MOTHER TERESA WOMEN'S UNIVERSITY, KODAIKANAL - 624101

DEPARTMENT OF COMPUTER SCIENCE

BCA

Curriculum Framework, Syllabus and Regulations

(Based on TANSCHE syllabus under Choice Based Credit System - CBCS)

(For the candidates to be admitted from the Academic Year 2023-24)

BCA

(Bachelor of Computer Application)

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 Application 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 Application 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 Application 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 Application 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 Application 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 Application 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 Application 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.

LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK GUIDELINES BASED REGULATIONSFOR UNDER GRADUATE PROGRAMME	
Programme:	**B.C.A.,**
Programme Code:	
Duration:	**3 years [UG]**
Programme Outcomes:	**PO1: Disciplinary knowledge:** Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate Programme of study **PO2: Communication Skills:** Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share one's views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups. **PO3: Critical thinking:** Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices,

policies and theories by following scientific approach to knowledge development.

PO4: Problem solving: Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's learning to real life situations.

PO5: Analytical reasoning: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples, and addressing opposing viewpoints.

PO6: Research-related skills: A sense of inquiry and capability for asking relevant/appropriate questions, problem arising, synthesising and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyse, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation

PO7: Cooperation/Team work: Ability to work effectively and respectfully withdiverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team

PO8: Scientific reasoning: Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.

PO9: Reflective thinking: Critical sensibility to lived experiences, with selfawareness and reflexivity of both self and society.

PO10 Information/digital literacy: Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data.

PO 11 Self-directed learning: Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.

PO 12 Multicultural competence: Possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups.

PO 13: Moral and ethical awareness/reasoning: Ability to embrace moral/ethical values in conducting one's life, formulate a position/argument

about an ethical issue from multiple perspectives, and use ethical practices in all work. Capable of demon starting the ability to identify ethical issues related to one‟s work, avoid unethical behaviour such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights; appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.

PO 14: Leadership readiness/qualities: Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating and inspiring team members to engage with that vision, and using management skills to guide people to the right destination, in a smooth and efficient way.

PO 15: Lifelong learning: Ability to acquire knowledge and skills, including „learning how to learn‟, that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing trades and demands of work place through knowledge/skill development/reskilling.

Programm eSpecific Outcomes:	**PSO1**: To enable students to apply basic microeconomic, macroeconomic and monetary concepts and theories in real life and decision making. **PSO 2**: To sensitize students to various economic issues related to Development, Growth, International Economics, Sustainable Development and Environment. **PSO 3**: To familiarize students to the concepts and theories related to Finance, Investments and Modern Marketing. **PSO 4**: Evaluate various social and economic problems in the society and develop answer to the problems as global citizens. **PSO 5:** Enhance skills of analytical and critical thinking to analyze effectiveness of economic policies.

	PO 1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO 8**
PSO 1	Y	Y	Y	Y	Y	Y	Y	Y
PSO 2	Y	Y	Y	Y	Y	Y	Y	Y
PSO3	Y	Y	Y	Y	Y	Y	Y	Y
PSO 4	Y	Y	Y	Y	Y	Y	Y	Y
PSO 5	Y	Y	Y	Y	Y	Y	Y	Y

3 – Strong, 2- Medium, 1- Low

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 Mathematics 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 - Artificial Intelligence.

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 Literature and analysing the world through the literary lens gives rise to a new perspective.	➢ Instill Confidence amongstudents ➢ Create interest for thesubject
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 language and communication skills enable the students gain • knowledge and • exposure in the competitive world.
		• Discipline centric skill will improve the Technical knowhow of solving real life • problems.
III, IV, V & VI	Elective papers	• Strengthening the domain knowledge • Introducing the stakeholders tothe State-of Art techniques from the streams of multi- disciplinary, cross disciplinary and inter disciplinary nature • Emerging topics in higher education/industry/ communication network / health • Sector etc. are introduced with hands-on-training.

IV	Elective Papers	➢ Exposure to industry moulds students into solution providers ➢ Generates Industryready graduates ➢ Employment opportunities enhanced
V Semester	Elective papers	➢ Self-learning is enhanced ➢ Application of the concept to real situation is conceived resulting in tangible outcome
VI Semester	Elective papers	➢ Enriches the study beyond the course. ➢ Developing a research framework and presenting their independent and intellectual ideas effectively.
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, Analyticalability, Professional Competency, Professional Communication and Transferrable Skill

Consolidated Semester wise and Component wise Credit distribution

Parts	Sem. I	Sem. II	Sem. III	Sem. IV	Sem. V	Sem. VI	Total Credits
Part I	3	3	3	3	-	-	12
Part II	3	3	3	3	-	-	12
Part III	11	11	11	11	22	18	84
Part IV	6	6	6	7	3	3	31
Part V	-	-	-	-	-	1	1
Total	23	23	23	24	25	22	**140**

*Part I. II, and Part III components will be separately taken into account for CGPA calculation and classification for the under graduate programme and the other components. IV, V have to be completed during the duration of the programme as per the norms, to be eligible for obtaining the UG degree

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-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge	
Evaluate (K5)	Longer essay/ Evaluation essay, Critique or justify with pros and cons	
Create (K6)	Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations	

SEMESTER I							
Category	Course Code	Course Title	Credits	Hrs./Week	CIA	ESE	Total Marks
PART I	U23TAL11	Language	3	6	25	75	100
PARTII	U23ENL21	English	3	6	25	75	100
PART III	U23CAT11	CC1 – Python Programming	5	5	25	75	100
	U23CAP11	CC2 - Practical: Python ProgrammingLab	5	5	25	75	100
	U23CAE11	Elective Course I – Database Management System (DBMS)	3	4	25	75	100
PART IV	U23CAS11	Skill Enhancement Course (SEC-I): Office Automation Lab	2	2	25	75	100
	U23CAF11	Foundation Course FC – Structured Programming in C	2	2	25	75	100
		Total	23	30			

SEMESTER - II							
Category	Course Code	Course Title	Credits	Hrs./Week	CIA	ESE	Tot. Marks
PART 1	U23TAL12	Language – 1	3	6	25	75	100
PART II	U23ENL22	English	3	6	25	75	100
PART III	U23CAT23	Core-1: Object Oriented Programming Concepts using C++	5	5	25	75	100
	U23CAP24	Core-2: Practical - C++ Programming Lab	5	5	25	75	100
	U23CAE22	Elective Course II – Graph Theory andits Applications	3	4	25	75	100
PART IV	U23CAS22	SEC 2 – Soft Skills	2	2	25	75	100
	U23CAS23	SEC 3 – Web Designing	2	2	25	75	100
		Total	23	30			

FIRST YEAR

SEMESTER - I

Subject Code	Subject Name	Category	L	T	P	S	Credits	CIA	External	Total
								Marks		
U23CAT11	**PYTHON PROGRAMMING**		5	-	-	-	4	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	

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 - else if - 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 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, Learn how to use an array.	PO1, PO2, PO3, 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	Reema Thareja, "Python Programming using problem solving approach", First Edition, 2017, Oxford University Press.
2	Dr. R. Nageswara Rao, "Core Python Programming", First Edition, 2017, Dream tech Publishers.

	Reference Books
1.	Vamsi Kurama, "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	2	2	3	3	3
CO 2	3	2	2	3	2	3
CO 3	3	2	2	3	2	2
CO 4	3	2	2	3	2	3
CO 5	3	2	2	3	3	3
Weightage of course contributed to each PSO	15	10	10	15	13	14

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

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
U23CAP11	**PYTHON PROGRAMMING LAB**		-	-	4	-	4	25	75	100

Course Objectives:

1. Be able to design and program Python applications.
2. Be able to create loops and decision statements in Python.
3. Be able to work with functions and pass arguments in Python.
4. Be able to build and package Python modules for reusability.
5. 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	
On completion of this course, students will	
CO1	Demonstrate the understanding of syntax and semantics of
CO2	Identify the problem and solve using PYTHON programming techniques.
CO3	Identify suitable programming constructs for problem solving.
CO4	Analyze various concepts of PYTHON language to solve the problem in an efficient way.
CO5	Develop a PYTHON program for a given problem and test for its correctness.

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	2	2	2	2	3	2
CO 2	2	1	3	2	-	2
CO 3	3	3	1	1	1	2
CO 4	2	3	3	1	-	1
CO 5	3	2	3	1	1	-
Weightage of course contributed to each PSO	12	11	12	7	5	7

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
U23CAE11	**DBMS**	Elective	-	Y	-	-	4	5	25	75	100

Course Objective	
LO1	Describe basic concepts of database system
LO2	Design a Data model and Schemas in RDBMS
LO3	Competent in use of SQL
LO4	Analyze functional dependencies for designing robust Database
LO5	Describe basic concepts of database system

UNIT	**Details**	**No. of Hours**
I	UNIT - I Introduction to DBMS– Data and Information - Database – Database Management System – Objectives - Advantages – Components - Architecture. ER Model: Building blocks of ER Diagram – Relationship Degree – Classification – ER diagram to Tables – ISA relationship – Constraints – Aggregation and Composition – Advantages	12
II	Relational Model: CODD's Rule- Relational Data Model - Key - Integrity – Relational Algebra Operations – Advantages and limitations – Relational Calculus – Domain Relational Calculus - QBE.	12
III	Structure of Relational Database. Introduction to Relational Database Design - Objectives – Tools – Redundancy and Data Anomaly – Functional Dependency - Normalization – 1NF – 2NF – 3NF – BCNF. Transaction Processing – Database Security.	12

IV	UNIT - IV SQL: Commands – Data types – DDL - Selection, Projection, Join and Set Operations – Aggregate Functions – DML – Modification - Truncation - Constraints – Subquery.	12
V	UNIT - V PL/SQL: Structure - Elements – Operators Precedence – Control Structure – Iterative Control - Cursors - Procedure - Function - Packages – Exceptional Handling - Triggers.	12
	Total	**60**

Course Outcomes		**Programme Outcome**
CO	On completion of this course, students will	
1	Understand basic concepts of database system	PO1
2	Design a Data model and Schemas in RDBMS	PO1, PO2
3	Understand Competent in use of SQL	PO4, PO6
4	Analyze functional dependencies for designing robust Database	PO4, PO5, PO6
5	Understand basic concepts of database system	PO3, PO8
Text Book		
1	TEXT BOOK: 1. S. Sumathi, S. Esakkirajan, "Fundamentals of Relational Database Management System", Springer International Edition 2007.	
Reference Books		
1.	REFERENCE BOOKS:	
2.	1. Abraham Silberchatz, Henry F. Korth, S. Sudarshan, "Database System Concepts", McGrawHill 2019, 7th Edition.	
3.	2. Alexis Leon & Mathews Leon, "Fundamentals of DBMS", Vijay Nicole Publications 2014, 2nd Edition.	
Web Resources		
1.	NPTEL & MOOC courses titled Relational Database Management Systems	
2.	https://nptel.ac.in/courses/106106093/	
3.	https://nptel.ac.in/courses/106106095/	

Mapping with Programme Outcomes:

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

CO 4	3	-	1	-	2	2
CO 5	3	2	1	3	2	2
Weightage of course contributed to each PSO	12	6	5	9	6	6

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
U23CAS11	**OFFICE AUTOMATION LAB**	Specific Elective		Y	-	-	2	2	25	75	100

Course Objective	
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.

UNIT	**Details**	**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	**Spreadsheet:** 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 data files; Understanding Programming environment in DBMS; Developing	6

	menu drive applications in query language (MS–Access).	
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	
1	Possess the knowledge on the basics of computers and its components	PO1,PO2,PO3,PO6,PO8
2	Gain knowledge on Creating Documents, spreadsheet and presentation.	PO1,PO2,PO3,PO6
3	Learn the concepts of Database and implement the Query in Database.	PO3,PO5,PO7
4	Demonstrate the understanding of different automation tools.	PO3,PO4,PO5,PO7
5	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
CO 1	2	2	2	3	3	1
CO 2	3	1	2	3	3	3
CO 3	3	2	1	2	1	3
CO 4	3	3	2	2	2	1
CO 5	2	2	1	3	1	3
Weightage of course contributed to each PSO	13	10	8	13	10	11

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

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks	
									CIA	External
U23CAF11	**Structured Programming in C**	FC	Y	-	-	-	2	2	25	75

Course Objective	
LO1	To familiarize the students with the Programming basics and the fundamentals of C, Data types 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
LO5	To understand the concept of implementing pointers.

UNIT	Details	No. of Hours	Course Objective
I	**Overview of C**: Importance of C, sample C program, C program structure, executing C program. Constants, Variables, and Data Types: Character set, C tokens, keywords and identifiers, constants, variables, data types, declarationof variables, Assigning values to variables---Assignment statement, declaring a variable as constant, as volatile. Operators and Expression.	6	CO1
II	**Decision Making and Branching**: Decision making with If, simple IF, IF ELSE, nested IF ELSE, ELSE IF ladder, switch,GOTO statement. **Decision Making and Looping**: While, Do-While, For, Jumps in loops.	6	CO2
III	**Arrays**: Declaration and accessing of one & two-dimensional arrays,initializing two-dimensional arrays, multidimensional arrays.	6	CO3

IV	**Functions**: The form of C functions, Return values and types, calling a function, categories of functions, Nested functions, Recursion, functions with arrays, call by value, call by reference, storage classes-character arrays and string functions	6	CO4
V	**Pointers:** definition, declaring and initializing pointers, accessing a variable through address and through pointer, pointer expressions, pointer increments and scale factor, pointers and arrays, pointers and functions, pointers and structures.	6	CO5
	Total		

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 types, operators, branching and looping, arrays, functions, structures, pointers and files)	PO2,PO3,PO6,PO7	
3	Apply the programming principles learnt in real-time problems	PO3,PO4,PO7	
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	PO7,PO8	
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, 199	8	
3.	Yashavant Kanetkar, Let Us C, Eighteenth Edition, BPB Publications,2021		
Web Resou			

	rces		
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/

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	1	2	2	2	2	-
CO 2	2	2	2	2	-	2
CO 3	3	2	2	1	1	-
CO 4	3	2	2	1	-	1
CO 5	1	2	2	2	2	3
Weightage of course contributed to each PSO	7	10	10	18	15	6

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

FIRST YEAR

SEMESTER - II

Title of the Course/ Paper	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
U23CAT23	**OBJECT ORIENTED PROGRAMMING CONCEPTS USING C**++	Core	Y	-	-	-	4	5	25	75	

Course 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, constructordestructors, etc
LO3	Describe the concept of function overloading, operator overloading, virtual functions a 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

UNIT	Details	No. of Hour
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
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
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

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
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 semantics	PO1,PO6
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 ,PO7
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	PO7,PO8
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	2	1	-	-	1
CO 2	2	2	2	1	-	-

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 3	3	1	1	-	1	-
CO 4	1	2	1	2	2	1
CO 5	3	2	1	2	3	2
Weightage of course contributed to each PSO	12	9	6	5	6	4

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
U23CAT24	<u>**C++ PROGRAMMING LAB**</u>	Core	-	-	Y	-	4	5	25	75	100

Course 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	

S. No.	Details	No. of Hours
1	Write a C++ program to demonstrate function overloading, Default Arguments and Inline function.	75
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 concept of Passing Objects to Functions	
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 • Multilevel Inheritance • Multiple Inheritance • Hierarchical Inheritance • Hybrid Inheritance
10	Write a C++ program to demonstrate Virtual Functions.
11	Write a C++ program to manipulate a Text File.
12	Write a C++ program to perform Sequential I/O Operations on a file.
13	Write a C++ program to find the Biggest Number using Command Line Arguments
14	Write a C++ program to demonstrate Class Template
15	Write a C++ program to demonstrate Function Template.
16	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	PO1,PO6
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 ,PO7
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	PO7,PO8

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:

O/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	1	2
CO 2	2	3	3	3	1	2
CO 3	2	3	3	3	1	2
CO 4	2	3	3	3	1	2
CO 5	2	3	3	3	1	2
Weightage of course contributed to each PSO	11	15	15	15	5	10

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

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst.	Marks		
									CIA	External	Total
U23CAE22	Graph Theory and Its **Applications**	Specific Elective	Y	-	-	-	2	2	25	75	100

Course Objective	
LO1	To acquire knowledge of different types of graphs
LO2	To understand different Models of a graph
LO3	To understand how to solve different real life problems
LO4	To understand many techniques to solve a particular problem
LO5	To understand directed graphs.

UNIT	Details	No. of Hours	Course Objective

I	**Unit-I:Graphs:** Definition of Graph–Examples for Graph- various definitions in Graph – Pictorial representation - sub graphs definition – examples- Isomorphism between Graphs – degree of Graph - Walks and connected graphs-cycles in graphs –cut vertices and cutedges definition and examples ..	12	C1
II	**Unit-II: Eulerian Graphs** Introduction of Eulerian graphs - definition and examples of Euleria ngraphs - Fleury's Algorithm for Graph–	12	C2
III	**Unit-III:Hamiltonian Graphs& BipartiteGraphs:** Introduction of Hamiltonian Graphs – Definition and example of Hamiltonian Graphs -Weighted graphs definition and examples .Introduction and definition of – algorithm and examples	12	C3
IV	**Unit-IV: Trees** Trees.- Definition –Example-Incident matrix in Graph algorithm and examples -adjacent matrix in Graph algorithm and examples - path matrix in Graph algorithm and examples and circuit matrix inGraph	12	C4
V	**Unit-V:PlanarGraphs:** Defining of Planer graphs – Examples for Planer graphs - Euler's Formula for: Planar Graph –Platonic solids-Dual of aplane graphs – definition and examples of dual of a plane graph – Characterization of planer graphs.	12 C5	
	Total	**60**	

TextBook:

1. **S.A.Choudum**, ̶AfirstCoursein Graph Theory‖, Macmillan india limited,1999.

ReferenceBooks:

1. **Arumugam S and Thangapandi Issac**,‖Graphtheory‖,ScitechPublicationp vt ltd,Edition 2014.
2. **S.A.Choudum**, ̶Afirst Course in Graph Theory‖, MacmillanIndia limited, 2007.

CourseOutcome:

	Onthesuccessful coursecompletion, studentswillbeable to	CognitiveLevel
CO1	Rememberandunderstandthetheoreticalknowledgeofgraph theoryto solveproblems.	K1,K2
CO2	Understand theories and concepts to test and validateintuitionandindependentmathematicalthinkinginproblemsolving.	K2
CO3	Applynetworksusingthemainconceptsofgraphtheory.	K3
CO4	UsedefinitionsingraphtheorytoAnalyzeexamplesandto distinguishexamples fromnon-example.	K4
CO5	Evaluategraphtheoryinacoherentandtechnicallyaccuratemanner.	K5

K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5- Evaluate; K6–Create

RelationshipMatrixforCourseOutcomes,ProgrammeOutcomesandProgrammeSpecificOutcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	M	M	S	S	M	M	M
CO2	S	S	M	M	M	S	M	S	S	M
CO3	S	M	S	M	M	M	M	M	S	S
CO4	S	M	M	S	M	S	S	M	S	S
CO5	S	S	M	M	M	M	S	M	S	S

*S-Strong;M-Medium;L-Low

- **U23CAS22 – SEC-2 – Soft Skills (Common Paper)**

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst.	Marks		
									CIA	Exter	Total
U23CAS23	**WEB DESIGNING**	Specific Elective	Y	-	-	-	2	2	25	75	100
Course Objective											
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										

UNIT	Details	No. of Hours	Course Objective
I	HTML: HTML-Introduction-tag basics- page structure-adding comments working with texts, paragraphs and line break. Emphasizing test- heading and horizontal rules-list-font size, face and color-alignment links-tables-frames.	6	C1
II	Forms & Images Using Html: Graphics: Introduction-How to work efficiently with images in web pages, image maps, GIF animation, adding multimedia, data collection with html forms textbox, password, list box, combo box, text area, tools for building web page front page.	6	C2
III	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	C3
IV	Dynamic HTML: Document object model (DCOM)-Accessing HTML & CSS through DCOM Dynamic content styles & positioning-Event bubbling-data binding. JavaScript: Client-side scripting, What is JavaScript, How to develop JavaScript, simple JavaScript, variables, functions, conditions, loops and repetition,	6	C4
V	Advance script, JavaScript and objects, JavaScript own objects, the DOM and web browser environments, forms and validations.	6	C5
	Total	**30**	

	Course Outcomes	Programme Outcome
CO	On completion of this course, students will	
1	Develop working knowledge of HTML	PO1, PO3, PO6, PO8
2	Ability to Develop and publish Web pages using Hypertext Markup Language (HTML).	PO1,PO2,PO3,PO6
3	Ability to optimize page styles and layout with Cascading Style Sheets (CSS).	PO3, PO5
4	Ability to develop a java script	PO1, PO2, PO3, PO7
5	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, Rafe Colburn , Jennifer Kyrnin, "Mastering HTML, CSS &Javascript We 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:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	-	2	1	1
CO 2	3	3	-	2	-	1
CO 3	3	3	-	2	2	1
CO 4	3	3	-	2	-	1
CO 5	3	3	3	2	-	1
Weightage of course contributed to each PSO	15	15	3	10	3	4

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

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