HAJEE KARUTHA ROWTHER HOWDIA COLLEGE

(An Autonomous Institution Affiliated to Madurai Kamaraj University, Madurai.)
Re-Accredited with A++ Grade by NAAC (3rd Cycle)
Uthamapalayam - 625 533.

DEPARTMENT OF COMPUTER SCIENCE

BACHELOR OF SCIENCE – COMPUTER SCIENCE

SYLLABUS (I Year)

Choice Based Credit System – CBCS

(As per TANSCHE/MKU Guidelines)

with

Outcome Based Education (OBE)

(With effect from Academic Year 2023 -2024 onwards)

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College Vision and Mission

Vision

Our vision is to provide the best type of higher education to all, especially to students hailing from minority Muslim community, rural agricultural families and other deprived, under privileged sections of the society, inculcating the sense of social responsibility in them. Our college is committed to produce talented, duty-bound citizens to take up the challenges of the changing times.

Mission

Our mission is to impart and inculcate social values, spirit of service and religious tolerance as envisioned by our beloved Founder President Hajee Karutha Rowther.

The Vision beckons ..... the Mission continues forever.

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Department Vision and Mission

Vision

The Department of Computer Science envisions to emerge as a centre for academic, software development and extension activities by producing outstanding computer professionals who can independently design, develop and implement computer applications accepting new challenges so as to contribute to the economic well-being of the nation.

Mission

1. Strive and achieve excellent standards of quality education through a well designed curriculum in tune with the challenging software needs of the industry.
2. Provide excellent undergraduate education in a state-of-the-art environment, preparing students for careers as computer professionals in industry, government and academia
3. Establish institute industry interaction programs to strengthen industry academic relationships for mutual benefit. Support students for their career development, professional growth and to sustain in lifelong learning

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- basedCurriculum 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 thatspans 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 solvingrequires precision, creativity, and careful reasoning. The ever-evolving discipline of computer sciencealso 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 bothcomputer 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 variousother 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 modifiedaccording 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 Addressissues 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 furtherstudies in Computer Science or Applications or Information Technology and its allied areason 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 thegrids: (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, advancedprogramming 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 thelatest – Statistics with R Programming, Data Science, Machine learing. Internet of Thingsand 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** (Disciplin	• Industry ready graduates • Skilled human resource • Students are equipped with essential skills to make them employable

	e centric / Generic / Entrepreneurial)	• 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 unde rGeneric 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 / IndustrialTraining	• 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 Competencycomponent	• 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 /		• To cater to the needs of peer learners / research aspirants

Honorsdegree	
Skills acquired fromthe Courses	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks
Methods of Assessment		
Recall(K1)	Simple definitions, MCQ, Recall steps, Concept definitions	
Understand/ Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, Short summary or Overview	
Application (K3)	Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain	
Analyze(K4)	Problem-solvingquestions,Finishaprocedureinmanysteps,Differentiate	
	between various ideas, Map knowledge	
Evaluate(K5)	Longer essay/Evaluation essay, Critique or justify with pros and cons	
Create(K6)	Checkknowledgeinspecificoroffbeatsituations,Discussion,Debatingor Presentations	

Programme Scheme Eligibility

A Pass in +2 examination conducted by Board of Higher Secondary Education, Government of Tamilnadu or equivalent with Mathematics as one of the subjects.

For Programme Completion

A Candidate shall complete:

- Part I - Language papers – Tamil/Arabic in semesters I, II, III and IV respectively
- Part II - Language papers - English in semesters I, II, III, IV respectively
- Part III - Core papers in semesters I, II, III, IV, V and VI respectively
- Part III - Elective papers (Discipline / Generic) in semesters I, II, III, IV, V and VI respectiv
- Part IV – Skill Enhancement Course (NME) papers in semesters I and II respectively
- Part IV - Skill Enhancement Course papers in semesters I, II, III, and IV respectively
- Part IV - Skill Enhancement Course (Foundation Course) paper in semester I respectively
- Part IV - Skill Enhancement Course (Professional Competency Skill) in semester VI respect
- Part IV - Value Education paper in semester V respectively
- Part IV - Environmental Studies paper in semesters III and IV respectively
- Part IV – Summer Internship/Industrial Training paper in semester V respectively

- Part V - Extension activity in semester VI respectively

Scheme of Examinations under Choice Based Credit System

Term End Examinations (TEE) - 75 Marks
Continuous Internal Assessment Examinations (CIAE) - 25 Marks
Total - 100 Marks

Pattern of Continuous Internal Assessment Examinations (CIAE)

Average of Two Internal Tests (each 20 marks) - 20 Marks

Assignment - 05 Marks Total - 25 Marks

Pattern of Term End Examinations

(Max. Marks: 75 / Time: 3 Hours)

External Examinations Question Paper Pattern for Part I & III and Part IV (Non- Major Elective & Skill based Subject)

Section – A (10 X 1 = 10 Marks)

Answer ALL questions.

- Questions 1 - 10
- Two questions from each unit
- Multiple choice questions and each question carries Four choices

Section – B (5 X 7 = 35 Marks)

Answer ALL questions choosing either A or B.

- Questions 11 - 15
- Two questions from each unit (either…. or…. type)
- Descriptive Type

Section – C (3 X 10 = 30 Marks)

Answer any THREE out of five questions.

- Questions 16 - 20
- One question from each unit
- Descriptive Type

External Examinations Question Paper Pattern for Part IV (Environmental Studies and Value Education)

Section – A: (5 X 6 = 30 Marks)

Answer ALL questions choosing either A or B.

- Questions 1 - 5
- Two questions from each unit (either…. or…. type)
- Descriptive Type

Section – B (3 X 15 = 45 Marks)

Answer any THREE out of five questions.

- Questions 6 – 10
- One question from each unit
- Descriptive Type

Part V (Extension Activities)

- Internal Evaluation

Passing Marks

Minimum 27 for External Exam
Eligibility for the degree – passing minimum is **40%**

Practical Examination

Internal – 40 marks

External – 60 marks

Total – 100 marks

Passing minimum is **40%**

Semester-I

Course Category	Course Code	Course Title	Hrs	CIAE	TEE	Max Marks	Credits
Part I	23UTALL11	பொதுத்தமிழ் - 1 தமிழ் இலக்கிய வரலாறு - 1	6	25	75	100	3
	23UARLL11	Paper I : Prose	6	25	75	100	3
	23UMMLL11	Prose, Composition and Translation	6	25	75	100	3
Part II	23UENLL11	General English - I	6	25	75	100	3
Part – III	23UCSCC11	Python Programming	5	25	75	100	5
	23UCSCC1P	CC2 - Python Programming Lab	5	40	60	100	5
	23UCSGE11	Elective Course 1 - Discrete Mathematics –I	4	25	75	100	3
Part IV	23UCSSE11	Skill Enhancement Course Fundamentals of Information Technology	2	25	75	100	2
	23UCSFN11	Foundation Course FC - Problem SolvingTechniques	2	25	75	100	2
Total			**30**				**23**

Semester-II

Course Category	Course Code	Course Title	Hrs	CIAE	TEE	Max Marks	Credits
Part-I	23UTALL21	பொதுத்தமிழ் - 2 தமிழ் இலக்கிய வரலாறு - 2	6	25	75	100	3
	23UARLL21	Paper II : Grammar	6	25	75	100	3
	23UMMLL21	Office Communication Malayalam	6	25	75	100	3
Part-II	23UENLL21	General English- II	6	25	75	100	3
Part-III	23UCSCC21	Data Structures and Algorithms	5	25	75	100	5
	23UCSCC2P	Practical: Data Structures and Algorithms Lab(C++)	5	40	60	100	5
	23UCSGE21	Numerical Methods – EC2(Annexure-I) (Generic / Discipline Specific)	4	25	75	100	3
Part -IV	23UCSSE21	Skill Enhancement Course- Office Automation (AnnexureII) - (Non Major Elective)	2	25	75	100	2
	23UCSSE2P	Skill Enhancement Course – Advanced Excel Lab(Annexure II) - (Discipline Specific / Generic)	2	40	60	100	2
Total			**30**				**23**

Course Code	Course Title	Category	Credits	Hours	Marks		
					CIAE	TEE	Total
23UCSCC11	Python programming	Core	5	5	25	75	100

Learning Objectives		
L1	To make students understand the concepts of Python programming.	
L2	To apply the OOPs concept in PYTHON programming.	
L3	To impart knowledge on demand and supply concepts	
L4	To make the students learn best practices in PYTHON programming	
L5	To know the costs and profit maximization	
UNIT	**Contents**	**No. of Hours**
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**
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**
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**
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**
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	
Course Outcomes		**Knowledge Level**

CO	On completion of this course, students will	
1	Learn the basics of python, Do simple programs on python, Learn how to use an array.	K1,K2,K3,K4
2	Develop program using selection statement, Work with Looping and jump statements, Do programs on Loops and jump statements.	K1,K2,K3,K4,K5,K6
3	Concept of function, function arguments, Implementing the concept strings in various application, Significance of Modules, Work with functions, Strings and modules.	K1,K2,K3,K4,K5,K6
4	Work with List, tuples and dictionary, Write program using list, tuples and dictionary.	K1,K2,K3,K4,K5,K6
5	Usage of File handlings in python, Concept of reading and writing files, Do programs using files.	K1,K2,K3,K4,K5
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.	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/	
	https://en.wikipedia.org/wiki/Python_(programming_language)	

Level of Correlation between PO's and CO's

CO /PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	3	3	3	3	2
CO3	3	3	3	3	2
CO4	3	3	3	3	2
CO5	3	2	3	3	3

Strong-3 Medium-2 Low-1

Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	2
CO3	3	3	3	3	2
CO4	3	3	3	3	2
CO5	3	2	3	3	3

Strong-3 Medium-2 Low-1

Course Code	Course Title	Category	Credits	Hours	Marks		
					CIAE	TEE	Total
23UCSCC1P	Python Programming Lab	Core	5	5	40	60	100

Learning Objectives	
L1	Be able to design and program Python applications.
L2	Be able to create loops and decision statements in Python.
L3	Be able to work with functions and pass arguments in Python.
L4	Be able to build and package Python modules for reusability.
L5	Be able to read and write files in Python.

LAB EXERCISES	Required Hours
1. Program using variables, constants, I/O statements in Python. 2. Program using Operators in Python. 3. Program using Conditional Statements. 4. Program using Loops. 5. Program using Jump Statements. 6. Program using Functions. 7. Program using Recursion. 8. Program using Arrays. 9. Program using Strings. 10. Program using Modules. 11. Program using Lists. 12. Program using Tuples. 13. Program using Dictionaries. 14. Program for File Handling.	75

Course Outcomes

Course Outcomes		Knowledge Level
CO	On completion of this course, students will	
1	Demonstrate the understanding of syntax and semantics of PYTHON language	K1,K2,K3,K4
2	Identify the problem and solve using PYTHON programming techniques.	K1,K2,K3,K4,K5,K6
3	Identify suitable programming constructs for problem solving.	K1,K2,K3,K4,K5,K6
4	Analyze various concepts of PYTHON language to solve the problem in an efficient way.	K1,K2,K3,K4,K5,K6
5	Develop a PYTHON program for a given problem and test for its correctness.	K1,K2,K3,K4,K5

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.	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/
	https://en.wikipedia.org/wiki/Python_(programming_language)

Level of Correlation between PO's and CO's

CO /PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	3	3	1	3	2
CO3	3	3	3	3	2
CO4	3	3	3	3	2
CO5	3	2	3	3	3

Strong-3 Medium-2 Low-1

Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	1	3	2
CO3	3	3	3	3	2
CO4	3	3	3	3	2
CO5	3	2	3	3	3

Strong-3 Medium-2 Low-1

Course Code	Course Title	Category	Credits	Hours	Marks		
					CIAE	TEE	Total
23UCSGE11	Discrete Mathematics – I	Elective	3	4	25	75	100

Learning Objectives		
L1	To understand the mathematical concepts like set theory, logics, number theory, combinatory and relations.	
L2	To Explain the Relations concepts and their properties	
L3	To know the Applications of recurrence relations	
L4	To understand the Graphs and Graphs models	
L5	To explain the Matrices concepts	
UNIT	**Contents**	**No. of Hours**
I	**SET THEORY :** Introduction- set and Its Element – Set Description(Roster, Set Builder and cardinal number method) Types of Sets- SetOperations and Laws of set Theory. Partition of sets. Minsets- Countable and un Countable set. Algebra of sets and Duality	12
II	**MATHEMATICAL LOGIC:** Basic Logic and Proof, logical operations – Logic Propositional equivalence, Predicates and Quantities, Tautology-Contradiction- Methods of proofs (Direct and Indirect)- Function- Definition-Notation- Types of Function- Composition of Functions-	12
III	**NUMBER THEORY:** The Integers and Division, Integers and Algorithms,(Multiplication, Addition and Division-Sequences and Summations, Recursive algorithms, Program correctness	12
IV	**COMBINATORICS:** The basics of counting, the pigeonhole principle, Permutations andCombinations, Binomial coefficients, Generalized permutations and combinations	12
V	**RELATIONS:** Relations – Relations and their properties, Representing Relations, Closures of relations, Equivalence relations, Partial orderings-Recurrence Relations Binary Relations.	12
	Total	60

Course Outcomes		Knowledge Level
CO	On completion of this course, students will	
1	To understand the mathematical concepts like set theory, logics, number theory, combinatory and relations.	K1,K2,K3,K4
2	To understand different mathematical logics and functions	K1,K2,K3,K4,K5,K6
3	To Understanding the different form of number theory	K1,K2,K3,K4,K5,K6
4	To gain knowledge on set theory	K1,K2,K3,K4,K5,K6
5	Able to understand Relations and its applications	K1,K2,K3,K4,K5

Textbooks	
1	Discrete Mathematics and its applications, Seventh Edition, Kenneth.H.Rosen, McGrawHill Publishing Company, 2012.
2	J.K Sharma "DISCRETE MATHEMATICS" 3rd Edition Macmillan Reprint, 2011
Reference Books	
1.	Johnson Baugh R, and Carman R, Discrete mathematics, 5th edition, Person Education, 2003.

2.	Kolman B, Busoy R.C, and Ross S.C, Discrete Mathematical Structures, 5th edition, Pretitice – Hall, 2004.
3.	Mott J.L, Kandel A, and Bake T.P, Discrete Mathematics for Computer Scientists & amp; Mathematicians, 2nd edition, Prentice-Hall of India, 2002.
Web Resources	
1.	Web resources from NDL Library, E-content from open-source libraries

Level of Correlation between PSO's and CO's

CO /PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	2
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	2	3	3	3
CO5	3	3	3	3	3

Strong-3 Medium-2 Low-1

Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	2
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	2	3	3	3
CO5	3	3	3	3	3

Strong-3 Medium-2 Low-1

Course Code	Course Title	Category	Credits	Hours	Marks		
					CIAE	TEE	Total
23UCSSE11	Fundamentals of Information Technology	NME	2	2	25	75	100

Learning Objectives		
L1	Understand basic concepts and terminology of information Technology.	
L2	Have a basic understanding of personal computers and their operation	
L3	Be able to identify data storage and its usage	
L4	Get great knowledge of software and its functionalities	
L5	Understand about operating system and their uses	
UNIT	**Contents**	**No. of Hours**
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	6
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.	6
III	**Storage Fundamentals:** Primary Vs Secondary Storage, Data storage & retrieval methods. Primary Storage: RAM ROM, PROM, EPROM, EEPROM. Secondary Storage: Magnetic Tapes, Magnetic Disks. Cartridgetape, hard disks, Floppy disks Optical Disks, Compact Disks, Zip Drive, Flash Drives	6
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	6
V	**Operating System:** Functions, Measuring System Performance, Assemblers, Compilers and Interpreters. Batch Processing, Multiprogramming, Multi Tasking, Multiprocessing, Time Sharing, DOS, Windows, Unix/Linux.	6
	Total	**30**

Course Outcomes		Knowledge Level
CO	**On completion of this course, students will**	
1	Learn the basics of computer, Construct the structure of the required things incomputer, learn how to use it.	K1,K2,K3,K4
2	Develop organizational structure using for the devices present currently underinput or output unit.	K1,K2,K3,K4,K5,K6
3	Concept of storing data in computer using two header namely RAM andROM with different types of ROM with advancement in storage basis.	K1,K2,K3,K4,K5,K6
4	Work with different software, Write program in the software and applicationsof software.	K1,K2,K3,K4,K5,K6
5	Usage of Operating system in information technology which really acts as ainterpreter between software and hardware.	K1,K2,K3,K4,K5
Textbooks		
1	Anoop Mathew, S. KavithaMurugeshan (2009), " Fundamental of InformationTechnology", 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 BookPublishing	
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	

Mapping with PO's:

CO /PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	3	3	3	3
CO 2	3	3	3	3	3	3
CO 3	3	3	3	3	3	3
CO 4	3	3	3	3	2	3
CO 5	3	3	2	3	3	2

Strong-3 Medium-2 Low-1

Mapping with PSO's:

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	3	3
CO 3	3	3	3	3	3	3
CO 4	3	3	3	3	2	3
CO 5	3	3	2	3	3	2

Strong-3 Medium-2 Low-1

Course Code	Course Title	Category	Credits	Hours	Marks		
					CIAE	TEE	Total
23UCSFN11	Problem Solving Techniques	FC	2	2	25	75	100

Learning Objectives		
L1	Familiarize with writing of algorithms, fundamentals of C and philosophy of problem solving.	
L2	Implement different programming constructs and decomposition of problems into functions.	
L3	Use data flow diagram, Pseudo code to implement solutions.	
L4	Define and use of arrays with simple applications	
L5	Understand about operating system and their uses	
UNIT	**Contents**	**No. of Hours**
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.	6
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.	6
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.	6
IV	**Data:** Numeric Data and Character Based Data. **Arrays:** One Dimensional Array - Two Dimensional Arrays – Strings as Arrays of Characters.	6
V	**Data Flow Diagrams:** Definition, DFD symbols and types of DFDs. **ProgramModules**: Subprograms-Value and Reference parameters- Scope of a variable - Functions – Recursion**. Files:** File Basics-Creating and reading a sequential file- Modifying Sequential Files.	6
	Total	**30**
Course Outcomes		**Knowledge Level**

CO	On completion of this course, students will	
1	Study the basic knowledge of Computers.Analyse the programming languages.	K1,K2,K3,K4
2	Study the data types and arithmetic operations. Know about the algorithms. Develop program using flow chart and pseudocode.	K1,K2,K3,K4,K5,K6
3	Determine the various operators. Explain about the structures. Illustrate the concept of Loops	K1,K2,K3,K4,K5,K6
4	Study about Numeric data and character-based data.Analyze about Arrays.	K1,K2,K3,K4,K5,K6
5	Explain about DFD Illustrate program modules. Creating and reading Files	K1,K2,K3,K4,K5
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	

Level of Correlation between PO's and CO's

CO /PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	2	3	3	3
CO4	3	3	2	3	3

S Strong-3 Medium-2 Low-1

Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	2	3	3	3
CO4	3	3	2	3	3
CO5	3	3	3	3	2

Strong-3 Medium-2 Low-1

Course Code	Course Title	Category	Credits	Hours	Marks		
					CIAE	TEE	Total
23UCSCC21	Data Structures And Algorithms	Core	5	5	25	75	100

Learning Objectives		
L1	To understand the concepts of ADTs	
L2	To learn linear data structures-lists, stacks, queues	
L3	To learn Tree structures and application of trees	
L4	To learn graph structures and application of graphs	
L5	To understand various sorting and searching	
UNIT	**Contents**	**No. of Hours**
I	Abstract Data Types (ADTs)- List ADT-array-based implementation-linked list implementation singly linked lists-circular linked lists-doubly- linked lists-applications of lists-Polynomial Manipulation-All operations-Insertion-Deletion-Merge-Traversal	15
II	Stack ADT-Operations- Applications- Evaluating arithmetic expressions– Conversion of infix to postfix expression-Queue ADT-Operations-Circular Queue- Priority Queue- dequeuer applications of queues.	15
III	Tree ADT-tree traversals-Binary Tree ADT-expression trees-applications of trees-binary search tree ADT- Threaded Binary Trees- AVL Trees- B-Tree- B+ Tree – Heap-Applications of heap.	15
IV	Definition- Representation of Graph- Types of graph-Breadth first traversal – Depth first traversal-Topological sort- Bi-connectivity – Cut vertex- Euler circuits-Applications of graphs	15
V	Searching- Linear search-Binary search-Sorting-Bubble sort-Selection sort-Insertion sort-Shell sort-Radix sort-Hashing-Hash functions- Separate chaining- Open Addressing-Rehashing Extendible Hashing	15
	Total	**75**

Course Outcomes		Knowledge Level
CO	**On completion of this course, students will**	
1	Understand the concept of Dynamic memory management, data types, algorithms, Big O notation	K1,K2,K3,K4
2	Understand basic data structures such as arrays, linkedlists, stacks and queues	K1,K2,K3,K4,K5,K6
3	Describe the hash function and concepts of collision andits resolution methods	K1,K2,K3,K4,K5,K6
4	Solve problem involving graphs, trees and heaps	K1,K2,K3,K4,K5,K6
5	Apply Algorithm for solving problems like sorting,searching, insertion and deletion of data	K1,K2,K3,K4,K5

Textbooks	
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, 2ndEdition
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/

Level of Correlation between PO's and CO's

CO /PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	3	3	1	3	3
CO3	3	3	3	3	2
CO4	3	2	3	3	3
CO5	3	3	3	3	3

Strong-3 Medium-2 Low-1

Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	1	3	3
CO3	3	3	3	3	2
CO4	3	2	3	3	3
CO5	3	3	3	3	3

Strong-3 Medium-2 Low-1

Course Code	Course Title	Category	Credits	Hours	Marks		
					CIAE	TEE	Total
23UCSCC2P	Data Structure and Algorithms Lab	Core	5	5	40	60	100

Learning Objectives		
L1	To understand the concepts of ADTs	
L2	To learn linear data structures-lists, stacks, queues	
L3	To learn Tree structures and application of trees	
L4	To learn graph structures and application of graphs	
L5	To understand various sorting and searching	
UNIT	**Contents**	**No. of Hours**
I	Write a program to implement the List ADT using arrays andlinked lists.	75
II	Write a programs to implement the following using a singly linked list. *Stack ADT *Queue ADT	
III	Write a program that reads an infix expression, converts the expression to postfix form and then evaluates the postfix expression (use stack ADT).	
IV	Write a program to implement priority queue ADT.	
V	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.	
VI	Write a program to perform the following operations • Insertion into an AVL-tree • Deletion from an AVL-tree	
VII	Write a programs for the implementation of BFS and DFS for a given graph.	
VIII	Write a programs for implementing the following searching methods: • Linear search • Binary search.	
IX	Write a programs for implementing the following sorting methods: • Bubble sort • Selection sort • Insertion sort • Radix sort.	
	Total	**75**

Course Outcomes		Knowledge Level
CO	**On completion of this course, students will**	
1	Understand the concept of Dynamic memory management, data types, algorithms, Big O notation	K1,K2,K3,K4
2	Understand basic data structures such as arrays, linkedlists, stacks and queues	K1,K2,K3,K4,K5,K6
3	Describe the hash function and concepts of collision and its resolution methods	K1,K2,K3,K4,K5,K6

4	Solve problem involving graphs, trees and heaps	K1,K2,K3,K4,K5,K6
5	Apply Algorithm for solving problems like sorting,searching, insertion and deletion of data	K1,K2,K3,K4,K5
Textbooks		
1	Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Pearson Education 2014, 4th Edition.	
2	Reema Thareja, "Data Structures Using C", Oxford Universities Press 2014, 2nd Edition	
Reference Books		
1.	Thomas H.Cormen, Chales E.Leiserson, RonaldL.Rivest, Clifford Stein, "Introduction toAlgorithms", 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/	

Level of Correlation between PO's and CO's

CO /PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	3	3	1	3	2
CO3	3	3	3	3	2
CO4	3	3	3	3	2
CO5	3	2	3	3	3

Strong-3 Medium-2 Low-1

Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	1	3	2
CO3	3	3	3	3	2
CO4	3	3	3	3	2
CO5	3	2	3	3	3

Strong-3 Medium-2 Low-1

Course Code	Course Title	Category	Credits	Inst. Hours	Marks		
					CIAE	External	Total
23UCSGE21	Numerical Methods	Elective	3	3	25	75	100

Learning Objectives		
L1	To introduce the various topics in Numerical methods.	
L2	To make understand the fundamentals of algebraic equations.	
L3	To apply interpolation and approximation on examples.	
L4	To solve problems using numerical differentiation and integration	
L5	To solve linear systems, numerical solution of ordinary differential equations.	
UNIT	**Contents**	**No. of Hours**
I	**FUNDAMENTALS OF ALGEBRAIC EQUATION:** Solution of algebraic and transcendental equations-Bisection method – Fixed point iteration method – Newton Raphson method –linear system of equations – Gauss elimination method – Gauss Jordan method	9
II	**ITERATIVE, INTERPOLATION AND APPROXIMATION:** Iterative methods - Gauss Jacobi and Gauss Seidel – Eigen values of a matrix by Power method and Jacobi‟s method for symmetric matrices. Interpolation with unequal intervals– Lagrange‟s interpolation – Newton‟s divided difference interpolation	9
III	**INTERPOLATION WITH EQUAL INTERVAL:** Difference operators and relations. -Interpolation with equal intervals – Newton‟s forward and backward difference formulae.	9
IV	**NUMERICAL DIFFERENTIATION AND INTEGRATION:** Approximation of derivatives using interpolation polynomials – Numerical integration using Trapezoidal, Simpson‟s 1/3 rule	9
V	**INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS**: Single step methods – Taylor‟s series method – Euler‟s method –Modified Euler‟s method - RungeKutta method for solving(first, second , Third and 4th) order equations – Multi step methods.	9
	Total	**45**

Course Outcomes		Knowledge Level
CO	**On completion of this course, students will**	
1	Know how to solve various problems on numerical methods	K1,K2,K3,K4
2	Use approximation to solve problems	K1,K2,K3,K4,K5,K6
3	Differentiation and integration concept are applied	K1,K2,K3,K4,K5,K6
4	Apply , direct methods for solving linear systems	K1,K2,K3,K4,K5,K6
5	To obtain knowledge in methods using initial values in numerical methods.	K1,K2,K3,K4,K5

Textbooks	
1	Charles Dierbach, “Introduction to Computer Science using Python - A computational Problem solving Focus”, Wiley India Edition, 2015
2	Wesley J. Chun, “Core Python Applications Programming”, 3rd Edition , Pearson Education, 2016
Reference Books	

1.	Mark Lutz, “Learning Python Powerful Object Oriented Programming”, O’reilly Media 2018, 5th Edition.
2.	Timothy A. Budd, “Exploring Python”, Tata MCGraw Hill Education Private Limited 2011, 1st Edition
3.	John Zelle, “Python Programming: An Introduction to Computer Science”, Second edition, Course Technology Cengage Learning Publications, 2013, ISBN 978-1590282410
4.	Michel Dawson, “Python Programming for Absolute Beginers” , Third Edition, Course Technology Cengage Learning Publications, 2013, ISBN 978-1435455009
Web Resources	
Web resources from NDL Library, E-content from open-source libraries	

Level of Correlation between PO’s and CO’s

CO /PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	2	3	3	3
CO4	3	3	3	2	3
CO5	3	3	3	3	3

Strong-3 Medium-2 Low-1

Level of Correlation between PSO’s and CO’s

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	2	3	3	3
CO4	3	3	3	2	3
CO5	3	3	3	3	3

Strong-3 Medium-2 Low-1

Course Code	Course Title	Category	Credits	Hours	Marks		
					CIAE	TEE	Total
23UCSSE21	Office Automation	NME	2	2	25	75	100

Learning Objectives		
L1	Understand the basics of computer systems and its components.	
L2	Understand and apply the basic concepts of a word processing package.	
L3	Understand and apply the basic concepts of electronic spreadsheet software.	
L4	Understand and apply the basic concepts of database management system.	
L5	Understand and create a presentation using PowerPoint tool.	
UNIT	**Contents**	**No. of Hours**
I	**Introductory concepts:** Memory unit– CPU-Input Devices: Key board, Mouse and Scanner. Output devices: Monitor, Printer. Introduction to Operating systems & its features: DOS– UNIX–Windows. Introduction to Programming Languages.	6
II	**Word Processing:** Open, Save and close word document; Editing text – tools, formatting, bullets; Spell Checker - Document formatting – Paragraph alignment, indentation, headers and footers, numbering; printing– Preview ,options, merge.	6
III	**Spreadsheets:** Excel– opening, entering text and data, formatting, navigating; Formulas– entering, handling and copying; Charts–creating, formatting and printing, analysis tables, preparation of financial statements, introduction to data analytics.	6
IV	**Database Concepts:** The concept of data base management system; Data field, records, and files, Sorting and indexing data; Searching records. Designing queries, and reports; Linking of datafiles; Understanding Programming environment in DBMS; Developing menu drive applications inquiry language(MS–Access).	6
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		Knowledge Level
CO	On completion of this course, students will	
1	Possess the knowledge on the basics of computers and its components	K1,K2,K3,K4
2	Gain knowledge on Creating Documents, spreadsheetand presentation.	K1,K2,K3,K4,K5,K6

3	Learn the concepts of Database and implement theQuery in Database.	K1,K2,K3,K4,K5,K6
4	Demonstrate the understanding of differentautomation tools.	K1,K2,K3,K4,K5,K6
5	Utilize the automation tools for documentation,calculation and presentation purpose.	K1,K2,K3,K4,K5
Textbooks		
1	PeterNorton,"IntroductiontoComputers"–TataMcGraw-Hill.	
Reference Books		
1.	Jennifer Ackerman Kettel, Guy Hat-Davis, Curt Simmons, "Microsoft 2003", TataMcGrawHill.	
Web Resources		
1.	https://www.udemy.com/course/office-automation-certificate-course/	
2.	https://www.javatpoint.com/automation-tools	

Mapping with PO's:

CO /PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	2	2	3	3	3
CO 2	3	3	3	3	3	3
CO 3	3	3	3	3	3	3
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3

Strong-3 Medium-2 Low-1

Mapping with PSO's:

CO /PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	2	2	3	3	3
CO 2	3	3	3	3	3	3
CO 3	3	3	3	3	3	3
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3

Strong-3 Medium-2 Low-1

Course Code	Course Title	Category	Credits	Hours	Marks		
					CIAE	TEE	Total
23UCSSE2P	Advanced Excel Lab	SEC	2	2	40	60	100

Learning Objectives		
L1	Handle large amounts of data	
L2	Aggregate numeric data and summarize into categories and subcategories	
L3	Filtering, sorting, and grouping data or subsets of data	
L4	Create pivot tables to consolidate data from multiple files	
L5	Presenting data in the form of charts and graphs	
UNIT	**Contents**	**No. of Hours**
I	**(Related programs to below concepts)** Basics of Excel- Customizing common options- Absolute and relative cells- Protecting and un-protecting worksheets and cells- Working with Functions - Writing conditional expressions - logical functions - lookup and reference functions- VlookUP with Exact Match, Approximate Match- Nested VlookUP with Exact Match- VlookUP withTables, Dynamic Ranges- Nested VlookUP with Exact Match- Using VLookUP to consolidate Data from MultipleSheets	6
II	Data Validations - Specifying a valid range of values - Specifying a list of valid values- Specifying custom validations based on formula - Working with Templates Designing the structure of a template- templates for standardization of worksheets - Sorting and Filtering Data - Sorting tables- multiple-level sorting- custom sorting- Filtering data for selected view - advanced filter options- Working with Reports Creating subtotals- Multiple-level subtotal.	6
III	Creating Pivot tables Formatting and customizing Pivot tables- advanced options of Pivot tables- Pivot charts- Consolidating data from multiple sheets and files using Pivottables- external data sources- data consolidation feature to consolidate data- Show Value As % of Row, % of Column, Running Total, Compare with Specific Field- Viewing Subtotal under Pivot- Creating Slicers.	6
IV	More Functions Date and time functions- Text functions- Database functions- Power Functions - Formatting Using auto formatting option for worksheets- Using conditionalformatting option for rows, columns and cells- What If Analysis - Goal Seek- Data Tables- Scenario Manager.	6
V	Charts - Formatting Charts- 3D Graphs- Bar and Line Chart together- Secondary Axis in Graphs- Sharing Charts with PowerPoint / MS Word, Dynamically- New Features Of Excel Spark lines, Inline Charts, data Charts- Overview of allthe new features.	6
	Total	**30**

Course Outcomes		Knowledge Level
CO	On completion of this course, students will	
1	Work with big data tools and its analysis techniques.	K1,K2,K3,K4
2	Analyze data by utilizing clustering and classification algorithms.	K1,K2,K3,K4,K5,K6

3	Learn and apply different mining algorithms and recommendation systems for large volumes of data.	K1,K2,K3,K4,K5,K6
4	Perform analytics on data streams.	K1,K2,K3,K4,K5,K6
5	Learn No-SQL databases and management.	K1,K2,K3,K4,K5
Textbooks		
1	Excel 2019 All	
2	Microsoft Excel 2019 Pivot Table Data Crunching	
Reference Books		
1.	Excel 2019 All-in-One for Dummies, Greg Harvey, 1st edition	
Web Resources		
1.	https://www.simplilearn.com	
2.	https://www.javatpoint.com	
3.	https://www.w3schools.com	

Level of Correlation between PO's and CO's

CO /PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	3	3	1	2	3
CO3	3	3	3	2	3
CO4	3	3	3	2	3
CO5	3	2	3	3	3

Strong-3 Medium-2 Low-1

Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	1	2	3
CO3	3	3	3	2	3
CO4	3	3	3	2	3
CO5	3	2	3	3	3

Strong-3 Medium-2 Low-1