lines and types of errors. **Program design:** Modular Programming.	
UNIT III	**Selection Structures:** Relational and Logical Operators -Selecting from Several Alternatives – Applications of Selection Structures. **Repetition Structures:** Counter Controlled Loops –Nested Loops– Applications of Repetition Structures.	
UNIT IV	**Data:** Numeric Data and Character Based Data. **Arrays:** One Dimensional Array - Two Dimensional Arrays – Strings as Arrays of Characters.	
UNIT V	**Data Flow Diagrams:** Definition, DFD symbols and types of DFDs. **Program Modules:** Subprograms-Value and Reference parameters- Scope of a variable - Functions – Recursion. **Files:** File Basics-Creating and reading a sequential file- Modifying Sequential Files.	

Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	

CO1	Study the basic knowledge of Computers. Analyze the programming languages.	PO1, PO2, PO3, PO4, PO5, PO6
CO2	Study the data types and arithmetic operations. Know about the algorithms. Develop program using flow chart and pseudocode.	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Determine the various operators. Explain about the structures. Illustrate the concept of Loops	PO1, PO2, PO3, PO4, PO5, PO6
CO4	Study about Numeric data and character-based data. Analyze about Arrays.	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Explain about DFD Illustrate program modules. Creating and reading Files	PO1, PO2, PO3, PO4, PO5, PO6

	Textbooks
1	**Stewart Venit,** "Introduction to Programming: Concepts and Design", Fourth Edition, 2010, Dream Tech Publishers.

	Web Resources
1.	https://www.codesansar.com/computer-basics/problem-solving-using-computer.htm
2.	http://www.nptel.iitm.ac.in/video.php?subjectId=106102067
3.	http://utubersity.com/?page_id=876

SECOND YEAR
SEMESTER II

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
23BCE2C1	**OBJECT ORIENTED PROGRAMMING CONCEPTS USING C++**	Core-III	5	-	-	-	4	5	25	75	100
	Learning Objective										
LO1	Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects										
LO2	Understand dynamic memory management techniques using pointers, constructors, destructors, etc										
LO3	Describe the concept of function overloading, operator overloading, virtual functions and polymorphism										
LO4	Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming										
LO5	Demonstrate the use of various OOPs concepts with the help of programs										

	Contents	**No. of Hours**
UNIT I	Introduction to C++ - key concepts of Object-Oriented Programming – Advantages – Object Oriented Languages – I/O in C++ - C++ Declarations. Control Structures : - Decision Making and Statements : If ..else, jump, goto, break, continue, Switch case statements - Loops in C++ :for, while, do - functions in C++ - inline functions – Function Overloading.	15
UNIT II	Classes and Objects: Declaring Objects – Defining Member Functions – Static Member variables and functions – array of objects –friend functions – Overloading member functions – Bit fields and classes – Constructor and destructor with static members.	15
UNIT III	Operator Overloading: Overloading unary, binary operators – Overloading Friend functions –type conversion – Inheritance: Types of Inheritance – Single, Multilevel, Multiple, Hierarchal, Hybrid, Multi path inheritance – Virtual base Classes – Abstract Classes.	15
UNIT IV	Pointers – Declaration – Pointer to Class , Object – this pointer – Pointers to derived classes and Base classes – Arrays – Characteristics – array of classes – Memory models – new and delete operators – dynamic object – Binding, Polymorphism and Virtual Functions.	15
UNIT V	Files – File stream classes – file modes – Sequential Read / Write operations – Binary and ASCII Files – Random Access Operation – Templates – Exception Handling - String – Declaring and Initializing string objects – String Attributes – Miscellaneous functions.	15
	Total	**75**

	Course Outcomes	**Programme Outcome**
CO	Upon completion of the course the students would be able to:	
1	Remember the program structure of C with its syntax and	PO1,PO6

	semantics	
2	Understand the programming principles in C (data types, operators, branching and looping, arrays, functions, structures, pointers and files)	PO2
3	Apply the programming principles learnt in real-time problems	PO4 ,PO5
4	Analyze the various methods of solving a problem and choose the best method	PO6
5	Code, debug and test the programs with appropriate test cases	PO3,PO6
Text Book		
1	E. Balagurusamy, "Object-Oriented Programming with C++", TMH 2013, 7th Edition.	
Reference Books		
1.	Ashok N Kamthane, "Object-Oriented Programming with ANSI and Turbo C++", Pearson Education 2003.	
2.	Maria Litvin& Gray Litvin, "C++ for you", Vikas publication 2002.	
Web Resources		
1.	https://alison.com/course/introduction-to-c-plus-plus-programming	

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	3
CO 2	3	3	3	2	3	3
CO 3	3	2	2	2	3	2
CO 4	3	3	3	3	2	3
CO 5	3	2	3	2	3	3
Weight age of course contributed to each PSO	15	13	14	12	14	14

S-Strong-3   M-Medium-2   L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	CIA	External	Total
									Marks		
23BCE2P1	**OBJECT ORIENTED PROGRAMMING CONCEPTS USING C++LAB**	Core Practical-II	-	-	4	-	4	4	25	75	100

Course Objective	
C1	Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects
C2	Understand dynamic memory management techniques using pointers, constructors, destructors, etc
C3	Describe the concept of function overloading, operator overloading, virtual functions and polymorphism
C4	Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming
C5	Demonstrate the use of various OOPs concepts with the help of programs

S.No	List of Excercises	No. of Hours
1	Write a C++ program to demonstrate function overloading, Default Arguments and Inlinefunction.	
2	Write a C++ program to demonstrate Class and Objects	
3	Write a C++ program to demonstrate the concept of Passing Objects to Functions	
4	Write a C++ program to demonstrate the Friend Functions.	
5	Write a C++ program to demonstrate the use of "this" pointer.	
6	Write a C++ program to demonstrate Constructor and Destructor	
7	Write a C++ program to demonstrate Unary Operator Overloading	
8	Write a C++ program to demonstrate Binary Operator Overloading	
9	Write a C++ program to demonstrate Single Inheritance	
10	Write a C++ program to demonstrate Multilevel Inheritance	
11	Write a C++ program to demonstrate Multiple Inheritance	
12	Write a C++ program to demonstrate Hierarchical Inheritance	
13	Write a C++ program for Hybrid Inheritance	
14	Write a C++ program to demonstrate Virtual Functions.	
15	Write a C++ program to manipulate a Text File.	60
16	Write a C++ program to perform Sequential I/O Operations on a file.	
17	Write a C++ program to find the Biggest Number using Command Line Arguments	
18	Write a C++ program to demonstrate Class Template	
19	Write a C++ program to demonstrate Function Template.	
20	Write a C++ program to demonstrate Exception Handling.	

Course Outcomes		Programme Outcome
CO	Upon completion of the course the students would be able to:	
1	Remember the program structure of C with its syntax and semantics	PO4,PO5

2	Understand the programming principles in C (data types, operators, branching and looping, arrays, functions, structures, pointers and files)	PO6
3	Apply the programming principles learnt in real-time problems	PO4 ,PO5
4	Analyze the various methods of solving a problem and choose the best method	PO6
5	Code, debug and test the programs with appropriate test cases	PO4,PO5

Text Book	
1	E. Balagurusamy, "Object-Oriented Programming with C++", TMH 2013, 7th Edition.

Reference Books	
1.	Ashok N Kamthane, "Object-Oriented Programming with ANSI and Turbo C++", Pearson Education 2003.
2.	Maria Litvin& Gray Litvin, "C++ for you", Vikas publication 2002.

Web Resources	
1.	https://alison.com/course/introduction-to-c-plus-plus-programming

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	3
CO 2	3	2	3	3	2	3
CO 3	3	3	3	3	3	3
CO 4	3	2	2	3	3	3
CO 5	3	2	3	3	3	2
Weightage of course contributed to each PSO	15	12	14	15	14	14

S-Strong-3   M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	CIA	External	Total
										Marks	
23BCE2S1	OFFICE AUTOMATION	Skill Enha. Course (SEC-II)	2	-	-	-	2	2	25	75	100

	Learning Objectives	
LO1	Understand the basics of computer systems and its components.	
LO2	Understand and apply the basic concepts of a word processing package.	
LO3	Understand and apply the basic concepts of electronic spreadsheet software.	
LO4	Understand and apply the basic concepts of database management system.	
LO5	Understand and create a presentation using PowerPoint tool.	

	Contents	No. of Hours
UNIT I	**Word Processing:** Open, Save and close word document; Editing text – tools, formatting, bullets; Spell Checker.	6
UNIT II	**Document formatting** : Paragraph alignment, indentation, headers and footers, numbering; printing–Preview, options, merge.	6
UNIT III	**Spreadsheets:** Excel– opening, entering text and data, formatting, navigating; Formulas – entering, handling and copying; Charts–creating, formatting and printing	6
UNIT IV	**Ms-Access :** Data field, records, and files, Creating Tables, Sorting and indexing data; Searching records. Designing queries, and reports;	6
UNIT V	**Power point:** Introduction to Power point - Features – Understanding slide typecasting & viewing slides – creating slide shows. Applying special object – including objects & pictures – Slide transition– Animation effects, audio inclusion, timers.	6
	Total	**30**

Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
CO1	Possess the knowledge on the basics of computers and its components	PO1,PO2,PO3, PO6,PO8
CO2	Gain knowledge on Creating Documents, spreadsheet and presentation.	PO1,PO2,PO3, PO6
CO3	Learn the concepts of Database and implement the Query in Database.	PO3,PO5,PO7
CO4	Demonstrate the understanding of different automation tools.	PO3,PO4,PO5, PO7
CO5	Utilize the automation tools for documentation, calculation and presentation purpose.	PO4,PO6,PO7, PO8

	Text Book
1	PeterNorton,"IntroductiontoComputers"–TataMcGraw-Hill.

	Reference Books
1.	Jennifer Ackerman Kettel, Guy Hat-Davis, Curt Simmons, "Microsoft 2003", Tata

	McGrawHill.
	Web Resources
1.	https://www.udemy.com/course/office-automation-certificate-course/
2.	https://www.javatpoint.com/automation-tools

Mapping with Programme Outcomes:

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	2	3	3	2
CO2	3	3	2	3	3	2
CO3	3	3	3	3	3	2
CO4	3	3	2	3	3	2
CO5	3	3	2	3	3	2
Weightage of course contributed to each PSO	15	14	11	15	15	10

S-Strong-3   M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	CIA	External	Total
								Marks		
23BCE2S2	**INTRODUCTION TO HTML**	Skill Enha. Course (SEC-III)	2	-	-		2	25	75	100

<div align="center">Learning Objectives</div>

LO1	Insert a graphic within a web page.
LO2	Create a link within a web page.
LO3	Create a table within a web page.
LO4	Insert heading levels within a web page.
LO5	Insert ordered and unordered lists within a web page. Create a web page.

	Contents	**No. Of. Hours**
UNIT I	Introduction : Web Basics: What is Internet–Web browser –What is Webpage – HTML Basics :Understanding tags.	6
UNIT II	Tags for Document structure (HTML, Head, BodyTag). Block level text elements: Headings paragraph(<p> tag) – Font style elements:(bold, italic, font, small, strong, strike, big tags)	6
UNIT III	Lists: Types of lists: Ordered, Unordered– Nesting Lists – Other tags: Marquee, HR, BR-Using Images –Creating Hyperlinks.	6
UNIT IV	Tables: Creating basic Table, Table elements, Caption –Table and cell alignment – Rowspan, Colspan – Cell padding. Frames: Frameset– Targeted Links – No frame	6
UNIT V	Forms: Input, Text area, Select, Option – button – label – field set - legend	6
	TOTAL HOURS	30

Course Outcomes		**Programme Outcomes**
CO	On completion of this course, students will	
CO1	Knows the basic concept in HTML Concept of resources in HTML	PO1, PO2, PO3, PO4, PO5, PO6
CO2	Knows Design concept. Concept of Meta Data Understand the concept of save the files.	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Understand the page formatting. Concept of list	PO1, PO2, PO3, PO4, PO5, PO6
CO4	Creating Links. Know the concept of creating link to email address	PO1, PO2, PO3, PO4, PO5, PO6
	Concept of adding images	PO1, PO2, PO3,

CO5	Understand the table creation.	PO4, PO5, PO6

Textbooks

1	"Mastering HTML5 and CSS3 Made Easy", TeachUComp Inc., 2014.
2	**Thomas Michaud, "Foundations of Web Design: Introduction to HTML & CSS"**

Web Resources

1.	https://www.teachucomp.com/samples/html/5/manuals/Mastering-HTML5-CSS3.pdf
2.	https://www.w3schools.com/html/default.asp

Mapping with Programme Outcomes:

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	2	3	3	2
CO2	3	3	2	3	3	2
CO3	3	3	3	3	3	2
CO4	3	3	2	3	3	2
CO5	3	3	2	3	3	2
Weightage of course contributed to each PSO	15	14	11	15	15	10

S-Strong-3   M-Medium-2 L-Low-1

Semester III

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	CIA	External	Total
									Marks		
23BCE3 C1	DATA STRUCTURE AND ALGORITHMS	Core-V	5	-	-	-	4	5	25	75	100

	Learning Objectives
LO1	To understand the concepts of ADTs
LO2	To learn linear data structures-lists, stacks, queues
LO3	To learn Tree structures and application of trees
LO4	To learn graph strutures and and application of graphs
LO5	To understand various sorting and searching

	Contents	No. of Hours
UNIT I	Introduction: Basic Terminology - Classification of Data Structures - Operations on Data Structures - Abstract Data Type – Algorithms - Time and Space Complexity - Asymptotic Notation. Arrays: Introduction to Array - Declaration of Arrays - Accessing the Elements of an Array - Operations on Arrays - Sparse Matrices – Application of Arrays.	15
UNIT II	Linked List: Introduction Basic Terminologies - Singly Linked Lists - Circular Linked Lists - Doubly Linked Lists - Circular Doubly Linked Lists - Applications of Linked Lists	15
UNIT III	Stack: Introduction to Stacks - Array Representation of Stacks - Operations on a Stack - Linked Representation of Stacks -Operations on a Linked Stack - Applications of Stacks. Queues: Introduction to ueues - Array Representation of Queues - Linked Representation of Queues - Types of Queues - Applications of Queues.	15
UNIT IV	Trees: Introduction - Types of Trees - Creating a Binary Tree from a General Tree - Traversing a Binary Tree - Huffman's Tree - Applications of Trees. Efficient Binary Trees: Binary Search Trees - Operations on Binary Search Trees: Searching for a Node in a Binary Search Tree - Inserting a New Node in a Binary Search Tree - Deleting a Node from a Binary Search Tree - Threaded Binary Trees - AVL Trees. Heaps: Binary Heaps - Applications of Heaps. Graphs: Introduction - Graph Terminology - Representation of Graphs - Graph Traversal Algorithms	15
UNIT V	Searching: Introduction to Searching - Linear Search - Binary Search Sorting: Introduction to Sorting - Bubble Sort - Insertion Sort - Selection Sort - Merge Sort - Quick Sort - Radix Sort - Heap Sort - Shell Sort -Tree Sort - Comparison of Sorting Algorithms - External Sorting	15
	Total	75

Course Outcomes		Programmeme Outcome
CO	On completion of this course, students will	
CO1	Understand the concept of Dynamic memory management, data types, algorithms, Big O notation	PO1,PO6

CO2	Understand basic data structures such as arrays, linked lists, stacks and queues	PO2
CO3	Describe the hash function and concepts of collision and its resolution methods	PO2,PO4
CO4	Solve problem involving graphs, trees and heaps	PO4,PO6
CO5	Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data	PO5,PO6
Text Book		
1	1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Pearson Education 2014, 4th Edition.	
2	ReemaThareja, "Data Structures Using C", Oxford Universities Press 2014, 2nd Edition	
Reference Books		
1.	Thomas H.Cormen,ChalesE.Leiserson,RonaldL.Rivest, Clifford Stein, "Introduction to Algorithms", McGraw Hill 2009, 3rd Edition.	
2.	Aho, Hopcroft and Ullman, "Data Structures and Algorithms", Pearson Education 2003	
Web Resources		
1.	https://www.programiz.com/dsa	
2.	https://www.geeksforgeeks.org/learn-data-structures-and-algorithms-dsa-tutorial/	

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	3
CO 2	3	3	1	3	3	3
CO 3	3	3	3	2	3	2
CO 4	3	2	3	2	3	3
CO 5	3	3	3	3	3	3
Weightage of course contributed to each PSO	15	14	13	13	15	14

S-Strong-3   M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	CIA	External	Total
									Marks		
23BCE3P1	**DATA STRUCTURE AND ALGORITHMS LAB** [Note: Practicals may be offered through C++]	Core Practical -III	-	-	4	-	4	4	25	75	100

	Learning Objectives
LO1	To understand the concepts of ADTs
LO2	To learn linear data structures-lists, stacks, queues
LO3	To learn Tree structures and application of trees
LO4	To learn graph strutures and and application of graphs
LO5	To understand various sorting and searching

Sl. No	Contents	No. of Hours
1.	Write a C++ program to implement the List ADT using arrays and linked lists.	
2.	Write a C++ program to implement Stack ADT	
3.	Write a C++ program to implement Queue ADT	
4.	Write a C++ program that reads an infix expression, converts the expression to postfix form and then evaluates the postfix expression (use stack ADT).	
5.	Write a C++ program to implement priority queue ADT.	
6.	Write a program to perform the following operations: • Insert an element into a binary search tree. • Delete an element from a binary search tree. • Search for a key element in a binary search tree.	**60**
7.	Write a program to perform the following operations i)Insertion into an AVL-tree ii) Deletion from an AVL-tree	
8.	Write a C++ program for the implementation of BFS and DFS for a given graph.	
9	Write a C++ program for implementing Linear search	
10	Write a C++ program for implementing Binary search.	
11.	Write a C++ program for implementing Bubble sort	
12	Write a C++ program for implementing Selection sort	
13	Write a C++ program for implementing Insertion sort	
14	Write a C++ program for implementing Radix sort.	
	Total	

	Course Outcomes	Programmem Outcome
CO	On completion of this course, students will	
1	Understand the concept of Dynamic memory management, data types, algorithms, Big O notation	PO1,PO4,PO5
2	Understand basic data structures such as arrays, linked lists, stacks and queues	PO1, PO4,PO6

3	Describe the hash function and concepts of collision and its resolution methods	PO1,PO3,PO6
4	Solve problem involving graphs, trees and heaps	PO3,PO4
5	Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data	PO1,PO5,PO6

Text Book		
1	Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Pearson Education 2014, 4th Edition.	
2	ReemaThareja, "Data Structures Using C", Oxford Universities Press 2014, 2nd Edition	

Reference Books		
1	Thomas H.Cormen,ChalesE.Leiserson,RonaldL.Rivest, Clifford Stein, "Introduction to Algorithms", McGraw Hill 2009, 3rd Edition	
2.	Aho, Hopcroft and Ullman, "Data Structures and Algorithms", Pearson Education 2003	

Web Resources		
1.	https://www.programiz.com/dsa	
2.	https://www.geeksforgeeks.org/learn-data-structures-and-algorithms-dsa-tutorial/	

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	3
CO 2	3	3	1	3	2	3
CO 3	3	3	3	3	2	3
CO 4	3	3	3	3	2	3
CO 5	3	2	3	3	3	3
Weightage of course contributed to each PSO	15	15	13	15	13	15

S-Strong-3   M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst.	CIA	External	Total
									Marks		
23BCE3S1	**WEB DESIGNING**	(SEC-IV)	2	-	-	-	2	2	25	75	100

Learning Objectives	
LO1	Understand the basics of HTML and its components
LO2	To study about the Graphics in HTML
LO3	Understand and apply the concepts of XML and DHTML
LO4	Understand the concept of JavaScript
LO5	To identify and understand the goals and objectives of the Ajax

	Details	No. of Hours
UNIT I	XML & DHTML: Cascading style sheet (CSS)-what is CSS-Why we use CSS-adding CSS to your web pages-Grouping styles-extensible markup language (XML).	6
UNIT II	Concept of CSS - Creating Style Sheet - CSS Properties - CSS Styling (Background, Text Format, Controlling Fonts) - Working with block elements and objects - Working with Lists and Tables - CSS Id and Class - Box Model (Introduction, Border properties, Padding Properties, Margin - properties) Navigation Bar - CSS Color - Creating page Layout and Site Design	6
UNIT III	Dynamic HTML: Document object model (DCOM)-Accessing HTML & CSS through DCOM Dynamic content styles & positioning-Event bubbling-data binding.	6
UNIT IV	JavaScript: Client-side scripting, What is JavaScript, How to develop JavaScript, simple JavaScript, variables, functions, conditions, loops and repetition	6
UNIT V	Advance script, JavaScript and objects, JavaScript own objects, the DOM and web browser environments, forms and validations.	6
\multicolumn{2}{c}{**Total**}	**30**

Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
CO1	Develop working knowledge of CSS	PO1, PO3, PO6, PO8
CO2	Ability to Develop and publish Web pages using DHTML.	PO1,PO2,PO3,PO6
CO3	Ability to optimize page styles and layout with Cascading Style Sheets (CSS).	PO3, PO5

CO4	Ability to develop a java script	PO1, PO2, PO3, PO7
CO5	An ability to develop web application using Ajax.	P02, PO6, PO7
Text Book		
1	Pankaj Sharma, "Web Technology", SkKataria& Sons Bangalore 2011.	
2	Mike Mcgrath, "Java Script", Dream Tech Press 2006, 1st Edition.	
3	Achyut S Godbole&AtulKahate, "Web Technologies", 2002, 2nd Edition.	
Reference Books		
1.	Laura Lemay, RafeColburn , Jennifer Kyrnin, "Mastering HTML, CSS &Javascript Web Publishing", 2016.	
2.	DT Editorial Services (Author), "HTML 5 Black Book (Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery)", Paperback 2016, 2nd Edition.	
Web Resources		
1.	NPTEL & MOOC courses titled Web Design and Development.	
2.	https://www.geeksforgeeks.org	

Mapping with Programme Outcomes:

MAPPING TABLE						
CO/ PSO	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**
CO1	3	2	1	2	1	2
CO2	3	3	2	2	3	3
CO3	3	3	2	3	3	2
CO4	3	2	3	2	2	3
CO5	3	2	2	2	3	3
Weightage of course contributed to each PSO	15	12	10	11	12	13

S-Strong-3   M-Medium-2   L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
23BCE3S2	**Multimedia Systems**	(SEC-V)	2	-	-	-	2	2	25	75	100

	Learning Objectives
LO1	Understand the definition of Multimedia
LO2	To study about the Image File Formats, SoundsAudio File Formats
LO3	Understand the concepts of Animation and Digital Video Containers
LO4	To study about the Stage of Multimedia Project
LO5	Understand the concept of Ownership of Content Created for Project Acquiring Talent

	Contents	**No. of Hours**	**Course Objective**
UNIT I	Multimedia Definition-Use Of Multimedia-Delivering Multimedia- Text: About Fonts and Faces - Using Text in Multimedia -Computers and Text Font Editing and Design Tools-Hypermedia and Hypertext.	6	
UNIT II	Images: Plan Approach - Organize Tools - Configure Computer Workspace -Making Still Images - Color - Image File Formats. Sound: The Power of Sound – Digital Audio-MidiAudio-Midivs.	6	
UNIT III	DigitalAudio-Multimedia System SoundsAudio File Formats -Vaughan's Law of Multimedia Minimums - Adding Sound to Multimedia Project.	6	
UNIT IV	Animation: The Power of Motion-Principles of Animation-Animation by Computer - Making Animations that Work. Video: Using Video - Working with Video and Displays-Digital Video Containers-Obtaining Video Clips -Shooting and Editing Video.	6	
UNIT V	Making Multimedia: The Stage of Multimedia Project - The Intangible Needs -The Hardware Needs - The Software Needs - An Authoring Systems Needs-Multimedia Production Team.	6	
	Total	**30**	

Course Outcomes		**Programme Outcomes**
CO	On completion of this course, students will	
CO1	understand the concepts, importance, application and the process of developing multimedia	PO1
CO2	to have basic knowledge and understanding about image related processings	PO1, PO2
CO3	To understand the framework of frames and bit images to animations	PO4, PO6
CO4	Speaks about the multimedia projects and stages of requirement in phases of project.	PO4, PO5, PO6

CO5	Understanding the concept of cost involved in multimedia planning, designing, and producing	PO3, PO6

Text Book	
1	TayVaughan,"Multimedia:MakingItWork",8thEdition,Osborne/McGraw-Hill,2001.

Reference Books	
1.	RalfSteinmetz&KlaraNahrstedt"MultimediaComputing,Communication&Applications",PearsonEducation,2012.

Web Resources	
1.	https://www.geeksforgeeks.org/multimedia-systems-with-features-or-characteristics/

Mapping with Programme Outcomes:

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	2	2	3	3	3	2
CO2	2	3	2	3	2	1
CO3	1	2	3	3	3	2
CO4	3	2	2	2	1	2
CO5	2	3	1	3	3	3
Weightage of course contributed to each PSO	10	12	11	14	12	10

Strong-3   M-Medium-2   L-Low-1

SEMESTER IV

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	Ext	Total
23BCE4C1	**Java Programming**	Core -VII	4	-	-	-	4	4	25	75	100

	Learning Objectives
LO1	To provide fundamental knowledge of object-oriented programming
LO2	To equip the student with programming knowledge in Core Java from the basics up.
LO3	To enable the students to use AWT controls, Event Handling and Swing for GUI.
LO4	To provide fundamental knowledge of object-oriented programming.
LO5	To equip the student with programming knowledge in Core Java from the basics up.

	Contents	**No. of Hours**
UNIT I	**Introduction:** Review of Object Oriented concepts – History of Java – Java buzzwords – JVM architecture – Data types - Variables - Scope and life time of variables - arrays - operators – control statements - type conversion and casting - simple java program - constructors - methods - Static block - Static Data – Static Method String and String Buffer Classes.	12
UNIT II	**Inheritance**: Basic concepts - Types of inheritance - Member access rules - Usage of this and Super key word - Method Overloading - Method overriding - Abstract classes - Dynamic method dispatch - Usage of final keyword. **Packages**: Definition – Access Protection – Importing Packages. **Interfaces**: Definition – Implementation – Extending Interfaces. **Exception Handling**: *try – catch- throw - throws – finally* – Built-inexceptions - Creating own Exception classes.	12
UNIT III	**Multithreaded Programming**: Thread Class - Runnable interface – Synchronization–Using synchronized methods– Using synchronized statement- Inter thread Communication –Deadlock. **I/O Streams:** Concepts of streams - Stream classes- Byte and Character stream - Reading console Input and Writing Console output - File Handling.	12
UNIT IV	**AWT Controls:** The AWT class hierarchy - user interface components- Labels - Button - Text Components - Check Box - Check Box Group - Choice - List Box - Panels – Scroll Pane - Menu - Scroll Bar. Working with Frame class - Colour - Fonts and layout managers. **Event Handling:** Events - Event sources - Event Listeners - Event Delegation Model (EDM) - Handling Mouse and Keyboard Events - Adapter classes - Inner classes	12
UNIT V	**Swing:** Introduction to Swing - Hierarchy of swing components. Containers - Top level containers - JFrame - JWindow - JDialog - JPanel - JButton - JToggleButton - JCheckBox - JRadioButton - JLabel,JTextField - JTextArea - JList - JComboBox - JScrollPane.	12
	Total	**60**

	Course Outcomes
Course Outcomes	On completion of this course, students will;

CO1	Understand the basic Object-oriented concepts.Implement the basic constructs of Core Java.	PO1, PO2, PO6
CO2	Implement inheritance, packages, interfaces and exception handling of Core Java.	PO2, PO3, PO8
CO3	Implement multi-threading and I/O Streams of Core Java	PO1, PO3, PO5
CO4	Implement AWT and Event handling.	PO2, PO6
CO5	Use Swing to create GUI.	PO1, PO3, PO6

Text Books:

1.	Herbert Schildt, The Complete Reference, Tata McGraw Hill, New Delhi, 7th Edition, 2010
2.	Gary Cornell, *Core Java 2 Volume I – Fundamentals,* Addison Wesley, 1999

References :

1.	Head First Java, O'Rielly Publications,
2.	Y. Daniel Liang, *Introduction to Java Programming*, 7th Edition, Pearson Education India, 2010

Web Resources	
1.	https://javabeginnerstutorial.com/core-java-tutorial
2.	http://docs.oracle.com/javase/tutorial/
3.	https://www.coursera.org/

Mapping with Programme Outcomes:

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	3	3	3	3	2
CO2	3	3	3	2	2	3
CO3	2	2	1	3	3	3
CO4	3	3	3	3	3	2
CO5	3	3	3	3	3	1
Weightage of course contributed to each PSO	14	14	13	14	14	11

S-Strong-3   M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst.	Marks		
									CIA	External	Total
23BCE4P1	**Java Programming Lab**	Core Practical-IV	-	-	4	-	3	4	25	75	100

Learning Objectives	
LO1	To provide fundamental knowledge of object-oriented programming.
LO2	To equip the student with programming knowledge in Core Java from the basics up.
LO3	To enable the students to know about Event Handling .
LO4	To enable the students to use String Concepts.
LO5	To equip the student with programming knowledge in to creat GUI using AWT controls.

Sl.No.	Details	Total No. of Hours
1	Write a Java program that prompts the user for an integer and then prints out all the prime numbers up to that Integer	
2	Write a Java program to multiply two given matrices.	
3	Write a Java program that displays the number of characters, lines and words in a text	
4	Generate random numbers between two given limits using Random class and print messages according to the range of the value generated.	

5	Write a program to do String Manipulation using CharacterArray and perform the following string operations:
	  a. String length
	  b. Finding a character at a particular position
	  c. Concatenating two strings	

6	Write a program to perform the following string operations using String class:
	  a. String Concatenation
	  b. Search a substring
	  c. To extract substring from given string	

7	Write a program to perform string operations using String Buffer class:
	  a. Length of a string
	  b. Reverse a string
	  c. Delete a substring from the given string	

8	Write a java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.	
9	Write a threading program which uses the same method asynchronously to print the numbers 1to10 using Thread1 and to print 90 to100 using Thread2.	

10	Write a program to demonstrate the use of following exceptions.
	  a. Arithmetic Exception
	  b. Number Format Exception
	  c. ArrayIndexOutofBoundException
	  d. NegativeArraySizeException	

11	Write a Java program that reads on file name from the user, then displays information about whether the file exists, whether the file is readable,	

	whether the file is writable, the type of file and the length of the file in bytes	
12	Write a program to accept a text and change its size and font. Include bold italic options. Use frames and controls.	
13	Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired. (Use adapter classes).	
14	Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,*, % operations. Add a text field to display the result. Handle any possible exceptions like divide by zero.	60
15	Write a Java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with "stop" or "ready" or "go" should appear above the buttons in a selected color. Initially there is no message shown.	
Total		**60**

	Course Outcomes	Programme Outcome
CO	On completion of this course, students will	
1	Understand the basic Object-oriented concepts.Implement the basic constructs of Core Java.	PO1
2	Implement inheritance, packages, interfaces and exception handling of Core Java.	PO1, PO2
3	Implement multi-threading and I/O Streams of Core Java	PO4, PO6
4	Implement AWT and Event handling.	PO4, PO5, PO6
5	Use Swing to create GUI.	PO3, PO6

Text Book	
1	Herbert Schildt, The Complete Reference, Tata McGraw Hill, New Delhi, 7th Edition, 2010.
2.	Gary Cornell, *Core Java 2 Volume I – Fundamentals,* Addison Wesley, 1999.

Reference Books	
1.	Head First Java, O'Rielly Publications,
2.	Y. Daniel Liang, *Introduction to Java Programming*, 7th Edition, Pearson Education India, 2010.

Web Resources	
1.	https://www.w3schools.com/java/
2.	http://java.sun.com
3.	http://www.afu.com/javafaq.html

Mapping with Programme Outcomes:

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	3	3	3	3	2
CO2	3	3	3	2	2	3
CO3	2	2	1	3	3	3
CO4	3	3	3	3	3	2
CO5	3	3	3	3	3	2
Weightage of course contributed to each PSO	14	14	13	14	14	12

S-Strong   M-Medium   L-Low

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
23BCE4 S1	**PHP PROGRAMMING**	Skill Enha. Course (SEC-VI)	2	-	-	-	2	2	25	75	100

Learn ing Objectives	
LO1	To provide the necessary knowledge on basics of PHP.
LO2	To design and develop dynamic, database-driven web applications using PHP version.
LO3	To get an experience on various web application development techniques.
LO4	To learn the necessary concepts for working with the files using PHP.
LO5	To get a knowledge on OOPS with PHP.

	Contents	No. of Hours
UNIT I	Introduction to PHP -Basic Knowledge of websites -Introduction of Dynamic Website -Introduction to PHP -Scope of PHP -XAMPP and WAMP Installation	6
UNIT II	PHP Programming Basics -Syntax of PHP -Embedding PHP in HTML -Embedding HTML in PHP. Introduction to PHP Variable -Understanding Data Types -Using Operators -Using Conditional Statements -If(), else if() and else if condition Statement.	6
UNIT III	Switch() Statements -Using the while() Loop -Using the for() Loop PHP Functions. PHP Functions -Creating an Array -Modifying Array Elements -Processing Arrays with Loops - Grouping Form Selections with Arrays -Using Array Functions.	6
UNIT IV	PHP Advanced Concepts -Reading and Writing Files -Reading Data from a File.	6
UNIT V	Managing Sessions and Using Session Variables -Destroying a Session -Storing Data in Cookies -Setting Cookies.	6
	Total	**30**

Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
CO1	Write PHP scripts to handle HTML forms	PO1,PO4,PO6
CO2	Write regular expressions including modifiers, operators, and metacharacters.	PO2,PO5,PO7.
CO3	Create PHP Program using the concept of array.	PO3,PO4,PO5.
CO4	Create PHP programs that use various PHP library functions	PO2,PO3,PO5
CO5	Manipulate files and directories.	PO3,PO5,PO6.

Text Book	
1	Head First PHP & MySQL: A Brain-Friendly Guide- 2009-Lynn mighley and Michael Morrison.
2	The Joy of PHP: A Beginner's Guide to Programming Interactive Web Applications with PHP and MySQL- Alan Forbes

Reference Books

1.	PHP: The Complete Reference-Steven Holzner.
2.	DT Editorial Services (Author), "*HTML 5 Black Book (Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery)*", Paperback 2016, 2ndEdition.

Web Resources	
1.	Opensource digital libraries: PHP Programming
2.	https://www.w3schools.com/php/default.asp

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	1	2	1	2
CO2	3	3	2	2	3	3
CO3	3	3	2	3	3	2
CO4	3	2	3	2	2	3
CO5	3	2	2	2	3	3
Weightage of course contributed to each PSO	15	12	10	11	12	13

S-Strong-3   M-Medium-2   L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	Ext	Total
23BCE 4S2	**Software Testing**	Skill Enha. Course (SEC-VII)	2	-	-	-	2	2	25	75	100

	Learning Objectives	
LO1	To study fundamental concepts in software testing	
LO2	To discuss various software testing issues and solutions in software unit test, integration and system testing.	
LO3	To study the basic concept of Data flow testing and Domain testing.	
LO4	To Acquire knowledge on path products and path expressions.	
LO5	To learn about Logic based testing and decision tables	

	Contents	No. of Hours
UNIT I	Introduction: Purpose–Productivity and Quality in Software–TestingVsDebugging–Model for Testing–Bugs–Types of Bugs – Testing and Design Style.	6
UNIT II	Flow / Graphs and Path Testing – Achievable paths – Path instrumentation Application Transaction FlowTesting Techniques.	6
UNIT III	Data Flow Testing Strategies - Domain Testing:Domains and Paths – Domains and Interface Testing.	6
UNIT IV	Linguistic –Metrics – Structural Metric – Path Products and Path Expressions.SyntaxTesting–Formats–Test Cases	6
UNIT V	Logic Based Testing–Decision Tables–Transition Testing–States, State Graph, StateTesting.	6
	Total	30

	Course Outcomes	Program Outcomes
CO	On completion of this course, students will	
CO1	Students learn to apply software testing knowledge and engineering methods	PO1
CO2	Have an ability to identify the needs of software test automation, and define and develop a test tool to support test automation.	PO1, PO2
CO3	Have an ability understand and identify various software testing problems, and solve these problems by designing and selecting software test models, criteria, strategies, and methods.	PO4, PO6
CO4	Have basic understanding and knowledge of contemporary issues in software testing, such as component-based software testing problems	PO4, PO5, PO6
CO5	Have an ability to use software testing methods and modern software testing tools for their testing projects.	PO3, PO8

	Text Book
1	B.Beizer,"SoftwareTestingTechniques",IIEdn.,DreamTechIndia,NewDelhi,2003.
2	K.V.K.Prasad,"SoftwareTestingTools",DreamTech.India,NewDelhi,2005

	Reference Books
1.	I.Burnstein,2003,"PracticalSoftwareTesting",SpringerInternationalEdn.
2.	E. Kit, 1995, "Software Testing in the Real World: Improving the

3.	Process", PearsonEducation,Delhi.
	R. Rajani,andP.P.Oak,2004,"SoftwareTesting",TataMcgrawHill,New Delhi.
Web Resources	
1.	https://www.javatpoint.com/software-testing-tutorial
2.	https://www.guru99.com/software-testing.html

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	1	2	1	2
CO2	3	3	2	2	3	3
CO3	3	3	2	3	3	2
CO4	3	2	3	2	2	3
CO5	3	2	2	2	3	3
Weightage of course contributed to each PSO	15	12	10	11	12	13

S-Strong-3   M-Medium-2   L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
23BCE5C1	Operating Systems	Core-IX	5	-	-	-	4	5	25	75	100

	Learning Objectives	
LO1	To know Basic Knowledge of Computer and its functions	
LO2	Understanding the design of the Operating System	
LO3	Imparting knowledge on CPU scheduling	
LO4	Understanding the concepts of Process and Memory Management.	
LO5	To code specialized programs for managing overall resources and operations of the computer.	

	Contents	No. of Hours
UNIT I	**Introduction**: operating system, history (1990s to 2000 and beyond), distributed computing, parallel computation. **Process concepts:** definition of process, process states-Life cycle of a process, process management- process state transitions, process control block(PCB), process operations , suspend and resume, context switching, Interrupts -Interrupt processing, interrupt classes, Inter process communication-signals, message passing.	15
UNIT II	**Asynchronous concurrent processes:** mutual exclusion-critical section, mutual exclusion primitives, implementing mutual exclusion primitives, Peterson's algorithm,software solutions to the mutual Exclusion Problem-, n-thread mutual exclusion- Lamports Bakery Algorithm. Semaphores – Mutual exclusion with Semaphores, thread synchronization with semaphores, counting semaphores, implementing semaphores. **Concurrent programming:** monitors, message passing	15
UNIT III	**Deadlock and indefinite postponement:** Resource concepts, four necessary conditions for deadlock, deadlock prevention, deadlock avoidance and Dijkstra's Banker's algorithm, deadlock detection, deadlock recovery	15
UNIT IV	**Job and processor scheduling:** scheduling levels, scheduling objectives, scheduling criteria, preemptive vs non-preemptive scheduling, interval timer or interrupting clock, priorities, scheduling algorithms- FIFO scheduling, RR scheduling, quantum size, SJF scheduling, SRT scheduling, HRN scheduling, multilevel feedback queues, Fair share scheduling	15
UNIT V	**Real Memory organization and Management**:: Memory organization, Memory management, Memory hierarchy, Memory management strategies, contiguous vs non-contiguous memory allocation, single user contiguous memory allocation, fixed partition multiprogramming, variable partition multiprogramming, Memory swapping **Virtual Memory organization:** virtual memory basic concepts, multilevel storage organization,	15

	block mapping, paging basic concepts, segmentation, paging/segmentation systems.	
	Total	**75**

Course Outcomes		Program Outcomes
CO	On completion of this course, students will	
CO1	Define the fundamentals of OS and identify the concepts relevant to process , process life cycle, Scheduling Algorithms, Deadlock and Memory management	PO1
CO2	know the critical analysis of process involving various algorithms, an exposure to threads and semaphores	PO1, PO2
CO3	Have a complete study about Deadlock and its impact over OS. Knowledge of handling Deadlock with respective algorithms and measures to retrieve from deadlock. .	PO4, PO6
CO4	Have complete knowledge of Scheduling Algorithms and its types.	PO4, PO5, PO6
CO5	understand memory organization and management	PO3, PO8

Text Book	
1	H.M. Deitel, Operating Systems, Third Edition, Pearson Education Asia, 2011

Reference Books	
1.	William Stallings, Operating System: Internals and Design Principles, Seventh Edition, Prentice-Hall of India, 2012.
2.	A. Silberschatz, and P.B. Galvin., Operating Systems Concepts, Nineth Edition, John Wiley &Sons(ASIA) Pte Ltd.,2012

Web Resources	
1.	Web resources from NDL Library, E-content from open-source libraries

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	CIA	External	Total
									Marks		
23BCE5C2	**Database Management System**	Core-X	5	-	-	-	4	5	25	75	100

	Learning Objectives
LO1	To enable the students to learn the designing of data base systems, foundation on the relational model of data and normal forms.
LO2	To understood the concepts of data base management system, design simple Database models
LO3	To learn and understand to write queries using SQL, PL/SQL.
LO4	To enable the students to learn the designing of data base systems, foundation on the relational model of data and normal forms.
LO5	To understood the concepts of data base management system, design simple Database models

	Contents	**No. of Hours**
UNIT I	**Database Concepts:**Database Systems - Data vs Information - Introducing the database -File system - Problems with file system – Database systems. Data models - Importance - Basic Building Blocks - Business rules - Evolution of Data models - Degrees of Data Abstraction	15
UNIT II	**Design Concepts:** Relational database model - logical view of data-keys -Integrity rules - relational set operators - data dictionary and the system catalog - relationships -data redundancy revisited -indexes - codd's rules. Entity relationship model - ER diagram	15
UNIT III	**Normalization of Database Tables**: Database tables and Normalization – The Need for Normalization –The Normalization Process – Higher level Normal Form. **Introduction to SQL**: Data Definition Commands – Data Manipulation Commands – SELECT Queries – Additional Data Definition Commands – Additional SELECT Query Keywords – Joining Database Tables.	15
UNIT IV	**Advanced SQL**:Relational SET Operators: UNION – UNION ALL – INTERSECT - MINUS.SQL Join Operators: Cross Join – Natural Join – Join USING Clause – JOIN ON Clause – Outer Join.**Sub Queries and Correlated Queries**: WHERE – IN – HAVING – ANY and ALL – FROM. SQL Functions: Date and Time Function – Numeric Function – String Function – Conversion Function	15
UNIT V	**PL/SQL**:A Programming Language: History – Fundamentals – Block Structure – Comments – Data Types – Other Data Types – Variable Declaration – Assignment operation –Arithmetic operators.**Control Structures and Embedded SQL**: Control Structures – Nested Blocks – SQL in PL/SQL – Data Manipulation – Transaction Control	15

statements. **PL/SQL Cursors and Exceptions**: Cursors – Implicit Cursors, Explicit Cursors and Attributes – Cursor FOR loops – SELECT…FOR UPDATE – WHERE CURRENT OF clause – Cursor with Parameters – Cursor Variables – Exceptions – Types of Exceptions.

Total	75

Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
CO1	Understand the various basic concepts of Data Base System. Difference between file system and DBMS and compare various data models.	PO1
CO2	Define the integrity constraints. Understand the basic concepts of Relational Data Model, Entity-Relationship Model.	PO1, PO2
CO3	Design database schema considering normalization and relationships within database. Understand and construct database using Structured Query Language. Attain a good practical skill of managing and retrieving of data using Data Manipulation Language (DML)	PO4, PO6
CO4	Classify the different functions and various join operations and enhance the knowledge of handling multiple tables.	PO4, PO5, PO6
CO5	Learn to design Data base operations and implement using PL/SQL programs. Learn basics of PL/SQL and develop programs using Cursors, Exceptions	PO3, PO5

Text Book	
1	Coronel, Morris, Rob, "Database Systems, Design, Implementation and Management", Ninth Edition
2	Nilesh Shah, "Database Systems Using Oracle", 2nd edition, Pearson Education India, 2016

Reference Books	
1.	Abraham Silberschatz, Henry F.Korth and S.Sudarshan,"Database System Concepts", McGraw Hill International Publication ,VI Edition
2.	Shio Kumar Singh , "Database Systems ",Pearson publications ,II Edition

Web Resources	
1.	Web resources from NDL Library, E-content from open-source libraries

Mapping with Programme Outcomes:

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	1	2	1	2
CO2	3	3	2	2	3	3
CO3	3	3	2	3	3	2
CO4	3	2	3	2	2	3
CO5	3	2	2	2	3	3
Weightage of course contributed to each PSO	15	12	10	11	12	13

S-Strong-3   M-Medium-2 L-Low-1

Title of the Course/ Paper	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
23BCE5P1	Database Management System Lab	Core Practical-V	-	-	5	-	4	5	25	75	100

<table>
<tr><td colspan="13" align="center">Learning Objectives</td></tr>
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LO1	To enable the students to learn the designing of data base systems, foundation on the relational model of data and normal forms.
LO2	To understood the concepts of data base management system, design simple Database models
LO3	To learn and understand to write queries using SQL, PL/SQL.
LO4	To enable the students to learn the designing of data base systems, foundation on the relational model of data and normal forms.
LO5	To understood the concepts of data base management system, design simple Database models

Sl. No	Contents	No. of Hours
1.	1. Create a student table with the following attributes name, register number, department, marks in 5 subjects and total. (a) Insert few records into student table. (b) Display all the records (c) Calculate the total marks for all the records. (d) Display the information of student name, register number and total only. 2. Create a student table with the following attributes name, registernumber, department, marks in 5 subjects and total. (a) Insert few records into student table. (b) Modify the name of the student as vignesh whose register number is 211278019. (c) Delete the records whose register number is 211278005. (d) Display all the records. 3. Create a table student with name, roll number, gender, age and mobile number. Apply the following integrity rules to the student table (a) The student name must be in capital letter. (b) The roll number must be greater than zero. (c) The age cannot be a null value. (d) The gender must be "Male" or "Female" or "Transgend" (e) The mobile number may contain null values. 4. Create a table student_master with the following attributes name, regno, dept and year of joining with suitable data types. Use Select command to do the following. (a) Display all the column in the student_ master table . (b) Display the student's name column only. (c) Eliminate the duplicate entry in student_mastertable. (d) Select the details of student who is studying computer science department (e) Sort the attribute name in alphabetical order.	**75**

5. Create a table sales_order_details with the s_order_no as primary key and it contains the following fields: product_no, description, qty_ordered, qty_disp, product_rate, profit_percent, sell_price, supplier_name. Use Select command to do the following

(a) Select each row and compute sell_price*.50 and sell_price*1.50 for each row selected.

(b) Select product_no, profit_percent, Sell_price where profit_per is not between 10 and 20 both inclusive.

(c) Select product_no, description, profit_percent, sell_price where profit_percent is not between 20 and 30.

(d) Select the suppliername and product_no where suppliername has 'r' or 'h'as second character.

6. Create an Employee table with the following attributes: employee_number, name, job and manager_id. Set the manager_id as a foreign key for creating self referential structure.

(a) Insert few records

(b) Display all the records

(c) Display the employee details who are working under particular manager_id.

7. Create an Employee table with the following attributes: employee_number, employee_name, department_number, job and salary.

(a) Query to display the employee_name and Salary of all the employees earning more than 20000 INR.

(b) Query to display employee_name and department_number for the particular employee _number.

(c) Query to display employee_name and Salary for all employees whose salary is not in the range of INR 15000 and INR 30000.

8. Create an Employee table with the following attribute employee_number, employee_name, job_type, hire_date, department_number and salary.

(a) Query to display employee_name and department_number of all the employees in department_number 10 and Department number 20 in the alphabetical order by name.

(b) Query to display Name of all the employees where the third letter of their name is =A.

(c) Query to display Name with the 1st letter capitalized and all other letter lowercase

(d) Query to display Name of all employees either have two R's or have two A's in their Name.

9. Create an Employee table with the following attributes: employee_number, name, job, hire_date and manager_id. Set the manager_id as a forein key for creating self-referential structure.

(a) Query to display name and Hire Date of every Employee who was hired in 2007.

(b) Query to display name and calculate the number of months between today and the date each employee was hired.

(c) Query to display name and job of all employees who don't have a current Manager.

10. Create a table sales_order with s_order_no, client_number, delivery_address, delivery_date and order_status. Define the s_order_no

as primary key using column level Constraints.
  (a) Create another table named as sales_order_copy with the same structure of sales_order table. Define the s_order_no as primary key using table level constraints.
  (b) Add a new column for storing salesman_number in sales_order using ALTER Command.
  (c) Modify the size of delivery_address in sales_order table using ALTER command.
  (d) Display the structure of sales_order table

11.   Create an Employee table with the following attribute employee_number, employee_name, job_type, hire_date, department_number, salary and commission.
  (a) Query to display the Highest, Lowest, Sum and Average Salaries of all the Employees
  (b) Query to display the employee_number and employee_name for all employees who earn more than the average salary.
  (c) Query to display the employee_name, salary and commission for all the employees who earn commission.
  (d) Sort the data in descending order of salary and commission
  (e) Query to display employee_name, salary and commission for all employees whose commission is greater than their salary increased by 5%.

12.   Create a DEPARTMENT table with the attributes of department_number and department_name. Set the department_ number as a primary key.
  (a) Insert few records
  (b) Display all the records
  (c) Create an employee table with the following attribute employee_number, employee_name, job and department_number. Set the employee_number as a primary key and set the department_number as a foreign key.
  (d) Query to display the employee details who are working in the particular department_number.
  (e) Query to display employee_number, employee_name and job from the employee table
  (f) Query to display unique jobs from the employee Table
  (g) Query to display the employee_name concatenated by a job separated by a comma.

13.   Create a DEPARTMENT table with the attributes of department_number and department_name. Set the department number as a primary key.
  (a) Create an Employee table with the following attributes: employee_number, name, job_type, department_number and location.
  (b) Query to display Unique Listing of all Jobs that are in department_number 20.
  (c) Query to display employee name, department_name and department_number for all the employees.
  (d) Query to display name, Job, department_number and department_name for all the employees working at the Mumbai

location.

14.   Create a table client-master with the following fields: client_no, name, address, city, state, pincode, remarks, bal_due with suitable data types.
    (a) Create another table supplier_master from client_master.
    (b) rename the attribute client_no with supplier_no and the attribute **name** with supplier_name in the supplier_master table
    (c) Insert data into client_master
    (d) Insert data into supplier_master from client_master.
    (e) Delete the row which is having the value chennai in the city attribute of client_master table.
    (f) Drop the client_master table

15.   Create a table master_book to contain the information of magazine_code, magazine_name and publisher, magazine_type (Weekly/biweekly/monthly) and price. Write a PL/SQL block to perform insert, update and delete operations on the above table

16.   Create a table to contain phone_number, user_name, address of the phone user. Write a function to search for an address using phone numbers.

17.   Create a table to store the salary details of the employees in a company. Declare the cursor to contain employee_number, employee_name and net_salary. Use cursor to update the employee salaries.

18. Create a table to contain the information about the voters in a particular constituency. Write a proper trigger to update or delete a row in the table.

19.   Create a table employee to contain the information of employee_name, employee_number and salary.
(a)   Write a procedure to increase 10% of salary to all employees (procedure without argument).
  (b) Write a procedure to increase specific percentage for specific department number (procedure with argument).

	Total	75

	Course Outcomes	Programmem Outcome
CO	On completion of this course, students will	
1	Understand the various basic concepts of Data Base System. Difference between file system and DBMS and compare various data models.	PO1,PO4,PO5
2	Define the integrity constraints. Understand the basic concepts of Relational Data Model, Entity-Relationship Model.	PO1, PO4,PO6
3	Design database schema considering normalization and relationships within database. Understand and construct database using Structured Query Language. Attain a good practical skill of managing and retrieving of data using Data Manipulation Language	PO1,PO3,PO6

	(DML)	
4	Classify the different functions and various join operations and enhance the knowledge of handling multiple tables.	PO3,PO4
5	Learn to design Data base operations and implement using PL/SQL programs. Learn basics of PL/SQL and develop programs using Cursors, Exceptions	PO1,PO5,PO6

Text Book		
1	Coronel, Morris, Rob, "Database Systems, Design, Implementation and Management", Ninth Edition	
2	Nilesh Shah, "Database Systems Using Oracle", 2nd edition, Pearson Education India, 2016	

Reference Books		
1	Abraham Silberschatz, Henry F.Korth and S.Sudarshan,"Database System Concepts", McGraw Hill International Publication ,VI Edition	
2.	Shio Kumar Singh , "Database Systems ",Pearson publications ,II Edition	

Web Resources		
1.	Web resources from NDL Library, E-content from open-source libraries	

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	3
CO 2	3	3	1	3	2	3
CO 3	3	3	3	3	2	3
CO 4	3	3	3	3	2	3
CO 5	3	2	3	3	3	3
Weightage of course contributed to each PSO	15	15	13	15	13	15

S-Strong-3   M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	CIA	External	Total
									Marks		
23BCE5C3	**Software Engineering**	Core -XII	5	-	-	-	4	5	25	75	100

	Learning Objectives
LO1	Gain basic knowledge of analysis and design of systems
LO2	Ability to apply software engineering principles and techniques
LO3	Model a reliable and cost-effective software system
LO4	Ability to design an effective model of the system
LO5	Perform Testing at various levels and produce an efficient system.

	Contents	**Course Objectives**
UNIT I	**Introduction**: The software engineering discipline, programs vs. software products, why study software engineering, emergence of software engineering, Notable changes in software development practices, computer systems engineering. **Software Life Cycle Models**: Why use a life cycle model, Classical waterfall model, iterative waterfall model, prototyping model, evolutionary model, spiral model, comparison of different life cycle models.	15
UNIT II	**Requirements Analysis and Specification:** Requirements gathering and analysis, Software requirements specification (SRS) **Software Design**: Good software design, cohesion and coupling, neat arrangement, software design approaches, object- oriented vs function-oriented design	15
UNIT III	**Function-Oriented Software Design:** Overview of SA/SD methodology, structured analysis, data flow diagrams (DFD's), structured design, detailed design.**User-Interface design:** Characteristics of a good interface; basic concepts; types of user interfaces; component based GUI development, a user interface methodology.	15
UNIT IV	**Coding and Testing:** Coding; code review; testing; testing in the large vs testing in the small; unit testing; black-box testing; white-box testing; debugging; program analysis tools; integration testing; system testing; some general issues associated with testing.**Software Reliability and Quality Management:** Software reliability; statistical testing; software quality; software quality management system; SEI capability maturity model; personal software process.	15
UNIT V	**Computer Aided Software Engineering:** CASE and its scope; CASE environment; CASE support in software life cycle; other characteristics of CASE tools; towards second generation CASE tool; architecture of a CASE environment. **Software Maintenance:** Characteristic of software maintenance; software reverse engineering; software maintenance process models; estimation of maintenance cost.	15

		Total	75

Course Outcomes

Course Outcomes	On completion of this course, students will;	
CO1	Gain basic knowledge of analysis and design of systems	PO1
CO2	Ability to apply software engineering principles and techniques	PO1, PO2
CO3	Model a reliable and cost-effective software system	PO4, PO6
CO4	Ability to design an effective model of the system	PO4, PO5, PO6
CO5	Perform Testing at various levels and produce an efficient system.	PO3, PO6

Text Books

1.	Rajib Mall, Fundamentals of Software Engineering, Fifth Edition, Prentice-Hall of India, 2018

References Books

1.	Richard Fairley, Software Engineering Concepts, Tata McGraw-Hill publishing company Ltd, Edition 1997
2.	Roger S. Pressman, Software Engineering, Seventh Edition, McGraw-Hill.
3.	James A. Senn, Analysis & Design of Information Systems, Second Edition, McGraw-Hill International Editions.

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	3	2	2	3
CO2	3	2	2	2	1	2
CO3	3	3	3	2	3	2
CO4	3	3	3	2	2	2
CO5	3	3	3	2	2	2
Weightage of course contribute d to each PO/PSO	15	13	14	10	10	11

S-Strong-3   M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	CIA	External	Total
									Marks		
23BCE5E1	**Artificial Intelligence**	DSE-I A	4	-	-	-	3	4	25	75	100

Course Objective	
C1	To learn various concepts of AI Techniques.
C2	To learn various Search Algorithm in AI.
C3	To learn probabilistic reasoning and models in AI.
C4	To learn about Markov Decision Process.
C5	To learn various type of Reinforcement learning.

	Contents	**No. of Hours**
UNIT I	Introduction: Concept of AI, history, current status, scope, agents, environments, Problem Formulations, Review of tree and graph structures, State space representation, Search graph and Search tree	12
UNIT II	Search Algorithms : Random search, Search with closed and open list, Depth first and Breadth first search, Heuristic search, Best first search, A* algorithm, Game Search	12
UNIT III	Probabilistic Reasoning : Probability, conditional probability, Bayes Rule, Bayesian Networks- representation, construction and inference, temporal model, hidden Markov model.	12
UNIT IV	Markov Decision process : MDP formulation, utility theory, utility functions, value iteration, policy iteration and partially observable MDPs.	12
UNIT V	Reinforcement Learning : Passive reinforcement learning, direct utility estimation, adaptive dynamic programming, temporal difference learning, active reinforcement learning- Q learning	12
	Total	**60**

Course Outcomes		**Programme Outcome**
CO	On completion of this course, students will	
1	Understand the various concepts of AI Techniques.	PO1
2	Understand various Search Algorithm in AI.	PO1, PO2
3	Understand probabilistic reasoning and models in AI.	PO4, PO6
4	Understand Markov Decision Process.	PO4, PO5, PO6
5	Understand various type of Reinforcement learning Techniques.	PO3, PO4

Text Book	
1	Stuart Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach" , 3rd Edition, Prentice Hall.
	Elaine Rich and Kevin Knight, "Artificial Intelligence", Tata McGraw Hill

Reference Books	
1.	Trivedi, M.C., "A Classical Approach to Artifical Intelligence", Khanna Publishing House, Delhi.
2.	SarojKaushik, "Artificial Intelligence", Cengage Learning India, 2011

	David Poole and Alan Mackworth, "Artificial Intelligence: Foundations for Computational Agents", Cambridge University Press 2010
3.	

	Web Resources
1.	https://github.com/dair-ai/ML-Course-Notes
2.	https://web.cs.hacettepe.edu.tr/~erkut/ain311.f21/index.html
3.	https://www.toolify.ai/?gclid=CjwKCAjwvdajBhBEEiwAeMh1U6tlqU1LXlRFbcghLMZVwICm_4PkIRcDRE-VYq_wTDcuaQeq_bCHnhoCcm4QAvD_BwE

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	1	2	1	2
CO2	3	3	2	2	3	3
CO3	3	3	2	3	3	2
CO4	3	2	3	2	2	3
CO5	3	2	2	2	3	3
Weightage ofcoursecontributedto eachPSO	15	12	10	11	12	13

S-Strong-3   M-Medium-2   L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst.	Marks			
									CIA	External	Total	
23BCE5E2	**NATURAL LANGUAGE PROCESSING**	DSE-IB	4	-	-		3	4	25	75	100	

	Learning Objectives
LO1	To understand approaches to syntax and semantics in NLP.
LO2	To learn natural language processing and to learn how to apply basic algorithms in this field.
LO3	To understand approaches to discourse, generation, dialogue and summarization within NLP.
LO4	To get acquainted with the algorithmic description of the main language levels: morphology, syntax, semantics, pragmatics etc.
LO5	To understand current methods for statistical approaches to machine translation.

	Contents	**No. Of. Hours**
UNIT I	**Introduction :** Natural Language Processing tasks in syntax, semantics, and pragmatics – Issue- Applications – The role of machine learning – Probability Basics –Information theory – Collocations -N-gram Language Models – Estimating parameters and smoothing – Evaluating language models.	**12**
UNIT II	**Word level and Syntactic Analysis:** Word Level Analysis: Regular Expressions-Finite-State Automata-Morphological Parsing-Spelling Error Detection and correction-Words and Word classes-Part-of Speech Tagging.Syntactic Analysis: Context-free Grammar-Constituency-Parsing-Probabilistic Parsing.	**12**
UNIT III	**Semantic analysis and Discourse Processing:** Semantic Analysis: Meaning Representation-Lexical Semantics- Ambiguity-Word Sense Disambiguation. Discourse Processing: cohesion-Reference Resolution-Discourse Coherence and Structure.	**12**
UNIT IV	**Natural Language Generation:** Architecture of NLG Systems-Generation Tasks and Representations- Application of NLG. Machine Translation: Problems in Machine Translation. Characteristics of Indian Languages- Machine Translation Approaches-Translation involving Indian Languages.	**12**
UNIT V	**Information retrieval and lexical resources:** Information Retrieval: Design features of Information Retrieval Systems-Classical, Non-classical, Alternative Models of Information Retrieval – valuation Lexical Resources: WorldNet-Frame NetStemmers- POS Tagger- Research Corpora SSAS.	**12**

Total hours	**60**
Course Outcomes	**Programme Outcomes**
CO On completion of this course, students will	

CO1	Describe the fundamental concepts and techniques of natural language processing. Explain the advantages and disadvantages of different NLP technologies and their applicability in different business situations.	PO1, PO2, PO3, PO4, PO5, PO6
CO2	Distinguish among the various techniques, taking into account the assumptions, strengths, and weaknesses of each Use NLP technologies to explore and gain a broad understanding oftext data.	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Use appropriate descriptions, visualizations, and statistics to communicate the problems and their solutions. Use NLP methods to analyse sentiment of a text document.	PO1, PO2, PO3, PO4, PO5, PO6
CO4	Analyze large volume text data generated from a range of real-world applications. Use NLP methods to perform topic modelling.	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Develop robotic process automation to manage business processes and to increase and monitor their efficiency and effectiveness. Determine the framework in which artificial intelligence and the Internet of things may function, including interactions with people, enterprise functions, and environments.	PO1, PO2, PO3, PO4, PO5, PO6

	Textbooks
1	Daniel Jurafsky, James H. Martin, "Speech & language processing", Pearson publications.
2	Tanveer Siddiqui, U..S.Tiwary, "Natural Language Processing and Information Retrieval", Oxford University press, 2008.
	Reference Books
1.	Pierre M. Nugues, "An Introduction to Language Processing with Perl and Prolog",Springer
2.	Allen, James. Natural language understanding. Pearson, 1995.
	Web Resources
1.	https://en.wikipedia.org/wiki/Natural_language_processing
2.	https://www.techtarget.com/searchenterpriseai/definition/natural-language-processing-NLP

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	3
CO 2	2	3	3	3	2	3
CO 3	3	3	3	3	3	3
CO 4	3	2	3	3	2	3
CO 5	3	3	3	3	3	3
Weightageofcoursecontributedtoeach PSO	14	14	15	15	13	15

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
23BCE5E3	**Introduction to Data Science**	DSE-II A	4	-	-	-	3	4	25	75	100

Learning Objectives	
LO1	To learn about basics of Data Science and Big data.
LO2	To learn about overview and building process of Data Science.
LO3	To learn about various Algorithms in Data Science.
LO4	To learn about Hadoop Framework.
LO5	To learn about case study about Data Science.

	Contents	No. of Hours
UNIT I	**Introduction:** Benefits and uses – Facts of data – Data science process – Big data ecosystem and data science	12
UNIT II	**The Data science process:**Overview – research goals - retrieving data - transformation – Exploratory Data Analysis – Model building .	12
UNIT III	**Algorithms :**Machine learning algorithms – Modeling process – Types – Supervised – Unsupervised - Semi-supervised	12
UNIT IV	**Introduction to Hadoop :**Hadoop framework – Spark – replacing MapReduce– NoSQL – ACID – CAP – BASE – types	12
UNIT V	**Case Study**: Prediction of Disease - Setting research goals - Data retrieval – preparation - exploration - Disease profiling - presentation and automation	12
	Total	**60**

Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
CO1	Understand the basics in Data Science and Big data.	PO1
CO2	Understand overview and building process in Data Science.	PO1, PO2
CO3	Understand various Algorithms in Data Science.	PO3, PO6
CO4	Understand Hadoop Framework in Data Science.	PO4, PO5
CO5	Case study in Data Science.	PO3, PO5

Text Book	
1	Davy Cielen, Arno D. B. Meysman, Mohamed Ali, "Introducing Data Science", manning publications 2016

Reference Books	
1.	Roger Peng, "The Art of Data Science", lulu.com 2016.
2.	MurtazaHaider, "Getting Started with Data Science – Making Sense of Data with Analytics", IBM press, E-book.
3.	Davy Cielen, Arno D.B. Meysman, Mohamed Ali,"Introducing Data Science: Big Data, Machine Learning, and More, Using Python Tools", Dreamtech Press 2016.
4.	Annalyn Ng, Kenneth Soo, "Numsense! Data Science for the Layman: No Math Added", 2017,1st Edition.

5.	Cathy O'Neil, Rachel Schutt, "Doing Data Science Straight Talk from the Frontline", O'Reilly Media 2013.
6.	Lillian Pierson, "Data Science for Dummies", 2017 II Edition

Web Resources	
1.	https://www.w3schools.com/datascience/
2.	https://en.wikipedia.org/wiki/Data_science
3.	http://www.cmap.polytechnique.fr/~lepennec/en/post/references/refs/

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	2	3	2	2
CO2	3	3	2	3	2	2
CO3	3	3	3	3	2	2
CO4	3	3	2	3	2	2
CO5	3	3	2	3	3	2
Weightage ofcoursecontributedtoeachPSO	15	14	11	15	11	10

S-Strong-3   M-Medium-2   L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	CIA	External	Total
									Marks		
23BCE5E4	**Big Data Analytics**	DSE-II B	4	-	-	-	3	4	25	75	100

	Course Objective	
LO1	Understand the Big Data Platform and its Use cases, Map Reduce Jobs	
LO2	To identify and understand the basics of cluster and decision tree	
LO3	To study about the Association Rules,Recommendation System	
LO4	To learn about the concept of stream	
LO5	Understand the concepts of NoSQL Databases	
	Contents	**No. of Hours**
UNIT I	Evolution of Big data — Best Practices for Big data Analytics — Big data characteristics — Validating — The Promotion of the Value of Big Data — Big Data Use Cases- Characteristics of Big Data Applications — Perception and Quantification of Value - Understanding Big Data Storage — A General Overview of High-Performance Architecture — HDFS — Map Reduce and YARN — Map Reduce Programming Model	12
UNIT II	Advanced Analytical Theory and Methods: Overview of Clustering — K-means — Use Cases — Overview of the Method — Determining the Number of Clusters — Diagnostics — Reasons to Choose and Cautions .- Classification: Decision Trees — Overview of a Decision Tree — The General Algorithm — Decision Tree Algorithms — Evaluating a Decision Tree — Decision Trees in R — Naïve Bayes — Bayes Theorem — Naïve Bayes Classifier.	12
UNIT III	Advanced Analytical Theory and Methods: Association Rules — Overview — Apriori Algorithm — Evaluation of Candidate Rules — Applications of Association Rules — Finding Association& finding similarity — Recommendation System: Collaborative Recommendation- Content Based Recommendation — Knowledge Based Recommendation- Hybrid Recommendation Approaches.	12
UNIT IV	Introduction to Streams Concepts — Stream Data Model and Architecture — Stream Computing, Sampling Data in a Stream — Filtering Streams — Counting Distinct Elements in a Stream — Estimating moments — Counting oneness in a Window — Decaying Window — Real time Analytics Platform(RTAP) applications — Case Studies — Real Time Sentiment Analysis, Stock Market Predictions. Using Graph Analytics for Big Data: Graph Analytics	12
UNIT V	NoSQL Databases : Schema-less Models : Increasing Flexibility for Data Manipulation-Key Value Stores- Document Stores — Tabular Stores — Object Data Stores — Graph Databases Hive — Sharding — Hbase — Analyzing big data with twitter — Big data for E-Commerce Big data for blogs — Review of Basic Data Analytic Methods using R.	12
	Total	**60**
	Course Outcomes	**Programme**

		Outcomes
CO	On completion of this course, students will	
CO1	Work with big data tools and its analysis techniques.	PO1
CO2	Analyze data by utilizing clustering and classification algorithms.	PO1, PO2
CO3	Learn and apply different mining algorithms and recommendation systems for large volumes of data.	PO4, PO5
CO4	Perform analytics on data streams.	PO3, PO5, PO6
CO5	Learn NoSQL databases and management.	PO3, PO4
Text Book		
1	AnandRajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.	
Reference Books		
1.	David Loshin, "Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph", Morgan Kaufmann/El sevier Publishers, 2013	
2.	EMC Education Services, "Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data", Wiley publishers, 2015.	
Web Resources		
1.	https://www.simplilearn.com	
2.	https://www.sas.com/en_us/insights/analytics/big-data-analytics.html	

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	2	3	3	3
CO2	3	3	2	3	3	3
CO3	3	3	3	3	3	2
CO4	3	3	2	3	3	3
CO5	3	3	2	3	3	2
Weightage ofcoursecontributedtoea chPSO	15	14	11	15	15	13

S-Strong-3   M-Medium-2   L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	Ext	Total
23BCE5IV	Internship/Industrial Visit/ Field Visit		-	-	-	-	2	-	25	75	100

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
23BCE6C1	Computer Networks	Core-XIII	6	-	-	-	4	6	25	75	100

Course Objective	
LO1	To learn the basic concepts of Data communication and Computer network
LO2	To learn about wireless Transmission
LO3	To learn about networking and data link layer.
LO4	To study about Network communication.
LO5	To learn the concept of Transport layer

	Contents	No. of Hours
UNIT I	Introduction – Network Hardware – Software – Reference Models – OSI and TCP/IP Models – Example Networks: Internet, ATM, Ethernet and Wireless LANs - Physical Layer – Theoretical Basis for Data Communication - Guided Transmission Media	18
UNIT II	Wireless Transmission - Communication Satellites – Telephone System: Structure, Local Loop, Trunks and Multiplexing and Switching. Data Link Layer: Design Issues – Error Detection and Correction.	18
UNIT III	Elementary Data Link Protocols - Sliding Window Protocols – Data Link Layer in the Internet - Medium Access Layer – Channel Allocation Problem – Multiple Access Protocols – Bluetooth.	18
UNIT IV	Network Layer - Design Issues - Routing Algorithms - Congestion Control Algorithms – IP Protocol – IP Addresses – Internet Control Protocols.	18
UNIT V	Transport Layer - Services - Connection Management - Addressing, Establishing and Releasing a Connection – Simple Transport Protocol – Internet Transporet Protocols (ITP) - Network Security: Cryptography	18
	Total	90

Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
CO1	To Understand the basics of Computer Network architecture, OSI and TCP/IP reference models	PO1
CO2	To gain knowledge on Telephone systems using wireless network	PO1, PO2
CO3	To understand the concept of MAC	PO4, PO6
CO4	To analyze the characteristics of Routing and Congestion control algorithms	PO4, PO5, PO6
CO5	To understand network security and define various protocols such as FTP, HTTP, Telnet, DNS	PO3, PO4

Text Book	
1	A. S. Tanenbaum, "Computer Networks", 4th Edition, Prentice-Hall of India, 2008.

	Reference Books
1.	B. A. Forouzan, "Data Communications and Networking", Tata McGraw Hill, 4th Edition, 2017
2.	F. Halsall, "Data Communications, Computer Networks and Open Systems", Pearson Education, 2008
3.	D. Bertsekas and R. Gallagher, "Data Networks", 2nd Edition, PHI, 2008.
4.	Lamarca, "Communication Networks", Tata McGraw- Hill, 2002
	Web Resources
1.	https://en.wikipedia.org/wiki/Computer_network
2.	https://citationsy.com/styles/computer-networks

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	3	2	3
CO2	3	2	2	2	2	2
CO3	3	2	3	3	2	3
CO4	3	2	2	2	2	2
CO5	3	2	2	2	2	3
Weightage of course contributed to each PSO	15	11	11	12	10	13

S-Strong-3   M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	CIA	External	Total
									Marks		
23BCE6D	**Dissertation**	Core-XIV		-	12	-	8	12	50	150	200

Course Objective	
LO1	The students will be allowed to work on any project based on the concepts studied in core/elective courses.
LO2	The project work should be compulsorily done in the college only under the supervision of the department staff.
LO3	The combined project shall be undertaken by the students as a team of two.
LO4	The number of teams should be equally assigned to existing Staff members.
LO5	The following list of parameters taken into account for the evaluation of Project work and Viva-voce. Total Marks: 200 (Internal: 50 marks, External: 150 Marks)

Contents	No. of Hours
Parameters: For Internal Marks: Two review meetings - 2×10 = 20 Marks Debugging = 10 Marks Execution = 10 Marks Output = 10 Marks _____ Total = 50 Marks _____ For External Marks: Project Report = 50 Marks Project demo &Presentation = 50 Marks Viva-Voce = 50 Marks _____ Total = 150 Marks _____	180
Total	**180**

Course Outcomes		**Programme Outcome**
CO	On completion of this course, students will	
CO1	be able to recognize the technological recent trends of computer science.	PO1
CO2	Students will gain knowledge about technological components of the softwares	PO1, PO2

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	CIA	External	Total
									Marks		
23BCE6E1	.Net Programming	DSE-III A	5	-	-	-	3	5	25	75	100

	Course Objective	
C1	To identify and understand the goals and objectives of the .NET framework and ASP.NET with C# language.
C2	To develop ASP.NET Web application using standard controls.
C3	To implement file handling operations.
C4	To handles SQL Server Database using ADO.NET.
C5	Understand the Grid view control and XML classes.

	Contents	No. of Hours
UNIT I	Overview of .NET framework: Common Language Runtime (CLR), Framework Class Library- C# Fundamentals: Primitive types and Variables – Operators - Conditional statements -Looping statements – Creating and using Objects – Arrays – String operations.	15
UNIT II	Introduction to ASP.NET - IDE-Languages supported Components -Working with Web Forms – Web form standard controls: Properties and its events – HTML controls -List Controls: Properties and its events.	15
UNIT III	Rich Controls: Properties and its events – validation controls: Properties and its events– File Stream classes - File Modes – File Share – Reading and Writing to files – Creating, Moving, Copying and Deleting files – File uploading.	15
UNIT IV	ADO.NET Overview – Database Connections – Commands – Data Reader - Data Adapter - Data Sets - Data Controls and its Properties – Data Binding	15
UNIT V	Grid View control: Deleting, editing, Sorting and Paging. XML classes – Web form to manipulate XML files - Website Security - Authentication - Authorization – Creating a Web application.	15
	Total	75

Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
1	Develop working knowledge of C# programming constructs and the .NET Framework	PO1, PO2, PO6
2	To develop a software to solve real-world problems using ASP.NET	PO2, PO3, PO5
3	To Work On Various Controls Files	PO1, PO3, PO6
4	To create a web application using MicrosoftADO.NET.	PO2, PO6
5	To develop web applications using XML	PO1, PO3, PO6

	Text Book
1	SvetlinNakov,VeselinKolev& Co, Fundamentals of Computer Programming with

	C#,Faber publication,2019.
2	Mathew, Mac Donald, The Complete Reference ASP.NET, Tata McGraw-Hill,2015.

	Reference Books
1.	Herbert Schildt, The Complete Reference C#.NET, TataMcGraw-Hill,2017.
2.	Kogent Learning Solutions, C# 2012 Programming Covers .NET 4.5 Black Book, Dreamtechpres,2013.
3.	Anne Boehm, Joel Murach, Murach's C# 2015, Mike Murach& Associates Inc.2016.
4.	DenielleOtey, Michael Otey, ADO.NET: The Complete reference, McGrawHill,2008.
5.	Matthew MacDonald, Beginning ASP.NET 4 in C# 2010,APRESS,2010.

	Web Resources
1.	https://www.geeksforgeeks.org/introduction-to-net-framework/
2.	https://www.javatpoint.com/net-framework

Mapping with Programme Outcomes:

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	3	3	3	2	3
CO2	3	2	2	3	3	3
CO3	3	3	3	2	3	3
CO4	2	2	1	3	3	2
CO5	3	3	3	3	3	3
Weightage of course contributed to each PSO	14	13	12	14	14	14

S-Strong-3   M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	CIA	External	Total
								Marks		
23BCE6E2	Python programming	**DSE-III B**	5	-	-	-	3	25	75	100

	Learning Objectives	
LO1	To make students understand the concepts of Python programming.	
LO2	To apply the OOPs concept in PYTHON programming.	
LO3	To impart knowledge on demand and supply concepts	
LO4	To make the students learn best practices in PYTHON programming	
LO5	To know the costs and profit maximization	

	Contents	No. of Hours
UNIT I	**Basics of Python Programming:** History of Python-Features of Python-Literal-Constants-Variables - Identifiers–Keywords-Built-in Data Types-Output Statements – Input Statements-Comments – Indentation- Operators-Expressions-Type conversions. **Python Arrays:** Defining and Processing Arrays – Array methods.	**15**
UNIT II	**Control Statements:** Selection/Conditional Branching statements: if, if-else, nested if and if-elif-else statements. Iterative Statements: while loop, for loop, else suite in loop and nested loops. **Jump Statements:** break, continue and pass statements**.**	**15**
UNIT III	**Functions:** Function Definition – Function Call – Variable Scope and its Lifetime-Return Statement. **Function Arguments**: Required Arguments, Keyword Arguments, Default Arguments and Variable Length Arguments- Recursion. **Python Strings:** String operations- Immutable Strings - Built-in String Methods and Functions - String Comparison. **Modules**: import statement- The Python module – dir() function – Modules and Namespace – Defining our own modules.	**15**
UNIT IV	**Lists:** Creating a list -Access values in List-Updating values in Lists-Nested lists -Basic list operations-List Methods. Tuples: Creating, Accessing, Updating and Deleting Elements in a tuple – Nested tuples– Difference between lists and tuples. **Dictionaries:** Creating, Accessing, Updating and Deleting Elements in a Dictionary – Dictionary Functions and Methods - Difference between Lists and Dictionaries.	**15**
UNIT V	**Python File Handling:** Types of files in Python - Opening and Closing files-Reading and Writing files: write() and writelines() methods- append() method – read() and readlines() methods – with keyword – Splitting words – File methods - File Positions-Renaming and deleting files.	**15**
	TOTAL HOURS	**75**

	Course Outcomes	Programme Outcomes
CO	On completion of this course, students will	
CO1	Learn the basics of python, Do simple programs on python,	PO1, PO2, PO3,

	Learn how to use an array.	PO4, PO5, PO6
CO2	Develop program using selection statement, Work with Looping and jump statements, Do programs on Loops and jump statements.	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Concept of function, function arguments, Implementing the concept strings in various application, Significance of Modules, Work with functions, Strings and modules.	PO1, PO2, PO3, PO4, PO5, PO6
CO4	Work with List, tuples and dictionary, Write program using list, tuples and dictionary.	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Usage of File handlings in python, Concept of reading and writing files, Do programs using files.	PO1, PO2, PO3, PO4, PO5, PO6

Textbooks

1	ReemaThareja, "Python Programming using problem solving approach", First Edition, 2017, Oxford University Press.
2	Dr. R. NageswaraRao, "Core Python Programming", First Edition, 2017, Dream tech Publishers.

Reference Books

1.	VamsiKurama, "Python Programming: A Modern Approach", Pearson Education.
2.	Mark Lutz, "Learning Python", Orielly.
3.	Adam Stewarts, "Python Programming", Online.
4.	Fabio Nelli, "Python Data Analytics", APress.
5.	Kenneth A. Lambert, "Fundamentals of Python – First Programs", CENGAGE Publication.

Web Resources

1.	https://www.programiz.com/python-programming
2.	https://www.guru99.com/python-tutorials.html
3.	https://www.w3schools.com/python/python_intro.asp
4.	https://www.geeksforgeeks.org/python-programming-language/
5.	https://en.wikipedia.org/wiki/Python_(programming_language)

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	3
CO 2	3	3	3	3	2	3
CO 3	3	3	3	3	2	2
CO 4	3	3	3	3	2	3
CO 5	3	2	3	3	3	3
Weightage of course contributed to each PSO	15	14	15	15	13	14

S-Strong-3   M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	CIA	External	Total
								Marks		
23BCE6E3	**Computer Graphics**	DSE-IV A	5	-	-	-	3	25	75	100

<table>
<tr><td colspan="3" align="center">Learning Objectives</td><td></td></tr>
<tr><td>LO1</td><td colspan="2">To make students understand the basic concepts of Computer Graphics.</td><td></td></tr>
<tr><td>LO2</td><td colspan="2">To understand about the Graphics output primitives.</td><td></td></tr>
<tr><td>LO3</td><td colspan="2">To know about the attributes of output primitives.</td><td></td></tr>
<tr><td>LO4</td><td colspan="2">To understand the concept of two dimensional transformation</td><td></td></tr>
<tr><td>LO5</td><td colspan="2">To know about the concept of two dimensional Viewing</td><td></td></tr>
</table>

	Contents	No. of Hours
UNIT I	**A survey of computer graphics:** Computer-Aided Design - Presentation Graphics – Computer Art – Entertainment – Education and Training – Visualization – Image Processing – Graphical User Interfaces. Overview of Graphics Systems: Video Display Devices – Raster Scan Systems – Random Scan Systems – Input Devices – Hard Copy Devices.	15
UNIT II	**Output Primitives:** Points and Lines – Line Drawing Algorithms – Circle Generating Algorithms – Ellipse Generating Algorithms – Filled Area primitives.	15
UNIT III	**Attributes of Output Primitives:** Line Attributes – Curve Attributes – Color and Gray Scale Levels – Area Fill Attributes – Character Attributes – Bundled Attributes – Inquiry Functions – Antialiasing.	15
UNIT IV	**Two–Dimensional Geometric Transformations:** Basic Transformations – Matrix Representations – Composite Transformations – Other Transformations – Transformations between Coordinate Systems.	15
UNIT V	**Two –Dimensional Viewing :** The Viewing Pipeline – Viewing Coordinate Reference Frame – Window –to- Viewport Coordinate Transformation – Two-Dimensional Viewing Functions – Clipping Operations – Point Clipping – Line Clipping – Polygon Clipping – Curve Clipping – Text Clipping – Exterior Clipping.	15
	TOTAL HOURS	**75**

Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
CO1	Able To make students understand the basic concepts of Computer Graphics.	PO1, PO2, PO3, PO4, PO5, PO6
CO2	Understand about the Graphics output primitives.	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Know about the attributes of output primitives.	PO1, PO2, PO3, PO4, PO5, PO6
CO4	Understand the concept of two dimensional transformation	PO1, PO2, PO3,

		PO4, PO5, PO6
CO5	Know about the concept of two dimensional Viewing	PO1, PO2, PO3, PO4, PO5, PO6

Textbooks	
1	*Computer Graphics*, Donald Hearn and M. Pauline Baker, Prentice Hall Of India Pvt. Ltd., New Delhi, Second Edition, 1994.

Reference Books	
1.	*Computer Graphics, Multimedia and Animation* – Malay K. Pakhira, Prentice Hall Of India Pvt. Ltd. , New Delhi – 2008
2.	*Fundamentals Of Computer Graphics And Multimedia* – D. P. Mukherjee, Prentice Hall Of India Pvt. Ltd. , New Delhi – 1999
3.	*Multimedia Graphics,* John Villamil, Casanova , LeonyFernanadez, Eliar, PHI,1998.

Web Resources	
1.	https://www.geeksforgeeks.org/computer-graphics-2/

Subject Code	Subject Name	Category	L	T	P	S	Credits	CIA	External	Total
								Marks		
23BCE6E4	**MOBILE COMPUTING**	DSE-IV B	5	-	-	-	3	25	75	100

	Learning Objectives									
LO1	To understand the Concept of mobile technologies.									
LO2	To understand the cellular communication concepts									
LO3	To know about the mobile mechanism.									
LO4	To understand about mobile terminologies.									
LO5	To know about mobile security.									

	Contents	No. of Hours
UNIT I	**Introduction:** Laptop computing – Wireless Technologies – Mobility and Portability – Overview of IP and Routing – Mobile networking – Example Architectures – The role of IETF in mobile networking.	15
UNIT II	**Cellular communication concepts:** Wireless transmission – Multiplexing –Modulation – Spread Spectrum – Cellular system – GSM architecture – protocols – handover procedure – security.	15
UNIT III	**Advertisement and registration :** Agent solicitation and Discovery Mechanism – Router Discovery Protocol – Agent advertisement – Agent operation – Agent discovery – registration overview – Authentication overview – Registration request, reply and extensions – Mobile node registration procedures – Foreign agent registration actions – Home agent Processing	15
UNIT IV	**Data grams and route optimizations :** Tunneling overview and terminology– Encapsulation – Routing failures – Tunnel management – Decapsulation – Unicast broadcast and multicast data gram routing – Mobile routers – Route optimization – Message format – Extensions – Mobile key requests.	15
UNIT V	**IP versions and DHCP** : Mobility support in IP version 6 – smooth hand off – Renumbering – DHCP – WAP protocol. **Security and motivation detection**: Ingress filtering – Reverse tunneling – Broadcast preference extensions – Movement detection – Localizing registrations.	15
	TOTAL HOURS	**75**

Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
CO1	Understand the Concept of mobile technologies.	PO1, PO2, PO3, PO4, PO5, PO6
CO2	Understand the cellular communication concepts	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Know about the mobile mechanism.	PO1, PO2, PO3, PO4, PO5, PO6
CO4	Understand about mobile terminologies.	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Know about mobile security.	PO1, PO2, PO3, PO4, PO5, PO6
Textbooks		

1	Charles E.Perkins, "*Mobile IP: Design Principles and Practices*", Addison Wesley, USA 1999
	William Lee, "*Mobile Telecommunications*" McGraw Hill Singapore 2001
	Jochen Schiller – *"Mobile Communication"* Pearson Education New Delhi 2003

	Reference Books
1.	David J Goodman "*Wireless Personal Communication systems*" Addison Wesley Wireless communication series USA 1999.
2.	Raj Pandya, *"Mobile and Personal Communication Systems and Services"* IEEE Press, USA 2004.

	Web Resources
1.	https://www.tutorialspoint.com/mobile_computing/mobile_computing_useful_resources.htm

Title of the Course		ESSENTIAL REASONING AND QUANTITATIVE APTITUDE						
Paper Number		**Professional Competency Skill**						
Category	**PCS**	**Year**		III	**Credits**		2	**Course Code**
		Semester		VI				**23BCE6S1**
Instructional Hours per week		**Lecture**			**Tutorial**	**Lab Practice**		**Total**
		1			1	-		2

Objectives of the Course	• Develop Problem solving skills for competitive examinations • Understand the concepts of averages , simple interest , compound interest
UNIT-I:	**Quantitative Aptitude:** Simplifications=averages-Concepts –problem-Problems on numbers-Short cuts- concepts –Problems
UNIT-II:	Profit and Loss –short cuts-Concepts –Problems –Time and work -Short –uts -Concepts -Problems.
UNIT-III:	Simple interest –compound interest- Concepts- Prolems
UNIT-IV:	**Verbal Reasoning :** Analogy- coding and decoding –Directions and distance –Blood Relation
UNIT-V:	**Analytical Reasoning :** Data sufficiency Non-Verbal Reasoning : Analogy ,Classification and series
Skills acquired from this course	Studnets relating the concepts of compound interest and simple interest
Recommended Text	1."Quantitative Aptitude" by R.S aggarwal ,S.Chand & Company Ltd 2007
Website and e-Learning Source	https://nptel.ac.in