MARUDHAR KESARI JAIN COLLEGE FOR WOMEN (AUTONOMOUS)

Vaniyambadi – 635 751

PG Department of Computer Applications

for

Undergraduate Programme

Bachelor of Computer Applications

From the Academic Year 2024-25

CONTENT

LEARNING OUTCOMES BASED CURRICULUM FRAMEWORK FOR UNDERGRADUATE EDUCATION

1. Preamble

The Department of Computer Applications started a programme as Specialization on BCA-1998 MCA-2002. As College is granted academic autonomy in the year 2024 it has the privilege of restructuring the syllabus and introducing new career oriented industry ready programs. Keeping an eye on the industry and to modernize the curriculum, the Board of Studies of the Department of Computer Applications, has initiated an industry collaboration to impart Bachelor of Computer Application, specialized in Mobile Applications and Cloud Technology. This programme comprises complementary course Mathematics and vocational course Cloud Technology.The main objective of this programme is to inculcate and horn up the skills of young minds in new generation technologies to compete in the knowledge era. This programme is designed in such a way that students can have a detailed knowledge of subjects as well as the knowledge of IT related applications. Throughout this programme the students will go through the IT scenario, its scope, career and the essentials of the IT world. This unique programme provides dual career options for the students in the latest and fast growing technology sectors of Mobile Applications and Cloud Technology.The syllabus aims to focus on enabling the students to familiarize with the new technologies, and at the same time enhance and strengthen the fundamental knowledge in Computer Applications, and related fields.

PROGRAMME OUTCOMES (PO)

Programme	**B.C.A**
Programme Code	**US02**
Duration	**3 Years**
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, synthesizing and articulating; Ability to recognize 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 / Teamwork:** Ability to work effectively and respectfully with diverse 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.

Programme Specific Outcomes:	**PSO1 – Placement:** To prepare the students who will demonstrate respectful engagement with others' ideas, behaviors, and beliefs and apply diverse frames of reference to decisions and actions. **PSO2 - Entrepreneur:** To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skills that will facilitate startups and high potential organizations. **PSO3 – Research and Development:** Design and implement HR systems and practices grounded in research that comply with employment laws, leading the organization towards Growth and development.

Eligibility for Admission:

Candidates for admission to the first year of the Bachelor of Computer Applications course shall be required to have passed the Higher Secondary Course Examination (Academic or Vocational) by the Government of Tamilnadu with Mathematics / Business Mathematics / Statistics / Computer Science / Commerce / Accountancy as a subject.

Methods of Evaluation and Assessment

Methods of Evaluation		
Internal Evaluation		25 Marks
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						
Code	Course Title	Hours Distribution				C
		L	T	P	S	
24UFTA11	Tamil – 1	4	1	0	0	3
24UFEN11	English – 1	4	1	0	0	3
24UCAC11	CC – 1-Programming in C	3	1	2	0	5
24UCAC12P	CC - 2 C Lab	0	0	4	0	3
24UMAA12	EC - 1 AL Statistical Methods and its Applications	3	1	0	0	3
24UCAS11	SEC – 1 Computer Basis	1	0	1	0	2
24UCAS12	SEC – 2 Fundamental of Information Technology	1	0	1	0	2
24UCAF11	FC-Digital Fundamental Computing	1	1	0	0	2
					30	**23**

Semester - II						
Code	Course Title	Hours Distribution				C
		L	T	P	S	
24UFTA21	Tamil – 2	4	1	0	0	3
24UFEN21	English – 2	4	1	0	0	3
24UCAC21	CC – 3 Programming in C++	3	1	1	0	4
24UCAC22	CC - 4 Data Structure	3	1	1	0	4
24UMAA23	EC - 2 (Statistical Methods and Its Applications II)	3	1	0	0	3
24UMAA23P	EC - 3 (Statistical Methods and its Applications Lab)	0	0	2	0	2
24UCAS21P	SEC – 3(Data Structure using C++ Lab)	0	0	2	0	2
24UAEC21	AEC – 1 LIFE SKILL FOR YOGA	1	1	0	0	2
					30	**23**

Semester – III						
	Tamil – 3	4	1	0	0	3
	English – 3	4	1	0	0	3
	CC – 5	3	1	2	0	5
	CC - 6 (Practical)	0	0	4	0	2
	EC - 4 AL	3	1	0	0	4
	EC - 5 AL (Practical)	0	0	2	0	2
	SEC -4	1	0	1	0	2
	AEC – 2HUMAN ETHICS AND VALUES	1	1	0	0	2
					30	**23**

Semester - IV						
	Tamil – 4	4	1	0	0	3
	English – 4	4	1	0	0	3
	CC – 7	3	1	2	0	5
	CC - 8 (Practical)	0	0	4	0	2
	EC - 6 AL	3	1	0	0	4
	EC - 7 AL (Practical)	0	0	2	0	2
	SEC – 5	1	0	1	0	2
	AEC – 3ENVIRONMENTAL STUDIES	1	1	0	0	2
					30	**23**

Semester – V						
	CC -9	4	1	0	0	4
	CC- 10 (Practical)	0	0	4	0	4
	CC - 11	2	1	1	0	4
	CC - 12 (Practical)	0	0	3	0	2
	EC - 8	4	1	0	0	4
	EC - 9	4	1	0	0	4
	AEC – 4SOCIAL RESPONSIBILITIES AND UPLIFTMENT	1	1	0	0	2
	Internship				2	2
					30	**26**

Semester - VI						
	CC – 13	4	1	0	0	4
	CC - 14 Practical	0	0	5	0	3
	CC - 15 – Project	0	0	0	5	4
	EC – 10	4	1	0	0	4
	EC – 11	4	1	0	0	4
	PEC – 1	1	1	0	0	2
	SLC – 1				3	2
					30	**23**
						141+2*

Students must complete at least one online course (MOOC) from platforms like SWAYAM, NPTEL, or Nanmudalvan within the fifth semester. Additionally, engaging in a specified Self-learning Course is mandatory to qualify for the degree, and successful participation will be acknowledged with an extra credit of 2*.

L- Learning T-Tutorial P-Practical S-Seminar C-Credit

1ST YEAR: FIRST SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UCAC11	**PROGRAMMING IN C**	**Core**	**3**	**1**	**2**	**0**	**5**	**6**	**25**	**75**	**100**

Learning Objectives	
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	To understand the concept of Arrays and Functions
LO4	Design programs involving decision structures, loops and functions.
LO5	To understand the concept of implementing pointers.

Unit	Content	Hours
1	**INTRODUCTION TO C PROGRAMMING** Introduction to Computing: Introduction, Art of Programming through Algorithms and Flowcharts Overview of C: History and importance of C, Basic structure of C program, executing a C program. Constants, Variable and Data Types: Introduction, Character Set, C Tokens, Keywords and Identifiers, Constants, Variables, Data Types, Declaration of Variables, Assigning Values to Variables, Defining Symbolic Constants. Managing Input and Output Operations:	14
2	**CONTROL STRUCTURES** Decision Making and Branching: Introduction, Decision Making with IF Statement, Simple IF Statement, the IF-ELSE Statement, Nesting of IF-ELSE Statements, The ELSE IF Ladder, The Switch statement, The ? : Operator, The goto statement. Decision Making and Looping: Introduction, The while Statement, The do statement, The for statement, Jumps in LOOPS.	14
3	**INTRODUCTION TO ARRAYS AND STRINGS** Arrays: One-dimensional Arrays, Declaration of One-dimensional Arrays, Initialization of One-dimensional Arrays, Example programs- Bubble sort, Selection sort, Linear search, Binary search, Two-dimensional Arrays, Declaration of Two-dimensional Arrays, Initialization of Two-dimensional Arrays. Character Arrays and Strings: Declaring and Initializing String Variables, Reading Strings from Terminal, Writing Strings to Screen, Arithmetic Operations on Characters, String-handling Functions	14

4	**FUNCTIONS AND INTRODUCTION TO POINTERS** User-defined Functions: Need for functions, Elements of User-defined Functions, Definition of Functions, Return Values and their Types, Function Calls, Function Declaration, Category of Functions, No Arguments and no Return Values, Arguments but no Return values, Arguments with Return Values, No Arguments but Returns a Value, Passing Arrays to Functions, Recursion. Pointers: Introduction, Declaring Pointer Variables, Initialization of Pointer variables, accessing a Variable through its Pointer.	14
5	**STRUCTURES AND FILE MANAGEMENT** Structures: Introduction, Defining a structure, declaring structure variables, accessing structure members, structure initialization, array of structures. File Management in C: Introduction, Defining and opening a file, closing a file, Input/output and Error Handling on Files.	14

CO	Course Outcomes
CO1	Describe the fundamentals of C programming Language.
CO2	Apply appropriate Control structures to solve problems.
CO3	Describe the concept of Arrays and Strings
CO4	Write User defined functions and apply concept of recursion to solve problems.
CO5	Describe the concept of Pointers and Structures

Textbooks:	
1	E. Balaguruswamy, “Programming in ANSI C”, 8th Edition, 2019, McGraw Hill Education, ISBN: 978-93-5316-513-0.
2	“Let us C”, YashavantKanetkar, 13th Edition, BPB Publications.
3	Computer fundamentals and programming in c, “Reema Thareja”, Oxford University, Second edition, 2017.
4	Brian W. Kernighan and Dennis M. Ritchie, The ‘C’ Programming Language, Prentice Hall of India
5	P.Rizwan Ahmed, Programming in C (ANSI), Margham Publications, 2020
Reference Books:	
1	Pradip Dey, Manas Ghosh, “Programming in C”, 2nd Edition, 2018, Oxford University Press, ISBN: 978-01-9949-147-6.
2	Kernighan B.W and Dennis M. Ritchie, “The C Programming Language”, 2nd Edition, 2015, Pearson Education India, ISBN: 978-93-3254-944-9.
3	Yashavant P. Kanetkar, “Let Us C”, 16th Edition, 2019, BPB Publications, ISBN: 978- 93-8728-449-4.
4	Jacqueline A Jones and Keith Harrow, “Problem Solving with C”, Pearson Education. ISBN: 978-93-325-3800-9.
5	Dr. Guruprasad Nagraj, “C Programming for Problem Solving”, Himalaya Publishing House. ISBN-978-93-5299-361-1.

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

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	3	3	3	3	3	3	3	2	2
CO2	3	3	3	3	3	3	3	2	3	2	2
CO3	3	3	3	3	3	3	3	2	3	2	3
CO4	3	3	3	3	3	3	3	2	3	3	2
CO5	3	3	3	3	3	3	3	3	3	3	3
Total	15	15	15	15	15	15	15	12	15	12	12
Average	3	3	3	3	3	3	3	2	3	2	2

3 – Strong, 2- Medium, 1- Low

1ST YEAR: FIRST SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UCAP12	**C LAB**	**Practical**	**0**	**0**	**4**	**0**	**3**	**4**	**25**	**75**	**100**

Learning Objectives	
LO1	Understand the need for programming to solve computational problems.
LO2	Discover the basic programming constructs to prepare the program.
LO3	Analyze and interpret data using array, functions and pointers
LO4	Recognize the bugs in the C program.
LO5	Apply problem- solving skills to real-world scenarios

Programs	Content	Hours
1	Write a C program to find the sum of individual digits of a positive integer.	6
2	A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.	6
3	Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.	6
4	Write a C program to calculate the following Sum: Sum=1-x2/2! +x4/4!-x6/6!+x8/8!-x10/10! ……	6
5	Write a C program to find the roots of a quadratic equation.	6
6	Write C programs that use both recursive and non-recursive functions to find the factorial of a given integer.	6
7	Write a C program to find both the larges and smallest number in a list of integers.	6
8	Write a C program that uses functions to perform the following: Addition of Two Matrices	6

9	Write a C program to determine if the given string is a palindrome or not.	6
10	Write a program which copies one file to another.	6

CO	Course Outcomes
CO1	Understand the logic for a given problem. Write the algorithm of a given problem.
CO2	Recognize and understand the syntax and construction of C programming code. Gain experience of procedural language programming. Know the steps involved in compiling, linking and debugging C code.
CO3	Understand using header files. Learn the methods of iteration or looping and branching. Make use of different data-structures like arrays, pointers, structures and files. Understand how to access and use library functions.
CO4	Understand function declaration and definition. Understand proper use of user defined functions. Write programs to print output on the screen as well as in the files.
CO5	Apply all the concepts that have been covered in the theory course, and Know the alternative ways of providing solution to a given problem.

Text books:	
1	E. Balaguruswamy, “Programming in ANSI C”, 8th Edition, 2019, McGraw Hill Education, ISBN: 978-93-5316-513-0.
2	“Let us C”, Yashavant Kanetkar, 13th Edition, BPB Publications.
3	Computer fundamentals and programming in c, “Reema Thareja”, Oxford University, Second edition, 2017.
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5	P.Rizwan Ahmed, Programming in C (ANSI), Margham Publications, 2020
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2	Kernighan B.W and Dennis M. Ritchie, “The C Programming Language”, 2nd Edition, 2015, Pearson Education India, ISBN: 978-93-3254-944-9.
3	Yashavant P. Kanetkar, “Let Us C”, 16th Edition, 2019, BPB Publications, ISBN: 978- 93-8728-449-4.
4	Jacqueline A Jones and Keith Harrow, “Problem Solving with C”, Pearson Education. ISBN: 978-93-325-3800-9.
5	Dr. Guruprasad Nagraj, “C Programming for Problem Solving”, Himalaya Publishing House. ISBN-978-93-5299-361-1.

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

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	3	3	3	3	3	3	3	2	2
CO2	3	3	3	3	2	3	3	2	2	3	3
CO3	3	2	3	3	3	3	3	3	3	2	2
CO4	3	3	3	3	2	3	3	2	2	3	3
CO5	3	2	3	3	3	3	3	3	3	2	2
Total	15	12	15	15	13	15	15	13	13	12	12
Average	3	2	3	3	3	3	3	3	3	2	2

3 – Strong, 2- Medium, 1- Low

ALLIED SYLLABUS

1. STATISTICAL METHODS AND THEIR APPLICATIONS -1

Subject Code	L	T	P	S	Credits	Inst.Hours	Marks		
							CIA	External	Total
24UMAA13	2	1	1	0	3	4	**25**	**75**	**100**

Learning Objectives	
LO1	Scope and diagrammatic representation of data
LO2	To know about Measures of Location
LO3	To gain knowledge on Measures of Dispersion
LO4	To understand the concept of Skewness
LO5	To understand the relationship between variables and forecasting the future values

Unit	Contents	No .of Hours
I	Introduction - Scope and Limitations of Statistical Methods - Classification of Data –Tabulation of Data- Diagrammatic and Graphical Representation of Data.	**10**
II	Measures of Location: Arithmetic Mean, Median, Mode, and Their Properties.	**10**
III	Measures of Dispersion: Range, Quartile Deviation, Mean Deviation, Standard Deviation.	**10**
IV	Measures of Skewness : Karl Pearson's, Bowley's, and Kelly's and Coefficient of Skewness .	**10**
V	Correlation: Karl Pearson – Spearman's Rank Correlation	**10**
	Total	**50**

COURSE OUTCOMES	
CO1	Understand the statistical methods measures of location
CO2	Understand the statistical methods measures of dispersion
CO3	Apply the statistical methods of dispersion and location
CO4	Understand the concept of Skewness.
CO5	Understand the relationship between variables and fore casting the future values

TEXT BOOKS	
1	Fundamental of Mathematical Statistics - S. C. Gupta & V. K. Kapoor - Sultan Chand
2	Fundamental of Applied Statistics - S. C. Gupta & V. K. Kapoor - Sultan Chand
3	Statistical Methods - Snedecor G.W.& Cochran W. G. oxford & +DII
4	Elements of Statistics - Mode. E. B. - Prentice Hall
5	Statistical Methods- Dr. S. P. Gupta -Sultan Chand & Sons
REFERENCE BOOKS	
1	Gupta S.P. (2001), Statistical Methods, Sultan Chand & Sons, New Delhi.
2	Gupta. S. C. and Kapoor. V. K. Fundamentals of Applied Statistics, Sultan Chand & Sons, New Delhi
3	Pillai R. S. N. And Bagavathi. V. (2005), Statistics, S. Chand & Company Ltd., New Delhi.
4	Sancheti D. C. And Kapoor. V. K (2005), Statistics (7th Edition), Sultan Chand & Sons, New Delhi.
5	Arora P. N, Comprehensive Statistical Methods, Sultan Chand & Sons, New Delhi
Web Resources	
https://nptel.ac.in/courses/111107105	

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	3	3	2	3	2	2	3	3	2
CO2	3	3	3	3	3	2	3	3	3	3	3
CO3	3	3	2	3	2	3	2	3	2	3	2
CO4	2	3	3	3	3	3	3	3	3	3	3
CO5	2	2	3	3	3	3	2	2	3	3	2
Total	13	13	14	15	13	14	12	13	14	15	12
Average	2.6	2.6	2.8	3	2.6	2.8	2.4	2.6	2.8	3	2.4

3 – Strong, 2- Medium, 1- Low

1ST YEAR: FIRST SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UCAS101	**COMPUTER BASICS**	**NME**	**1**	**0**	**1**	**0**	**2**	**2**	**25**	**75**	**100**

Learning Objectives	
LO1	Converse in basic computer terminology.
LO2	Possess the knowledge of basic hardware peripherals.
LO3	Possess the knowledge of basic Software and its features.
LO4	Build an understanding of the fundamental concepts of computer networking
LO5	It manages the computer's memory and processes, as well as all of its software and hardware.

Unit	Content	Hours
1	**Introduction to Computers** Introduction, Characteristics of computers, Evolution of computers, Generation of Computers, Classification of Computers, The Computer System, Applications of Computers.	6
2	**Input / Output devices and Memory** Introduction, Keyboard, Pointing Devices, Speech Recognition, Digital Camera, Scanners, Optical Scanners. Classification of Output, Printers, Plotters, Computer Output Microfilm (COM), Monitors, Audio Output, Projectors. Random Access Memory (RAM), Read Only Memory (ROM),Types of ROM. Classification of Secondary Storage Devices, Magnetic Tape, Magnetic Disk, Optical Disk, Magneto Optical disk.	**6**
3	**Software Concepts** Introduction to Software, Relationship between Software and Hardware, System Software, Application Software Algorithm, Flowchart, Program, Pseudocode (P-Code).Features of a Good Programming Language. Operating Systems: History & Evolution, Functions of an Operating System, A Brief History of MS-DOS, Linux, Windows System. Database Management System	**6**
4	**Data Communication and Computer Network** Introduction, Data Communication, Transmission Media, Multiplexing, Switching, Computer Network, Network Topologies, Communication Protocols, Network devices.	

	World Wide Web, Hypertext, Uniform Resource Locator, Web Browsers, IP Address, Domain Name, Internet Services Providers, Internet Security, Internet Requirements, Web Search Engine, Net Surfing, Internet Services, Case Study, Intranet.	**6**
5	**Operating System:** Functions, Measuring System Performance, Assemblers, Compilers and Interpreters. Batch Processing, Multiprogramming, Multi Tasking, Multiprocessing, Time Sharing, DOS, Windows, Unix/Linux.	**6**

CO	**Course Outcomes**
CO1	Understand the fundamentals of computer, hardware, software and Programming.
CO2	Identify the hardware components of a computer and its usages.
CO3	Ability to develop the appropriate program, analyze and interpret data
CO4	Independently understand basic computer network technology.
CO5	Understand the use of Operating system, commands and shell script.

Textbooks:	
1	Introduction to Information Technology, ITL Education Solutions limited, Pearson Education
2	Computer Fundamentals, A. Goel, 2010, Pearson Education.
3	Fundamentals of Computers, P. K.Sinha & P. Sinha, 2007, BPB Publishers.
4	Anoop Mathew, S. Kavitha Murugeshan (2009), “Fundamental of Information Technology”, Majestic Books.
5	Alexis Leon, Mathews Leon,” Fundamental of Information Technology”, 2nd Edition.
Reference Books:	
1	Bhardwaj Sushil Puneet Kumar, “Fundamental of Information Technology”
2	GG WILKINSON, “Fundamentals of Information Technology”, Wiley-Blackwell
3	A Ravichandran , “Fundamentals of Information Technology”, Khanna Book Publishing
4	Fundamentals of Computers and Information Technology, M.N Doja, 2005
5	Fundamentals of Information Technology, Alexis Leon And Mathews Leon, Vikas Publishing House Pvt. Ltd, 2009
Web resources:	
1	https://testbook.com/learn/computer-fundamentals 2.
2	https://www.tutorialsmate.com/2020/04/computer-fundamentals-tutorial.html 3.
3	https://www.javatpoint.com/computer-fundamentals-tutorial 4.
4	https://www.tutorialspoint.com/computer_fundamentals/index.htm 5.
5	https://www.nios.ac.in/media/documents/sec229new/Lesson1.pdf

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	3	3	3	2	2
CO2	3	3	3	3	3	3	3	2	3	2	2
CO3	3	3	3	3	3	3	3	2	3	2	3
CO4	3	3	3	3	3	3	3	2	3	3	2
CO5	3	3	3	3	3	3	3	3	3	3	3
Total	15	15	15	15	15	15	15	12	15	12	12
Average	3	3	3	3	3	3	3	2	3	2	2

3 – Strong, 2- Medium, 1- Low

1ST YEAR: FIRST SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UCAS12	FUNDAMENTAL OF INFORMATION TECHNOLOGY	SEC	1	0	1	0	2	2	25	75	100

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

Unit	Content	Hours
1	**Introduction to Computers** Generations of Computer – Data and Information – Components of Computer – Software – Hardware – Input Devices - Output Devices — Types of Operating System.	**6**
2	**MS Word:** Introduction – Elements of Window – Files, Folders and Directories – Text Manipulating: Cut, Copy, Paste, Drag and Drop – Text Formatting: Font – Style, Size, Face and Colors (Both foreground and background) – Alignment - Bullets and Numbering - Header and footer-watermark – inserting objects (images, other application document) –Table creation – Mail merge.	**6**
3	**Ms Excel:** Introduction – Inserting rows and columns – Sizing rows and columns – Implementing formulas – Generating series - Functions in excel– Creation of Chart – Inserting objects – Filter – Sorting – Inserting worksheet.	**6**
4	**MS PowerPoint**: Introduction – Slides Manipulation (Inserting new, Copy, paste, delete and duplicate slides) – Slide show– Types of Views – Types of Animations – Inserting Objects – Implementing multimedia (Video and Audio) – Templates (Built-in and User-Defined).	**6**
5	**Internet**: Introduction to Internet and Intranet – Services of Internet -Domain Name – URL – Browser – Types of Browsers – Search Engine -E-Mail – Basic Components of E-Mail –.How to send group mail. E-Commerce: Digital Signature – Digital Currency – Online shopping and transaction.	**6**

CO	Course Outcomes
CO1	Understand basic concepts and terminology of information technology.
CO2	Have a basic understanding of personal computers and their operations.
CO3	Be able to identify issues related to information security.
CO4	Develop MS Office applications knowledge and skills
CO5	To use the Internet safely, legally, and responsibly

Textbooks:	
1	Introduction of Information System ALEXISLEON,
2	Computer Fundamentals-Nasib Singh Gill.
3	"Microsoft Excel 2019 Step by Step" by Curtis Frye
4	"Excel 2019 Bible" by Michael Alexander, Richard Kusleika, and John Walkenbach
5	Introduction to Information Technology, ITL Education Solutions limited, Pearson Education
Reference Books:	
1	Computer Basics Absolute Beginner's Guide, Windows 11 Edition: Now Covers Windows 11 Paperback – Import, 4 August 2022
2	Computer Basics: For A Literate Living Paperback – 1 January 2017by Bittu Kumar
3	Computer Fundamentals, A. Goel, 2010, Pearson Education.
4	Fundamentals of Computers, P. K.Sinha & P. Sinha, 2007, BPB Publishers.
5	Computer Basics Absolute Beginner's Guide, Windows 11 Edition: Now CoversWindows 11 Paperback – Import, 4 August 2022
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 Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	3	3	3	2	2
CO2	3	3	3	3	3	3	3	2	3	2	2
CO3	3	3	3	3	3	3	3	2	3	2	3
CO4	3	3	3	3	3	3	3	2	3	3	2
CO5	3	3	3	3	3	3	3	3	3	3	3
Total	15	15	15	15	15	15	15	12	15	12	12
Average	3	3	3	3	3	3	3	2	3	2	2

3 – Strong, 2- Medium, 1- Low

1ST YEAR: FIRST SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UCAF11	**DIGITAL COMPUTER FUNDAMENTAL**	**FC**	**1**	**1**	**0**	**0**	**2**	**2**	**25**	**75**	**100**

Learning Objectives	
LO1	Identify the logic gates and their functionality.
LO2	Perform number conversions from one system to another system.
LO3	Design basic electronic circuits (combinational circuits).
LO4	Understand the fundamental concepts of computers, algorithms, flowcharts and problem solving techniques.
LO5	Apply the basic knowledge of mathematical factoring methods to model an algorithm, flowchart for a given problem.

Unit	Content	Hours
1	Divisibility, LCM, HCF- Numbers, Decimals, Fractions, Powers -Profit, Loss -Simple interest and Compound interest -Speed, Distance, Time.	**6**
2	Coding Decoding, Series-missing number, odd one out, Cause and Effect, Direction and Ranking, Blood relations.	**6**
3	NUMBER SYSTEM AND CODES: Decimal Numbers, Binary Numbers, Decimal to Binary Conversions, Binary Arithmetic, 1's and 2's complements of Binary Numbers, Signed Numbers, Arithmetic Operations with Signed numbers, Hexadecimal Numbers, Octal Numbers, Digital Codes, Error Detection Codes.	**6**
4	LOGIC GATES: The Inverter, The AND gate, The OR gate, The NAND gate, NOR gate, The Exclusive–OR gate and Exclusive-NOR gate; Boolean Algebra and Logic Simplification – Boolean Operations and Expressions, Laws and Rules, DeMorgan's Theorems, Boolean Expressions and Truth Tables, The Karnaugh Map, SOP minimizations.	**6**
5	Factoring Methods: Finding the square root of a number, the smallest Divisor of an integer, the greatest common divisor of two integers, computing the prime factors of an integer, raising a number to a large power.	**6**

CO	Course Outcomes
CO1	Appreciate and understand the differences between hardware and software.
CO2	Analyze a given problem and develop an algorithm to solve the problem.
CO3	Improve upon a solution to a problem.
CO4	An ability to understand and appreciate Boolean algebraic expressions to digital design
CO5	Know and use different number systems and the basics of programming

Textbooks:	
1	Quantitative Aptitude For All Competitive Exams by Dr. R.S. Aggarwal.
2	R.G.Dromey, "How to Solve it by Computer", Pearson Education India, 2008.
3	Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "Introduction to Algorithms", 3rd Edition, The MIT Press Cambridge, Massachusetts London, England,2008.
4	Floyd, Thomas L, "Digital Computer Fundamentals", 10 th Edition, University Book Stall, 1997.
5	Malvino, Paul Albert and Leach, Donald P, "Digital Computer Fundamentals", 3 rd Edition, TMH, 1995.
Reference Books:	
1	Steven S. Skiena, "The Algorithm Design Module", 2nd Edition, Springer-Verlag LondonLimited, 2008.
2	Donald E. Knuth, The Art of Computer Programming", Volume 1: FundamentalAlgorithms, 3rd Edition, Addison Wesley Longman, 1997.
3	Donald E. Knuth, The Art of Computer Programming", Volume 2: SeminumericalAlgorithms, 3rd Edition, Addison Wesley Longman, 1998.
4	Greg Perry and Dean Miller, "C programming Absolute Beginner's Guide", 3rd edition,Pearson Education, Inc, 2014.
5	Bartee, Thomas C, "Digital Computer Fundamentals", 6th Edition, TMH, 1995.
Webresources:	
1	http://algorithmsforinterviews.com "Algorithms for Interviews"
2	https://www.geeksforgeeks.org/computer-fundamentals-tutorial/
3	https://www.tutorialspoint.com/computer_fundamentals/computer_websites.html
4	https://www.indiabix.com/
5	https://www.tutorialspoint.com/basics_of_computers/basics_of_computers_useful_resources.html

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	3	3	3	2	2
CO2	3	3	3	3	3	3	3	2	3	2	2
CO3	3	3	3	3	3	3	3	2	3	2	3
CO4	3	3	3	3	3	3	3	2	3	3	2
CO5	3	3	3	3	3	3	3	3	3	3	3
Total	15	15	15	15	15	15	15	12	15	12	12
Average	3	3	3	3	3	3	3	2	3	2	2

3 – Strong, 2- Medium, 1- Low

1st YEAR: SECOND SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UCAC21	PROGRAMMING IN C++	Core	3	1	2	0	5	6	25	75	100

Learning Objectives	
LO1	Learn the fundamentals of input and output using the C++
LO2	Design a class that serves as a program module or package
LO3	Learn how inheritance promotes code reuse and how to reuse properties of the base class in the derived classes
LO4	It provides all techniques of software development in the C++ Programming Language.
LO5	Demonstrates these techniques by the solution of a variety of problems

Unit	Content	Hours
1	**Introduction to Object Oriented Programming**-Basic Concepts of OOP, **Basic Elements of C++:**Tokens, Keywords, Identifiers, Variables, Basic Data Types in C++, Operators in C++.**Decision and Control Structures:** if Statement, if-else Statement, switch Statement, while, do-while, for.	14
2	**Functions in C++:**The Main Function, Function Prototyping, Call by Reference, Call by Value, Inline Function, Function Overloading- Classes **and Objects:** Specifying a Class, Defining Member functions, Nesting of Member Functions, Static Data Member and Member Function, Friend Function.	14
3	**Constructors and Destructors:** Constructors, Default Constructor, Parameterized Constructor, Constructor Overloading, Copy Constructor, and Destructor. **Operator Overloading:** Defining Operator Overloading, Overloading Unary Operators and Overloading Binary Operators.	14
4	**Inheritance:** Introduction, Defining Derived Class, Single Inheritance, Multilevel Inheritance, Multiple Inheritance, Hierarchical Inheritance, Hybrid Inheritance. **Virtual Functions:** Virtual Function, Pure Virtual Functions.	14
5	**Working with Files:** Introduction, Classes for File Stream Operations, Opening and Closing a File, Detecting end-of-file, Sequential Input and Output Operations, Updating a File: Random Access, Error Handling During File Operations, Command Line Arguments.	14

CO	Course Outcomes
CO1	Understand object oriented features and C++ concepts.
CO2	Create class hierarchies using the object-oriented design process
CO3	Identify difference between types of inheritance
CO4	Understand the concepts of polymorphism and Exceptional Handling
CO5	Implement Object Oriented Programs concepts
Textbooks:	
1	E.Balagurusamy Object Oriented Programming with C++ Tata Mc Graw Hill Publications, 6th Edition. 2013
2	Ashok N Kamthane, "Object-Oriented Programming with ANSI and Turbo C++", Pearson Education 2003.
3	Maria Litvin& Gray Litvin, "C++ for you", Vikas publication 2002.
4	C++ Plus Data Structure, Nell Dale, Jones & Bartlett Publishers , 4th Edition, 2010. (Units III, VI & V)
5	"Introduction to C++" by Paul Deitel and Harvey Deitel
Reference Books:	
1	Bjarne Stroustrup The C++ Programming Language Pearson Education, 4th Edition. 2014
2	Mt Somashekara, Ds Guru, Hs Nagendra swamy, ented Programming With C++ Prentice Hall Of India 2014
3	https://notalentgeek.github.io/note/note/project/project-independent/pi-brp-beginning-c-programming/document/20170807-1504-cet-1-book-and-source-1.pdf
4	https://gacbe.ac.in/pdf/ematerial/18BCS33C-U2.pdf
5	C++ The Complete Reference, Herbert Schildt, Tata McGraw Hill, 4th Edition, 2003.
Web resources:	
1	https://www.tutorialspoint.com/cplusplus/index.htm
2	www.cplusplus.com
3	www.codecademy.com
4	https://www.youtube.com/watch?v=-TkoO8Z07hI
5	https://www.youtube.com/watch?v=EPwK6D9zY0E

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	3	3	3	2	2
CO2	3	3	3	3	3	3	3	2	3	2	2
CO3	3	3	3	3	3	3	3	2	3	2	3
CO4	3	3	3	3	3	3	3	2	3	3	2
CO5	3	3	3	3	3	3	3	3	3	3	3
Total	15	15	15	15	15	15	15	12	15	12	12
Average	3	3	3	3	3	3	3	2	3	2	2

3 – Strong, 2- Medium, 1- Low

1st YEAR: SECOND SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UCAC22	**DATA STRUCTURE**	Core	5	-	-	-	5	5	25	75	100

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

Unit	Content	Hours
1	Abstract Data Types (ADTs)- List ADT-array-based implementation-linked list implementation singly linked lists-circular linked lists-doubly-linked lists-applications of lists- All operations-Insertion-Deletion-Merge - Polynomial Manipulation.	15
2	Stack ADT-Operations- Applications- Evaluating arithmetic expressions– Conversion of infix to postfix expression-Queue ADT-Operations- Circular Queue- Priority Queue- deQueue applications of queues.	15
3	Tree ADT-tree traversals-Binary Tree ADT-expression trees-applications of trees-binary search tree ADT- Heap-Applications of heap.	15
4	Definition- Representation of Graph- Types of graph-Breadth first traversal – Depth first traversal- Applications of graphs.	15
5	Searching: Linear search-Binary search- Sorting: Bubble sort-Selection sort-Insertion sort- Hashing: Hash functions-Separate chaining- Open Addressing-Rehashing Extendible Hashing.	15

CO	Course Outcomes
CO1	Understand the concept of Dynamic memory management, data types, algorithms, Big O notation.
CO2	Understand basic data structures such as arrays, linked lists, stacks and queues
CO3	Describe the hash function and concepts of collision and its resolution methods
CO4	Solve problem involving graphs, trees and heaps.
CO5	Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data

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, 2nd Edition
3	Object Oriented Programming with C++, E Balagurusamy , Tata McGraw Hill, 6th Edition, 2014.
4	C++ Plus Data Structure, Nell Dale, Jones & Bartlett Publishers , 4th Edition, 2010.
5	Data Structures and Algorithms, Alfred V. Aho, Jeffrey D. Ullman, John E. Hopcroft, Addison Wesley Longman Inc., 2nd Edition, 1999.
Reference Books:	
1	Thomas H.Cormen, Chales E.Leiserson, Ronald L.Rivest, Clifford Stein, "Introduction to Algorithms", McGraw Hill 2009, 3rd Edition.
2	Aho, Hopcroft and Ullman, "Data Structures and Algorithms", Pearson Education 2003
3	P Rizwan Ahmed, C++ and Data Structure , Margham Pubications, 2015
4	**Data Structures and Algorithms in C++ Paperback – 1 January 2007** by Michael T. Goodrich (Author), Roberto Tamassia (Author), David Mount (Author)
5	Data Structures And Algorithms Made Easy: Data Structures And Algorithmic Puzzles Paperback – 21 July 2023 by Narasimha Karumanch
Web resources:	
1	https://www.youtube.com/watch?v=7hNxbV8Ab4Q
2	https://www.geeksforgeeks.org/learn-dsa-in-cpp/
3	https://www.codechef.com/roadmap/cpp-dsa
4	https://www.youtube.com/watch?v=B31LgI4Y4DQ
5	https://www.udemy.com/course/data-structures-algorithms-using-c-zero-to-mastery/?srsltid=AfmBOoqBZzyvIZ0t8Hbxk1HjHsXzB3o4LTSMc1I2xG4lfh8FjofZ59hg

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	3	3	3	2	2
CO2	3	3	3	3	3	3	3	2	3	2	2
CO3	3	3	3	3	3	3	3	2	3	2	3
CO4	3	3	3	3	3	3	3	2	3	3	2
CO5	3	3	3	3	3	3	3	3	3	3	3
Total	15	15	15	15	15	15	15	12	15	12	12
Average	3	3	3	3	3	3	3	2	3	2	2

3 – Strong, 2- Medium, 1- Low

1st YEAR: SECOND SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UCAS21P	**DATA STRUCTURE USING C++ LAB**	core	-	-	2	-	5	2	25	75	100

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

Unit	Content	Hours
1	Create a C++ Program to Implement Singly Linked List	30
2	Create a C++ Program to Implement Doubly Linked List	
3	Create a C++ Program for Stack Implementation	
4	Create a C++ Program for Queue Implementation	
5	Create a C++ Program to implement tree traversal techniques	
6	Write a C++ program to demonstrate Breadth first search (BFS) algorithm	
7	Write a C++ program to demonstrate Depth first search (DFS) algorithm	
8	Write a C++ program to demonstrate Binary Search	
9	Write a C++ Program to demonstrate the Bubble Sort	
10	Write a C++ Program to demonstrate the Insertion Sort, Quick Sort	

CO	Course Outcomes
CO1	Understand the concept of Dynamic memory management, data types and algorithm
CO2	Understand basic data structures such as arrays, linked lists, stacks and queues
CO3	Describe the hash function and concepts of collision and its resolution methods
CO4	Solve problem involving graphs, trees and heaps
CO5	Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data

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, 2nd Edition

3	Object Oriented Programming with C++, E Balagurusamy , Tata McGraw Hill, 6th Edition, 2014.
4	C++ Plus Data Structure, Nell Dale, Jones & Bartlett Publishers , 4th Edition, 2010.
5	Data Structures and Algorithms, Alfred V. Aho, Jeffrey D. Ullman, John E. Hopcroft, Addison Wesley Longman Inc., 2nd Edition, 1999.
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
3	P Rizwan Ahmed, C++ and Data Structure , Margham Pubications, 2015
4	**Data Structures and Algorithms in C++ Paperback – 1 January 2007** by Michael T. Goodrich (Author), Roberto Tamassia (Author), David Mount (Author)
5	Data Structures And Algorithms Made Easy: Data Structures And Algorithmic Puzzles Paperback – 21 July 2023 by Narasimha Karumanch
Web resources:	
1	https://www.youtube.com/watch?v=7hNxbV8Ab4Q
2	https://www.geeksforgeeks.org/learn-dsa-in-cpp/
3	https://www.codechef.com/roadmap/cpp-dsa
4	https://www.youtube.com/watch?v=B31LgI4Y4DQ
5	https://www.udemy.com/course/data-structures-algorithms-using-c-zero-to-mastery/?srsltid=AfmBOoqBZzyvIZ0t8Hbxk1HjHsXzB3o4LTSMc1I2xG4lfh8FjofZ59hg

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	3	3	3	2	2
CO2	3	3	3	3	3	3	3	2	3	2	2
CO3	3	3	3	3	3	3	3	2	3	2	3
CO4	3	3	3	3	3	3	3	2	3	3	2
CO5	3	3	3	3	3	3	3	3	3	3	3
Total	15	15	15	15	15	15	15	12	15	12	12
Average	3	3	3	3	3	3	3	2	3	2	2

3 – Strong, 2- Medium, 1- low