MOTHER TERESA WOMEN'S UNIVERSITY KODAIKANAL.

Bachelor of Computer Applications (BCA)

UNDER CBCS
(with effect from 2021-2022)

DEPARTMENT OF COMPUTER SCIENCE

BACHELOR OF COMPUTER APPLICATIONS (BCA)

About the Programme:

Bachelor of Computer Applications is a three-year undergraduate course which deals with Information Technology and Computer Applications. The course imparts knowledge about different computer applications and how to solve and address the problems which arise from a computer and its applications. The course includes subjects such as core programming languages Java and C++, data structure, networking and others. BCA provides various opportunities to the students who wish to pursue their career in IT industry.

Eligibility: Hr. Sec. with Mathematics as one of the Subjects.

PROGRAM EDUCATIONAL OBJECTIVES (PEOS)
The Graduates of BCA programme will be able to

PEO1: Enhance creative and innovative thinking for improving their career.

PEO2: Apply computing principles and related domain knowledge to work as a team or individual in IT fields, public and private sectors.

PEO3: Apply current tools and techniques to create real world problems.

PEO4: Pursue higher studies and professional development in their field.

PEO5: Provide strong foundations in fundamentals of Computer Science and applications, inter disciplinary courses and electives for widening the domain expertise.

General Guidelines for UG Programme:

1. Duration: The programme shall extend through a period of 6 consecutive semesters and the duration of a semester shall normally be 90 days or 450 hours. Examinations shall be conducted at the end of each semester for the respective subjects.

2. Medium of Instruction: English

3. Evaluation: Evaluation of the candidates shall be through Internal and External assessment. The ratio of formative and summative assessment should be 25:75 for both Core and Elective papers.

	Theory		Practical	
	Min	Max	Min	Max
Internal	**10**	**25**	**10**	**25**
External	**30**	**75**	**30**	**75**

- **Internal (Theory): Test (15) + Assignment (5) + Seminar/Quiz (5) = 25**
- **External Theory: 75**

Question paper pattern for External examination for Core and Elective papers:

Max. Marks: 75 **Time: 3 Hrs.**

S.No.	Part	Type	Marks
1	**A**	**10*1 Marks=10** Multiple Choice Questions - 2 Questions from each Unit	**10**
2	**B**	**5*4=20** Two questions from each Unit with Internal Choice (either / or)	**20**
3	**C**	**3*15=45** (Open Choice) (Any three Questions out of 5 - one Question from each Unit)	**45**
Total Marks			**75**

Minimum credits required to pass - 156.

- **Project Report**

A student should select a topic for the Project Work at the end of the third semester itself and submit the Project Report at the end of the fourth semester. The Project Report shall not exceed 75 typed pages in Times New Roman font with 1.5 line space.

- **Project Evaluation**

There is a Viva Voce Examination for Project Work. The Guide and an External Examiner shall evaluate and conduct the Viva Voce Examination. The Project Work carries 100 marks (Internal: 25 Marks; External (Viva): 75 Marks).

4.Conversion of Marks to Grade Points and Letter Grade

(Performance in a Course/ Paper)

Range of Marks	Grade Points	Letter Grade	Description
90 – 100	9.0 – 10.0	O	Outstanding
80-89	8.0 – 8.9	D+	Excellent
75-79	7.5 – 7.9	D	Distinction
70-74	7.0 – 7.4	A+	Very Good
60-69	6.0 – 6.9	A	Good
50-59	5.0 – 5.9	B	Average
40-49	4.0 – 4.9	C	Satisfactory
00-39	0.0	U	Re-appear
ABSENT	0.0	AAA	ABSENT

5. Attendance

Students must have earned 75% of attendance in each course for appearing for the examination. Students with 71% to 74% of attendance shouldapply for condonation in the prescribed form with prescribed fee. Students with65% to 70% of attendance should apply for condonation in the prescribed form with the prescribed fee along with the Medical Certificate. Studentswithattendance lesser than 65% are not eligible to appear for the examination and they shall re-do the course with the prior permission of the Head of the Department, Principal and the Registrar of the University.

6. Any Other Information:

In addition to the above regulations, any other common regulations pertaining to the UG Programmes are also applicable for this programme.

Maternity Leave – The student who avails maternity leave may be considered to appear for the examination with the approval of Staffi/c, Head of the Department, Controller of Examination and The Registrar.

PROGRAME OUTCOMES (POs):
At the end of the Programme, the students will be able to

PO1: Computer Knowledge: Apply the knowledge of mathematics, computer Fundamentals to IT applications.
PO2: Problem Analysis: Conceptualize, analyze and experiment solutions for complex problems.
PO3: **Design/Development of solutions:** Design solutions for It applications using latest technologies and develop and implement the solutions using various latest languages.
PO4: Modern tool usage: Create, select and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex IT applications with an understanding of the limitations.
PO5: Environment and sustainability: Understand the impact of the IT analyst solutions in societal and environmental contexts, and demonstrate the knowledge and need for sustainable development.
PO6: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO7: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PROGRAM SPECIFIC OUTCOMES (PSO)
At the end of this program, graduates will be able to execute the outcomes defined by Professional body.
PSO1: To impart the basic knowledge and conceptual understanding of Computing Systems through mathematical and analytical skills.
PSO2: To understand the concepts and ability to design and apply appropriate methods and techniques
PSO3: To develop the skill set of the students in the domains of Enterprise Systems and security.
PSO4: To improve the analytical knowledge of the students for innovative system design using modern tools and techniques as a team.

BACHELOR OF COMPUTER APPLICATION

CURRICULUM

SEMESTER I							
Course Code	**Title of the Course**	**Credits**	**Hours**		**Int.**	**Ext.**	**Total**
			T	**P**			
U21LTA11	PART I – Tamil	3	6	0	25	75	100
U21LEN11	PART II – English	3	6	0	25	75	100
U21CAT11	CORE I - Programming In C	4	5	0	25	75	100
U21CAP11	CORE II - Programming in C Lab	4	0	6	25	75	100
U21CAA11	**ALLIED I** - Digital Principles & Computer Organization	4	5	0	25	75	100
U21EVS11	Environmental Studies	2	2	0	25	75	100
U21PEPS11	Professional English I	4	6	0	25	75	100
Total		**24**	**36**		**-**	**-**	**700**
SEMESTER II							
U21LTA22	PART I – Tamil	3	6	0	25	75	100
U21LEN22	PART II – English	3	6	0	25	75	100
U21CAT21	CORE III - Data Structures & Algorithms	4	5	0	25	75	100
U21CAP22	CORE IV - Data Structures using C Lab	4	0	5	25	75	100
U21CAA22	**ALLIED II** - Accounting & Financial Management	4	5	0	25	75	100
U21VAE21	Value – Education	3	3	0	25	75	100
U21PEPS22	Professional English II	4	6	0	25	75	100
Total		**25**	**36**		**-**	**-**	**700**
SEMESTER III							
U21LTA33	PART I – Tamil	3	6	0	25	75	100
U21LEN33	PART II – English	3	6	0	25	75	100
U21CAT31	CORE V - Web Technology	4	5	0	25	75	100
U21CAE311 / U21CAE312	**Elective-I** Web Technology Lab Graphics using C++ Lab	3	0	4	25	75	100

U21CAA33	**ALLIED III** - Operations Research	4	5	0	25	75	100
U21MSS31	**SBE I**- MANAGERIAL SKILLS	2	2	0	25	75	100
	Non-Major Elective–I	2	2	0	25	75	100
U21PEPS33	Professional English III	4	6	0	25	75	100
Total		**25**	**36**				**800**
SEMESTER IV							
U21LTA44	PART I – Tamil	3	6	0	25	75	100
U21LEN44	PART II – English	3	6	0	25	75	100
U21CAT41	CORE VI – Relational Database Management System (RDBMS)	4	4	0	25	75	100
U21CAP44	CORE VII - RDBMS Lab	4	0	4	25	75	100
U21CAA44	**ALLIED IV** - Statistical Methods	4	4	0	25	75	100
U21CAE421/ U21CAE422	**Elective II** Software Engineering/ System Software	3	3	0	25	75	100
U21CSS42	**SBE II**-Computer Skills for Office Management	2	0	2	25	75	100
	Non -Major Elective –II	2	0	2	25	75	100
U21PEPS44	Professional English IV	4	6	0	25	75	100
TOTAL		**29**	**37**				**900**
SEMESTER V							
U21CAT51	CORE VIII - Object Oriented Programming using JAVA	4	5	0	25	75	100
U21CAT52	CORE IX - Computer Networks	4	5	0	25	75	100
U21CAT53	CORE X - Operating System	4	5	0	25	75	100
U21CAP55	CORE XI - Object Oriented Programming using JAVA Lab	4	0	5	25	75	100
U21CAT54	Core XII – Cloud Computing	4	5	0	25	75	100
U21CAE531 / U21CAE532 / U21CAE533	**ELECTIVE III** Internet of Things / E-Commerce / Information Security	3	3	0	25	75	100
U21CAS53	**SBE - III** Skill Based Elective - Operating System Lab	2	0	2	25	75	100
Total		**25**	**30**				**700**

SEMESTER – VI							
U21CAT61	CORE XIII - Python Programming	4	4	0	25	75	100
U21CAT62	CORE XIV - Computer Graphics & Multimedia	4	5	0	25	75	100
U21CAT63	CORE XV - Mobile Applications	4	4	0	25	75	100
U21CAP66	CORE XVI- Python Programming Lab	4	0	6	25	75	100
U21CAR61	CORE XVII – Project	4	0	6	25	75	100
U21CAE641/ U21CAE642	**ELECTIVE IV** 1. R Programming/ 2. PHP with MySQL	3	3	0	25	75	100
U21CAS64	**SBE IV** – Image Processing Lab	2	2	0	25	75	100
U21EAS61	Extension Activities	3	-	-	25	75	100
Total		**28**	**30**		**-**	**-**	**800**
Grand Total		**156**	**205**				**4600**

Non Major Elective

The Candidates, who have joined the UG Programme, can also undergo Non Major Elective offered by other Departments.

COURSE CODE	Title of the Course
U21CAN31	NME I: Web Designing using HTML
U21CAN42	NME II: Photo Designing Tools

ADDITIONAL CREDIT COURSES

SEMESTER	COURSE CODE	COURSE	CREDITS
III	U21CAO31	SWAYAM - Online Course	2
IV	U21CAI41	Internship	2
V	U21CAV51	Quantitative Aptitude - Value Added Course	2

SEMESTER – I

COURSE CODE	U21CAT11	PROGRAMMING IN C	L	T	P	C
CORE –I			5	-	-	4

Cognitive Level	**K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyze
Objectives	1. To understand and develop well-structured programs using C language. 2. To learn the basic data structures implementing through C language. 3. To deal with different memory allocation & input/output methods. 4. Problem solving through computer programming using C Language.

UNIT I: BASICS OF C PROGRAMMING

Overview of C:– Introduction - character set - C tokens - keyword & identifiers –constants – variables - data types – Declarations of variables – Arithmetic, Relational, Logical, Assignment, conditional, Bit wise, special, increment and decrement operators - Arithmetic expressions - Evaluation of expression - Operator precedence & associativity - Mathematical functions - Reading & writing a character - Formatted input and output.

UNIT II: **DECISION STATEMENTS & ARRAYS**

Decision Statements: If, if else, switch, break, continue - the? Operator - The GOTO statement. – Loop Control Statements: Introduction – for, nested for loops – while, do-while statements – Arrays: One-dimensional - Two dimensional - Multidimensional arrays

UNIT III: STRINGS AND FUNCTIONS

Character string handling - Declaring and initializing string variables – Reading strings from terminal - Writing strings to screen - String handling functions - User-defined functions: Need for user defined functions – Types of functions - calling a function category of functions - no arguments and no return values – Arguments but no return values- Arguments with return values– Recursion - functions with arrays - functions with arrays - The scope and lifetime of variables in functions

UNIT IV: STRUCTURES AND POINTERS

Structure: Definition- Structure initialization - Comparison of structure variables - Arrays of structures - Arrays within structures - Structures within structures – unions. Pointers: understanding pointers - accessing the address of a variable - declaring and initializing pointers - accessing a variable through its pointers - pointer expressions – pointers and arrays - pointers and character strings - pointers and functions - pointers and structures

UNIT V: FILE PROCESSING

File Management in C: defining and opening a file - closing file - I/O operations on files - error handling during I/O operations - Random access to files - command line arguments. Dynamic memory allocation: Introduction- dynamic memory allocation – MALLOC – CALLOC – REALLOC - The pre-processor.

TEXT BOOK:

1. E. Balagurusamy , Programming In ANSI C, Tata McGraw Hill 7th Edition, 2017

REFERENCE BOOKS:

1. Byron Gottfried, Programming with C, Tata McGraw Hill, 3rd Edition, 2013
2. V.Rajaraman, Computer Programming in C, Prentice Hall of India Pvt Ltd, 1st Edition, 2004
3. SmarajitGhosh, Programming in C, Prentice Hall of India Pvt Ltd, 1st Edition, 2004
4. YashwvantKanetkar, Let us C, BPB Publications 13th Edition, 2014

WEB RESOURCES:

1. https://www.unf.edu/~wkloster/2220/ppts/cprogramming_tutorial.pdf
2. https://www.tutorialspoint.com/cprogramming/cprogramming_pdf_version.htm
3. www.fresh2fresh.com
4. www.cprogramming.com 5.www.spoken-tutorial.org

CO	COURSE OUTCOMES	CL
1.	Understand and apply the basic of C	**K1**
2.	Implement the concepts of decision making and arrays	**K2, K3**
3	Implement about functions, recursions and strings	**K2, K3**
4.	Understand about the structures and pointers	**K2, K3**
5.	Apply the concepts of Files and preprocessor.	**K2, K3**

MAPPING OF COs WITH POs AND PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	**S**	**S**	**M**	**M**	**M**	**M**	**M**	**M**	**S**	**S**	**M**
CO2	**S**	**S**	**M**	**S**	**M**	**S**	**M**	**M**	**S**	**S**	**S**
CO3	**S**	**S**	**M**	**M**	**M**	**S**	**M**	**M**	**S**	**M**	**S**
CO4	**M**	**S**	**M**	**S**	**M**	**S**	**S**	**M**	**S**	**S**	**S**
CO5	**S**	**M**	**S**	**S**	**M**	**M**	**M**	**M**	**M**	**S**	**S**

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	U21CAP11	PROGRAMMING IN C – LAB	L	T	P	C
CORE -II			-	-	6	4

Cognitive Level **K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyze

Objectives	1. To learn the operation of latches, flip-flops, counters, registers, and register transfers in the Computer organization. 2. To design two-level logic functions with AND, OR, NAND, NOR and XOR gates with minimum number of gate delays or literals 3. To be trained and design the combinational circuits and sequential circuits 4. Gaining background knowledge as well as core expertise in computer organization.

LAB EXERCISES

1. Simple Programs
2. Programs using Control Structures
3. Programs using Loop structures
4. Programs using Arrays (1D and 2D)
5. Programs using Strings
6. Programs using Functions (Library & User defined)
7. Programs using Structures
8. Programs using Pointers
9. Programs using Files
10. Programs using command line arguments

REFERENCE BOOKS:

1. E.Balagurusamy, Programming in ANSI C, Tata McGraw Hill 7th Edition, 2017
2. Byron Gottfried, Programming with C, Tata McGraw Hill, 3rd Edition, 2013
3. YashwvantKanetkar, Let us C, BPB Publications 13th Edition, 2014

WEB RESOURCES:

1. https://www.unf.edu/~wkloster/2220/ppts/cprogramming_tutorial.pdf
2. https://www.tutorialspoint.com/cprogramming/cprogramming_pdf_version.htm
3. www.fresh2fresh.com
4. www.cprogramming.com
5. www.spoken-tutorial.org

NO	COURSE OUTCOMES	CL
1.	Implement real time problems using I/O functions	**K2, K3, K4**
2.	Apply the concepts of Control functions	**K2, K3, K4**
3	Execute the concepts of Function and recursion	**K2, K3, K4**
4.	Implement real time problems using Arrays and Pointers	**K2, K3, K4**
5.	Able to implement with structures and files	**K2, K3, K4**

MAPPING OF COs with POs andPSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	M	M	M	M	M	S	S	M
CO2	S	S	M	S	M	S	M	M	S	S	S
CO3	S	S	M	M	M	S	M	M	S	M	S
CO4	M	S	M	S	M	S	S	M	S	S	S
CO5	S	M	S	S	M	M	M	M	M	S	S

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	U21CAA11	DIGITAL PRINCIPLES & COMPUTER ORGANIZATION	L	T	P	C
ALLIED I			5	-	-	4
Cognitive Level		**K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyze				

Objectives

1	To learn the operation of latches, flip-flops, counters, registers, and register transfers in the Computer organization.
2	To design two-level logic functions with AND, OR, NAND, NOR and XOR gates with minimum number of gate delays or literals
3	To be trained and design the combinational circuits and sequential circuits
4	Gaining background knowledge as well as core expertise in computer organization.

UNIT I: NUMBER REPRESENTATION & BOOLEAN ALGEBRA

Number Representation-Number System: Binary, Hexadecimal-Octal Codes-BCD-Excess-3-Gray Code - ASCII - EBCDIC - Binary Arithmetic-1's Complement-2's Complement Representation-Error Detecting Codes-Hamming Codes.

Introduction-Boolean Algebra- De Morgan's Theorem-Sum Of Product method-Product of Sum method - Karnaugh Map.

UNIT II: LOGIC GATES & FLIPFLOPS

Introduction - Logic Gates – Universal Gates – Decoder – Encoder – Multiplexer - Demultiplexer - Half Adder - Full Adder - Half Subtractor - Full Subtractor. Flip-Flops - S-R Flip-flop - J-K Flip Flops

UNIT III: COMPUTER LANGUAGE AND ORGANIZATION

Introduction: Machine Language - Assembly language – Assembler - Programming Arithmetic & Logic Operations – Input - Output Programming.

Basic Computer Organization and Design Instruction Codes - Computer Registers -Computer Instruction - Timing & Control Instruction Cycles-Memory Reference Instruction.

UNIT IV: I/O ORGANIZATION

I/O Organization - Peripheral Devices - I/O Interface - Mode of Transfers - DMA.

UNIT V: MEMORY ORGANIZATION

Memory Organization - Memory Hierarchy - Main Memory - Auxiliary Memory -Associative Memory - Cache Memory - Virtual Memory.

TEXT BOOK:

1. Albert Paul Malvino& Donald P.Leach, Digital Principles and Applications, IV Edition - Tata McGraw Hill Company Limited, 2015.
2. Morris Mano, **Computer System Architecture**, Pearson Publication, Third Edition, 2003.

REFERENCE BOOKS:

1. P. K. Sinha&PritiSinha , "Computer Fundamentals", 6th Edition, BPB Publications, 2019
2. Dr.AnitaGoel, Computer Fundamentals", Pearson Education, 2010.
3. Alexis Leon, "Fundamentals of Information Technology", Vikas Publication, 2009
4. P.S.Manoharan, "F Digital Principles & System Design", Revised Edition - Charulatha Publication, 2013.

WEB RESOURCES:

1. https://lecturenotes.in/subject/419/digital-logic-design-and-computer-organisation-dldco/note
2. https://www.javatpoint.com/digital-computers
3. https://www.yumpu.com/en/document/view/16977783/digital-principles-and-computer-organisation-npr-arts-and-science-

CO	COURSE OUTCOMES	CL
1.	Understand the concept of number representation and boolean algebra.	**K1**
2.	Implement the concepts of logic gates &flip flops	**K2, K3**
3	Sketch out the definitions of computer language and organization	**K2, K3**
4.	Understand about input/output organization	**K2, K3**
5.	Recognizes the concepts of memory organization	**K2, K3**

MAPPING OF COs with POs andPSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	**S**	**S**	**M**	**M**	**M**	**M**	**M**	**M**	**S**	**S**	**M**
CO2	**S**	**S**	**M**	**S**	**M**	**S**	**M**	**M**	**S**	**S**	**S**
CO3	**S**	**S**	**M**	**M**	**M**	**S**	**M**	**M**	**S**	**M**	**S**
CO4	**M**	**S**	**M**	**S**	**M**	**S**	**S**	**M**	**S**	**S**	**S**
CO5	**S**	**M**	**S**	**S**	**M**	**M**	**M**	**M**	**M**	**S**	**S**

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	U21CAT21	DATA STRUCTURES & ALGORITHMS	L	T	P	C
CORE – III			5	-	-	4
Cognitive Level		**K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyze				

Objectives

1	To understand the linear data structures Stack, queue and their applications
2	To be trained in non-linear data structures list and tree along with their real time applications.
3	To be trained and design the various searching techniques and the differences between them.
4	To be trained and enterprise the various sorting techniques and the differences between them.

UNIT I: STACK AND QUEUE

Introduction – Analysis of Algorithms- Stacks: Introduction- Stack Operations - Applications – Queues: Introduction- Operations on Queues-Circular Queues- Applications

UNIT II: LINKED LIST

Linked Lists: Introduction - Singly Linked Lists - Circularly Linked Lists - Doubly Linked Lists – Applications- Dynamic storage – Garbage collection and compaction

UNIT III: TREES

Trees: Introduction - Definition and Basic Terminologies - Representation of Trees - Binary Trees: Basic Terminologies and Types - Representation of Binary Trees - Binary Tree Traversals – Application.

UNIT IV: SEARCHING TECHNIQUES

Searching: Introduction - Linear Search - Transpose Sequential Search - Binary Search

UNIT V: SORTING TECHNIQUES

Sorting: Introduction- Bubble Sort - Insertion Sort - Selection Sort -Merge Sort -Shell Sort -Quick Sort

TEXT BOOK:

1. G A VijayalakshmiPai, “Data Structures and Algorithms Concepts, Techniques and Applications”, Tata McGraw-Hill Publishing Company Limited NEW DELHI, 2017

REFERENCE BOOKS:

1. NarasimhaKarumanchi, “Data Structures and Algorithms Made Easy: Data Structures and Algorithmic Puzzles”, 5th Edition, 2016.
2. Debdutta Pal SumanHalder, “Data Structures and Algorithms with C”, Alpha Science International Ltd. Oxford, U.K., 2018.

WEB RESOURCES:

1. http://www.dhimangaurav.com/docs/data.pdf
2. https://dokumen.pub/qdownload/data-structures-and-algorithms-with-c-9781783323685.html
3. https://dokumen.pub/qdownload/data-structures-and-algorithms-concepts-techniques-and-applications-9780070667266-0070667268.html

CO	COURSE OUTCOMES	CL
1.	Analyze the space and time complexities for an algorithm	**K2, K3, K4**
2.	Identify and use appropriate data structure to solve problems	**K2, K3, K4**
3	Learn about the Linked List and its applications	**K2, K3, K4**
4.	Implement and Handle various searching algorithms	**K2, K3, K4**
5.	Implement and Handle various sorting algorithms	**K2, K3, K4**

MAPPING OF COs WITH POs AND PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	**S**	**S**	**M**	**M**	**M**	**M**	**M**	**M**	**S**	**S**	**M**
CO2	**S**	**S**	**M**	**S**	**M**	**S**	**M**	**M**	**S**	**S**	**S**
CO3	**S**	**S**	**M**	**M**	**M**	**S**	**M**	**M**	**S**	**M**	**S**
CO4	**M**	**S**	**M**	**S**	**M**	**S**	**S**	**M**	**S**	**S**	**S**
CO5	**S**	**M**	**S**	**S**	**M**	**M**	**M**	**M**	**M**	**S**	**S**

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

SEMESTER – II

U21CAP22	DATA STRUCTURES USING C – LAB	L	T	P	C
CORE -IV		-	-	5	4
Cognitive Level	**K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyze				

Objectives

1	To implement the linear data structures Stack, queue and their applications
2	To be trained to implement non-linear data structures list and tree along with their real time applications.
3	To be implemented various searching techniques.
4	To be practiced to use various sorting techniques.

LAB EXERCISES

1. To perform Stack operations
2. Write a C program that uses stack operations to convert a given infix expression into its postfix Equivalent, Implement the stack using an array.
3. To perform Queue Operations
4. To perform operations in circular queue.
5. Write a C program that uses functions to perform the following:
6. Create a singly linked list of integers.
    a. Add some more data in the list
    b. Display the contents of the above list after addition.
    c. Delete a given integer from the above linked list.
    d. Display the contents of the above list after deletion.
7. Create a doubly linked list of integers.
    a. Add some more data in the list
    b. Display the contents of the above list after addition.
    c. Delete a given integer from the above linked list.
    d. Display the contents of the above list after deletion.
8. Write a C program that uses functions to perform the following:
    a. Create a binary search tree of characters.
    b. Traverse the above Binary search tree recursively in Post order.
9. Write a C program that uses functions to perform the following:
    a. Create a binary search tree of integers.
    b. Traverse the above Binary search tree non recursively in in-order.
10. Write C programs for implementing the following sorting methods to arrange a list of integers in ascending order:
    a. a) Insertion sort b) Merge sort
11. Write C programs for implementing the following sorting methods to arrange a list of integers in ascending order:
    a. a) Quick sort b) Selection sort

REFERENCE BOOKS:

1. G.A.VijayalakshmiPai, “Data Structures and Algorithms Concepts, Techniques and Applications”, Tata McGraw-Hill Publishing Company Limited NEW DELHI, 2008.
2. NarasimhaKarumanchi, Data Structures and Algorithms Made Easy: Data Structures and Algorithmic Puzzles” 5th Edition, 2016.
3. Debdutta Pal SumanHalder, “Data Structures and Algorithms with C”, Alpha Science International Ltd. Oxford, U.K., 2018.

WEB RESOURCES:
1. https://iare.ac.in/sites/default/files/lab2/DS%20LAB%20MANUAL_0.pdf 2. https://www.wctmgurgaon.com/wctm/dsa%20lab-it-labmanual.pdf

CO	COURSE OUTCOMES	CL
1.	Implement real time problems of Stack and Queue	**K2, K3, K4**
2.	Apply the operations of Linked Lists	**K2, K3, K4**
3	Execute the concepts of Tree and traversal	**K2, K3, K4**
4.	Implement all searching algorithms.	**K2, K3, K4**
5.	Able to implement all sorting algorithms	**K2, K3, K4**

MAPPING OF COs WITH POs AND PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	**S**	**S**	**M**	**M**	**M**	**M**	**M**	**M**	**S**	**S**	**M**
CO2	**S**	**S**	**M**	**S**	**M**	**S**	**M**	**M**	**S**	**S**	**S**
CO3	**S**	**S**	**M**	**M**	**M**	**S**	**M**	**M**	**S**	**M**	**S**
CO4	**M**	**S**	**M**	**S**	**M**	**S**	**S**	**M**	**S**	**S**	**S**
CO5	**S**	**M**	**S**	**S**	**M**	**M**	**M**	**M**	**M**	**S**	**S**

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	U21CAA22	ACCOUNTING AND FINANCIAL MANAGEMENT	L	T	P	C
ALLIED -II			5	-	-	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Analyze				

Objectives	
1	To know a brief of accounting procedures.
2	To know about the preparation of final Accounts.
3	To create knowledge of accessing the account information.
4	Understanding the need of Accounts of an organization for decision making.

UNIT I: ACCOUNTING INFORMATION AND DOUBLE ENRTY

Origin and Growth of accounting: Meaning – objectives & Classifications, uses of accounting information – Limitations. Double Entry System: Definitions – Rules, Merits & Demerits

UNIT II: JOURNAL AND LEDGERS

Journal – Ledger – Posting Journal to Ledger.

UNIT III: BALACE SHEET

Final accounts of Sole Trading Concerns: Trail Balance – Profit and Loss account – Balance Sheet.

UNIT IV: FINACIAL MANAGEMENT

Introduction to Financial Management – Origin – Scope – Types.

UNIT V: FINANCIAL STATEMENT ANALYSIS

Financial statement analysis & interpretation: Accounting ratio their significance, Utility & Limitations, Analysis for Inequality, Profitability & Solvency.

TEXT BOOK:

1. T.S.Grewal, "Double entry book keeping", 2019.
2. R.L.Gupta&M.Radhasamy, "Advanced Accountancy", 2013.
3. M.A.Arulanantham&S.Raman, "Advanced Accountancy" , 2016.
4. S.N.Maheswari, "Advanced Accountancy" - 2019
5. M.C.Shukhala&T.S.Grewal, "Advanced Accountancy", 2016.

REFERENCE BOOKS:

1. R.L.Gupta&RadhaSwamy, "Accounting", Sultan Chand & Sons, 1993.
2. Khan & Jain, "Financial Management", McGraw Hill Companies, 2007.

WEB RESOURCES:

1. https://www.educba.com/accounting-vs-financial-management/
2. https://talentedge.com/articles/difference-financial-management-financial-accounting/
3. https://www.investopedia.com/ask/answers/041015/how-does-financial-accounting-differ-managerial-accounting.asp

CO	COURSE OUTCOMES	CL
1.	Know about the accounting information and double entry system.	**K2, K3,**
2.	Understand about how to enter the data in Journal and Ledgers	**K2, K3**
3	Understand about to prepare the balance sheet	**K2, K3**
4.	Gain more knowledge about financial management.	**K2, K3**
5.	Gain more knowledge about financial management and analyse it.	**K2, K3, K4**

MAPPING OF COs WITH POs AND PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	M	M	M	M	M	S	S	M
CO2	S	S	M	S	M	S	M	M	S	S	S
CO3	S	S	M	M	M	S	M	M	S	M	S
CO4	M	S	M	S	M	S	S	M	S	S	S
CO5	S	M	S	S	M	M	M	M	M	S	S

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

SEMESTER – III

COURSE CODE	U21CAT31	WEB TECHNOLOGY	L	T	P	C
CORE - V			5	-	-	4

Cognitive Level **K1: Recall** **K2: Understand** **K3: Apply** **K4: Analyze**

Objectives

1	To know about the static web page designing.
2	To understand about the scripting language
3	To understand the concept of OLEDB connection class & Cookies.
4	Knowledge of solving web client/server problems

UNIT I: HTML

Introduction – History of the Internet – Services and Accessibility – Uses – Protocols – Internet Standards-**HTML** – Introduction – HTML Document – Head Section – Body Section – HTML Forms – Java Script – Introduction – Language Elements – Objects of Java Script – Other Objects – Arrays.

UNIT II: **CSS**

Cascading Style Sheets – Advantages of CSS – Properties of Tags – Property Values – Embedded Style Sheets – External Style Sheets – Grouping – Inheritance – Class as Selector – Pseudo Classes and Pseudo Elements – Positioning – Backgrounds – Element Dimensions

UNIT III: JAVA SCRIPT

Java Script Basics – Variables – String Manipulation –Mathematical Functions – Statements – Operators – Arrays – Functions – Data and Objects – Regular Expressions –Exception Handling – Built-in Objects – Events –Dynamic HTML with Java Script

UNIT IV: ASP.Net

ASP. NET Language Structure - Page Structure - Page event, Properties & Compiler Directives. HTML server controls - Anchor, Tables, Forms, Files. Basic Web server Controls- Label, Textbox, Button, Image, Links, Check & Radio button, Hyperlink.

Data List Web Server Controls - Check box list, Radio button list, Drop down list, List box, Data grid, Repeater.

UNIT V: ASP.Net

Request and Response Objects, Cookies, Working with Data - OLEDB connection class, command class, transaction class, data adaptor class, data set class. Advanced Issues - Email, Application Issues, Working with IIS and page Directives.

TEXT BOOK:

1. N.P.Gopalan, J.Akilandeswari, "Web Technology – A Developers Perspective", Prentice Hall of India Pvt. Ltd., New Delhi, 2008.
2. Deitel&Deitel," Internet & World Wide Web How to program, Pearson Education", 4th Edition, 2009

REFERENCE BOOKS:

1. J Jaworkski, "Mastering JavaScript", BPB Publications, 1999
2. Marty Hall and Larry, "Core Servlets and Java Server Pages, Core Technologies", Brown Pearson, Pearson Education India, 1998.
3. Bayross, "Web Enabled Commercial Application Development Using HTML, DHTML, Javascript", Pen CGI, BPB Publications, 2000.

WEB RESOURCES:

1. https://study.com/academy/lesson/what-is-web-technology-definition-trends.html.
2. https://www.geeksforgeeks.org/web-technology/
3. https://www.goodcore.co.uk/blog/web-technologies/
4. https://en.wikibooks.org/wiki/Introduction_to_Information_Technology/Web_Technologies

CO	COURSE OUTCOMES	CL
1.	Know to design the web page using HTML	**K2, K3,**
2.	Understand about how to enhance the web page using CSS	**K2, K3**
3	Understand about to use scripting language Java Script	**K2, K3**
4.	Gain more knowledge about ASP.net	**K2, K3**
5.	Gain practical knowledge in linking OLEDB in ASP.Net	**K2, K3, K4**

MAPPING OF COs WITH POs AND PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	**S**	**S**	**M**	**M**	**M**	**M**	**M**	**M**	**S**	**S**	**M**
CO2	**S**	**S**	**M**	**S**	**M**	**S**	**M**	**M**	**S**	**S**	**S**
CO3	**S**	**S**	**M**	**M**	**M**	**S**	**M**	**M**	**S**	**M**	**S**
CO4	**M**	**S**	**M**	**S**	**M**	**S**	**S**	**M**	**S**	**S**	**S**
CO5	**S**	**M**	**S**	**S**	**M**	**M**	**M**	**M**	**M**	**S**	**S**

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	U21CAE311	CHOICE I	L	T	P	C
ELECTIVE I		WEB TECHNOLOGY LAB	-	-	4	3

Cognitive Level	K1: Recall	K2: Understand	K3: Apply	K4: Analyze

Objectives

1	To design the static web page using HTML
2	To enhance the web page using CSS
3	To be implemented the practical knowledge of ASP.Net
4	To be practiced to use various controls in ASP.Net

LAB EXERCISES

Write the HTML program using

1. Heading Tag
2. Formatting Tag
3. Ordered List
4. Unordered List
5. Definition List

Write the ASP.NET program to

1. Designing Login Form
2. Show the data in data grid
3. Program using request and response object
4. Program using Cookies
5. Create an advertisement using Ad rotator Control
6. Validator Control
7. String Functions
8. Program using system – data OLEDB
9. Payroll Detail in ASP.NET using Access as Background
10. Generate the Hotspots in the image

Write the Java Script Program to

1. Greatest among three numbers using branching statements
2. Sorting the number
3. Fibonacci Series
4. Palindrome Checking
5. Looping through Arrays
6. Background color changing
7. Temperature color changing
8. Functions
9. Date and time function
10. String Function
11. Numeric Function
12. Quiz using Forms
13. Online Shopping

REFERENCE BOOKS:

1. N.P.Gopalan, J. Akilandeswari, “Web Technology – A Developers Perspective”, Prentice Hall of India Pvt. Ltd., New Delhi, 2008.
2. Deitel&Deitel, “Internet & World Wide Web How to program”, Pearson Education, 2009

WEB RESOURCES:

1. https://www.w3schools.com/js/DEFAULT.asp

2. https://www.tutorialspoint.com/javascript/index.htm
3. https://www.w3schools.com/asp/default.ASP
4. https://www.tutorialspoint.com/asp.net/index.htm
5. https://www.w3schools.com/html/

CO	COURSE OUTCOMES	CL
1.	Impart the practical knowledge in HTML for web page design.	**K2, K3, K4**
2.	Able to apply CSS enhancement into HTML	**K2, K3, K4**
3	Execute the programming concepts of ASP.NET	**K2, K3, K4**
4.	Implement the programming knowledge of Java Script	**K2, K3, K4**
5.	Able to implement the practical exposure to design static and dynamic web pages.	**K2, K3, K4**

MAPPING OF COs WITH POs AND PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	**S**	**S**	**M**	**M**	**M**	**M**	**M**	**M**	**S**	**S**	**M**
CO2	**S**	**S**	**M**	**S**	**M**	**S**	**M**	**M**	**S**	**S**	**S**
CO3	**S**	**S**	**M**	**M**	**M**	**S**	**M**	**M**	**S**	**M**	**S**
CO4	**M**	**S**	**M**	**S**	**M**	**S**	**S**	**M**	**S**	**S**	**S**
CO5	**S**	**M**	**S**	**S**	**M**	**M**	**M**	**M**	**M**	**S**	**S**

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	U21CAE312	CHOICE II	L	T	P	C
ELECTIVE -I		GRAPHICS USING C++ LAB	-	-	4	3
Cognitive Level	K1: Recall	K2: Understand	K3: Apply	K4: Analyze		

Objectives:

1. To apply the fundamentals of Graphics primitives using C++
2. To create a program using 2D & 3D Transformations
3. To understand the features of line, circle and ellipse algorithms
4. To emphasize the properties of composite transformations in Graphics

Program List

1. Draw a Line using DDA Algorithm
2. Draw a Line using Bresenham's Line Drawing Algorithm
3. Draw a Circle using Mid Point Circle Algorithm
4. Draw an Ellipse using Mid Point Ellipse Algorithm
5. Implement various attributes of Output primitives
6. Implement 2D Transformation
7. Implement 2D Composite Transformation
8. Clip a Line using Cohen Sutherland Clipping Algorithm
9. Implement 3D Transformation
10. Implement 3D Composite Transformation

COURSE CODE	U21CAA33	OPERATIONS RESEARCH	L	T	P	C
ALLIED -III			5	-	-	4

Cognitive Level	K1: Recall	K2: Understand	K3: Apply	K4: Analyze

Objectives	
1	To understand the mathematical tools that are needed to solve optimization problems.
2	To provide Basic skills and knowledge of operations research and its application
3	To apply the techniques used in operations research to solve real life problem
4	Able to develop operational research models from the description of the real-world systems

UNIT I: INTRODUCTION

Definition of OR – General methods for solving OR models – Main characteristics of OR – Applications of OR.

UNIT II: LINEAR PROGRAMMING PROBLEMS

Linear programming problems – Mathematical formation of LPP – Slack and surplus variables – Graphical solutions for LPP.

UNIT III: SIMPLEX METHOD

Simplex method – Computational procedure – Artificial variable techniques – two phase method – Duality in Linear programming.

UNIT IV: ASSIGNMENT PROBLEM

Mathematical formula of Assignment problem – Method for solving the assignment problem

UNIT V: TRANSPOTATION PROBLEM

Mathematical formula of Transportation problem method for obtaining an Initial feasible solution – Optimum solution T.P – Degeneracy in T.P – Unbalanced T.P

TEXT BOOK:

1. S.D.Sharma, "Operations Research", KedarNath Ram Nath& Co Publications, Sixteenth Revised Edition, 2009.

REFERENCE BOOKS:

1. KantiSwarup, P.K Gupta &Manmohan, "Operations Research", Sultan Chand &Sons publications, Sixteenth Revised Edition, 2009.
2. Prof.V.Sundaresan, K.S.Ganapathy Subramanian, K.Ganesan, "Resource Management Techniques", AR Publications Revised Edition, 2010.

WEB RESOURCES:

1. https://www.businessmanagementideas.com/personnel-management/operation-research/operation-research-definition-scope-and-techniques/6556
2. https://www.britannica.com/topic/operations-research/Computers-and-operations-research
3. https://whatis.techtarget.com/definition/operations-research-OR

CO	COURSE OUTCOMES	CL
1.	Solve optimization problems using mathematical tools	**K2, K3,**
2.	Solve transportation and assignment problems	**K2, K3**
3	Apply integer programming and linear programming to solve real life applications	**K2, K3**
4.	Design simple operation research models to improve decision making	**K2, K3**
5.	Gain more knowledge about transportation problem.	**K2, K3, K4**

MAPPING OF COs WITH POs AND PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	M	M	M	M	M	S	S	M
CO2	S	S	M	S	M	S	M	M	S	S	S
CO3	S	S	M	M	M	S	M	M	S	M	S
CO4	M	S	M	S	M	S	S	M	S	S	S
CO5	S	M	S	S	M	M	M	M	M	S	S

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	U21PEN31	PHOTO DESIGNING TOOL	L	T	P	C
NME – I			2	-	-	2

Cognitive Level	K1: Recall	K2: Understand	K3: Apply	K4: Analyze

Objectives

1	To perform documentation.
2	To perform accounting operations.
3	To perform presentation skills.
4	The student can capable to handle Basic Data Processing Work in Working Environment

UNIT I: Getting into Photoshop

Introduction - Best in Photoshop 7.0 - Photoshop Interface-Saving the File-Importing Existing File.

UNIT II: Editing and Retouching

Working with Selections-Getting started with the Selection tool-Selection with Rectangle Marquee Tool-Selection with Elliptical Marquee Tool-Moving a Selection-Moving with Keyboard Shortcut-Selection with the Magic Wand-Selection with Lasso Tool-Adding and Subtraction Selection-Selection with the Magnetic Lasso-Transforming a Selection-Combining Selection Tools-Cropping the Completed Image-Quick Mask tool to make Selection-Enabling the Quick Mask Mode-Adjusting Quick Mask Setting-Patch Tool-Paint Tools-Image Color Adjustments.

UNIT III: Making Artistic use of Photoshop

Painting Tools-Working with Brushes-Drawing-Eraser Tool-Brushes Palette-Pen Tool-Selecting an Image with Pen Tool-Editing and Cleaning Tools-Clone Stamp Tool-Healing Brush-Image Resizing.

UNIT IV: Building Original Art work

Layers-Creating A Layer -Layer Mask-Transform-Custom shapes -Create Your own Custom shapes.

UNIT V: Transforming Images with Filters

Filters-Text Tool-Text Wrap-Try it.

Text Book:

1. J. Jenitha, A. Diana, “Adobe Photoshop 7.0 - A Novice Guide” ACCA Publication, 2012.

Reference Books:

1. Deke McClelland, Laurie Ulrich Fuller Robert C.Fuller, "Photoshop CS2 Bible" Professional Edition, 2005.
2. Damian Belak, “Photoshop: Step By Step Tutorial for Beginners”, PS Publishers, 2017.

CO	COURSE OUTCOMES	CL
1.	Become experts in manipulating Photos	K2
2.	Combine excellent technical skills with strong conceptual ideation	K2, K3
3	Knowledgeable about methods and techniques	K2
4.	Digital Software proficiency (Digital lab, Adobe suite, web, apps)	K2
5.	Practice process as a deliberate component of the final photographic image	K2, K3

MAPPING OF COs WITH POs AND PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	**S**	**S**	**M**	**M**	**M**	**M**	**M**	**M**	**S**	**S**	**M**
CO2	**S**	**S**	**M**	**S**	**M**	**S**	**M**	**M**	**S**	**S**	**S**
CO3	**S**	**S**	**M**	**M**	**M**	**S**	**M**	**M**	**S**	**M**	**S**
CO4	**M**	**S**	**M**	**S**	**M**	**S**	**S**	**M**	**S**	**S**	**S**
CO5	**S**	**M**	**S**	**S**	**M**	**M**	**M**	**M**	**M**	**S**	**S**

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

SEMESTER – IV

COURSE CODE	U21CAT41	RELATIOANAL DATABASE MANAGEMENT SYSTEM	L	T	P	C
CORE - VI			4	-	-	4

Cognitive Level	K1: Recall	K2: Understand	K3: Apply	K4: Analyze

Objectives	
1	To understand the overview of Data Base systems & Data Models.
2	To modify and maintain the database structure.
3	To Understand about the PL/SQL / SQL.
4	The Students can able to handle the Database.

UNIT I: INTRODUCTION

Introduction: Purpose of data base systems – View of data – Data models – Database languages – Transaction management – Storage management – Database Administrator – Database users – Overall system structure

UNIT II: LINEAR PROGRAMMING PROBLEMS

Entity – Relationship Model-Basic concepts – Design issues – Mapping cardinalities – Keys – E-R Diagrams – Weak entity sets – Extended E-R features – Design of an E-R Database scheme – Reduction of an E-R scheme to table.

UNIT III: SIMPLEX METHOD

Relational Model: Structure of relational databases – Relational algebra – The tuple relational calculus – The domain relational calculus – Extended relational – Algebra operations – Modification of the database – Views

UNIT IV: ASSIGNMENT PROBLEM

Other Relational Languages & Integrity Constraints: Query by Example – Quel – Datalog – Domain constraints – Referential Integrity – Assertions – Triggers – Functional dependencies.

UNIT V: TRANSPOTATION PROBLEM

PL/SQL – Relationships between SQL & PL/SQL –Advantages of PL/SQL – arithmetic & expressions in PL/SQL – Loops and conditional statements in PL/SQL – Exceptions Handling – Cursor management – Triggers – Functions & Procedures.

TEXT BOOK:

1. Abraham Silberschatz, Henry F.Korth, S.Sudarshan, "Database System Concepts (6th edition)- McGraw - Hill international editions, 2013

REFERENCE BOOKS:

1. James W Martin, "Principles of Database Management", Prentice Hall, 2006
2. C.I.DATE , An Introduction to Database Management Systems", 8th Edition, Addition Wesley, 2009

WEB RESOURCES:

1. https://www.tutorialspoint.com/sql/sql-rdbms-concepts.htm
2. https://www.codecademy.com/articles/what-is-rdbms-sql
3. https://www.javatpoint.com/what-is-rdbms
4. https://beginnersbook.com/2015/04/rdbms-concepts/
5. https://www.guru99.com/difference-dbms-vs-rdbms.html

CO	COURSE OUTCOMES	CL
1.	Understand the fundamentals of database system.	**K2, K3,**
2.	Design and create tables in database and execute queries.	**K2, K3**
3	Have knowledge in network and hierarchical data base system.	**K2, K3**
4.	Design a database based on a data models using normalization.	**K2, K3**
5.	Understand the programming concept of PL/SQL	**K2, K3, K4**

MAPPING OF COs WITH POs AND PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	**S**	**S**	**M**	**M**	**M**	**M**	**M**	**M**	**S**	**S**	**M**
CO2	**S**	**S**	**M**	**S**	**M**	**S**	**M**	**M**	**S**	**S**	**S**
CO3	**S**	**S**	**M**	**M**	**M**	**S**	**M**	**M**	**S**	**M**	**S**
CO4	**M**	**S**	**M**	**S**	**M**	**S**	**S**	**M**	**S**	**S**	**S**
CO5	**S**	**M**	**S**	**S**	**M**	**M**	**M**	**M**	**M**	**S**	**S**

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	U21CAP43	RELATIOANAL DATABASE MANAGEMENT SYSTEM LAB	L	T	P	C
CORE - VII			-	-	4	4
Cognitive Level		**K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyze				

Objectives	
1	Populate and query using DDL, DML ,DCL, TCL
2	Create tables in database using logical operator, set operator sequence
3	Create implicit and explicit cursor
4	Create trigger procedure and function

LAB EXERCISES

1. Program using Conditional Controls, Iterative Controls & Sequential Controls.
2. Programs using Exception Handling.
3. Programs using Explicit Cursors & Implicit Cursors.
4. Programs using PL/SQL Tables & Records.
5. Programs using Database Triggers.
6. Programs to design Procedures using In, Out, Inout Parameter.
7. Program to design Procedure using Functions.
8. Programs to design Procedures using Packages.
9. Program using ADO, DAO & RDO Connectivity

REFERENCE BOOKS:

1. Abraham Silberschatz, Henry F.Korth, S.Sudarshan, “Database System Concepts”, (third edition), McGraw - Hill International Editions, 1997.
2. S.AT’RE, “DS Techniques for Design, Performance & Management”, John Wiley & sons, 1988.
3. James W Martin, “Principles of Database Management”, Prentice hall,1979.
4. C.I.DATE , “An Introduction to DBS”, Addition Wesley, 1981.

WEB RESOURCES:

1. https://www.tutorialspoint.com/sql/sql-rdbms-concepts.htm
2. https://www.codecademy.com/articles/what-is-rdbms-sql
3. https://www.javatpoint.com/what-is-rdbms
4. https://beginnersbook.com/2015/04/rdbms-concepts/
5. https://www.guru99.com/difference-dbms-vs-rdbms.html

CO	COURSE OUTCOMES	CL
1.	Design and implement database schema for the given problem	**K2, K3, K4**
2.	Populate and query using DDL,DML,DCL,TCL prepare SQL reports	**K2, K3, K4**
3	Create implicit and explicit cursor. capable to create triggers, procedures and function	**K2, K3, K4**
4.	Capable to create triggers, procedures and function	**K2, K3, K4**
5.	Able to create practical knowledge on PL/SQL	**K2, K3, K4**

MAPPING OF COs WITH POs AND PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	M	M	M	M	M	S	S	M
CO2	S	S	M	S	M	S	M	M	S	S	S
CO3	S	S	M	M	M	S	M	M	S	M	S
CO4	M	S	M	S	M	S	S	M	S	S	S
CO5	S	M	S	S	M	M	M	M	M	S	S

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	U21CAA44	STATISTICAL METHODS	L	T	P	C
ALLIED -IV			4	-	-	4

Cognitive Level	**K1:** Recall	**K2:** Understand	**K3:** Apply	**K4:** Analyze

Objectives	
1	To have a broad background in Statistics fundamentals and techniques.
2	To recognize the importance and value of mathematical and statistical thinking, training, and approach to problem solving, on a diverse variety of disciplines.
3	To become familiar with a variety of examples where mathematics or statistics helps accurately explain abstract or physical phenomena.
4	To understand the probability concept.

UNIT I: ORGANIZING DATA

Organizing data: Raw data-Frequency distribution-percentage- bar graph- pie graph-histogram-cumulative frequency distributions- Ogives.

UNIT II: **LINEAR PROGRAMMING PROBLEMS**

Frequency distribution: measure of central tendency - Arithmetic Mean – Median – Mode – Geometric Mean – Harmonic Mean.

UNIT III: SIMPLEX METHOD

Correlation- Regression – Rank Correlation- Binomial Distribution – Poison distribution

UNIT IV: ASSIGNMENT PROBLEM

Experiment – outcomes - sample space – compound events- probability- marginal and continuous probability- mutually exclusive events- Baye's Theorem – permutation and combination.

UNIT V: TRANSPOTATION PROBLEM

χ^2 – Distribution - χ^2 Test - χ^2 test to test the goodness of fit – Test for independence of attributes.

TEXT BOOK:

1. S.ArumugamIssac, "Statistics", New Gamma Publishing House, Palayamkottai, 2009.
2. Larry.J.Stephens, "Beginning statistics", Schaum's Outline Series, McGraw-Hill Education; 2nd edition, 2006

REFERENCE BOOKS:

1. S.C.Gupta, V.K.Kapoor, "Element of Mathematical Statistics", Sultan Chand & Sons, 2020.

WEB RESOURCES:

1. https://learn.g2.com/statistical-analysis-methods
2. https://www.analyticsvidhya.com/blog/2017/02/lintroductory-guide-on-linear-programming-explained-in-simple-english/
3. https://www.britannica.com/topic/simplex-method
4. https://www.geeksforgeeks.org/transportation-problem-set-1-introduction/

S.No.	COURSE OUTCOMES	CL
CO1	Understand the concepts of mean, median, mode	**K2, K3,**
CO2	Discuss about the Regression and Correlation to solve problems	**K2, K3**
CO3	Describe the solution methods using Bayes theorem.	**K2, K3**
CO4	Evaluate problems using various distributions	**K2, K3**
CO5	Understand the probability concepts	**K2, K3, K4**

MAPPING OF COs WITH POs AND PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	M	M	M	M	M	S	S	M
CO2	S	S	M	S	M	S	M	M	S	S	S
CO3	S	S	M	M	M	S	M	M	S	M	S
CO4	M	S	M	S	M	S	S	M	S	S	S
CO5	S	M	S	S	M	M	M	M	M	S	S

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	U21CAE421	CHOICE -I	L	T	P	C
ELECTIVE - II		SOFTWARE ENGINEERING	3	-	-	3

Cognitive Level	K1: Recall	K2: Understand	K3: Apply	K4: Analyze

Objectives

1	To Describe the processes of software development
2	To Develop software design and modules for real time system
3	To Analyze verification & validation techniques
4	To identify, formulate, and solve engineering problems.

UNIT I: INTRODUCTION

Introduction to Software engineering some definitions – some size factors – quality to productivity factors – managerial Issue. Planning a software project: defining the problems developing a solution strategy – planning on organization structure – other planning activities.

UNIT II: SOFTWARE COST ESTIMATION

Software cost estimation: Software cost factors – Software cost estimation techniques – staffing – level estimation – estimative software maintenance costs.

UNIT III: SOFTWARE REQUIREMENTS

Software requirements, definition: the software requirements specifications – formal specification techniques – language and processors for requirements specification.

UNIT IV: SOFTWARE DESIGN

Software Design: fundamentals Descartes concepts – Modules and Modularizing criteria -Design techniques – detailed design considerations – real time and distributed system design – test plan – mile – stones walk through and inspection – design guide line.

UNIT V: VERIFICATION & VALIDATION

Verification and validation techniques: Quality Assurance – static analysis – symbolic execution – unit testing and debugging system - testing formal verification.

Software maintenance: enhancing maintainability during developments managerial aspects of software maintenance – configuration management – sources code metrics – other maintenance tools and techniques.

TEXT BOOK:

Richard E.Fairy, "Software Engineering Concepts", McGraw Hill Pvt Ltd, 2017

REFERENCE BOOKS:

1. Roger S, Pressman, "Software Engineering, A Practitioner's Approach", (2014).
2. PankajJalote, Narosa, "An Integrated Approach to Software Engineering", 3rd edition, 2005.

CO	COURSE OUTCOMES	CL
1.	Understand the factors and strategies in Software Engineering	**K2, K3,**
2.	Recognize the cost metrics and feasibility study in Software estimation	**K2, K3**
3	Understand the process of developing real time projects	**K2, K3**
4.	Create software design using real time applications	**K2, K3**
5.	Analyze the quality based on validation and verification techniques in Software development	**K2, K3, K4**

MAPPING OF COs WITH POs AND PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	M	M	M	M	M	S	S	M
CO2	S	S	M	S	M	S	M	M	S	S	S
CO3	S	S	M	M	M	S	M	M	S	M	S
CO4	M	S	M	S	M	S	S	M	S	S	S
CO5	S	M	S	S	M	M	M	M	M	S	S

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	U21CAE422	CHOICE - II	L	T	P	C
ELECTIVE - II		SYSTEM SOFTWARE	3	-	-	3

Cognitive Level **K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyze

OBJECTIVES:

1.	To understand the relationship between system software and machine architecture.
2.	To know the design and implementation of assemblers, macro processors, loaders, linkers and compilers.
3.	To understand the process of scanning and parsing of a program.
4.	To have clear knowledge about system software like assemblers, loaders, linkers, macro processors and compilers.

UNIT I: Background

Introduction – System Software and Machine Architecture – The Simplified Instructional Computer (SIC) – Traditional (CISC) machines – RISC Machines

UNIT II: Assemblers

Basic Assembler Functions – Machine-Dependent Assembler Features – Machine-Independent Assembler Features – Assembler Design Options

UNIT III: Loaders and Linkers

Basic Loader Functions – Machine-Dependent Loader Features - Machine-Independent Loader Features - Loader Design Options.

UNIT IV: Macro Processors

Basic Macro Processor Functions – Machine-Independent Macro Processor Features – Macro Processor Design Options

UNIT V: Compilers

Basic Compiler Functions – Machine-Dependent Compiler Features - Machine-Independent Compiler Features

TEXT BOOK

1. Leland L. Beck &Manjula. D - System Software - An Introduction to Systems Programming - 3rd Edition. India: Pearson Education (2009)..

REFERENCE BOOKS

1. Dhamdhere.D.M - System Programming and Operating Systems - India: Tata McGraw Hill Education Private Limited. (2006)
2. Donovan.J.J - Systems Programming - India: Tata McGraw Hill Education Private Limited. (2001).

CO	COURSE OUTCOMES	CL
1.	understand the relationship between system software and machine architecture.	**K2, K3,**
2.	know the design and implementation of assemblers, macro processors, loaders, linkers and compilers	**K2, K3**
3	interpret various concepts of scanning and parsing of a program	**K2, K3**
4.	discuss the processing of a HLL program for execution on a computer system	**K2, K3**
5.	Understand the structure and design of assemblers, linkers and loaders.	**K2, K3, K4**

MAPPING OF COs WITH POs AND PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	**S**	**S**	**M**	**M**	**M**	**M**	**M**	**M**	**S**	**S**	**M**
CO2	**S**	**S**	**M**	**S**	**M**	**S**	**M**	**M**	**S**	**S**	**S**
CO3	**S**	**S**	**M**	**M**	**M**	**S**	**M**	**M**	**S**	**M**	**S**
CO4	**M**	**S**	**M**	**S**	**M**	**S**	**S**	**M**	**S**	**S**	**S**
CO5	**M**	**S**	**M**	**S**	**M**	**S**	**S**	**M**	**S**	**S**	**S**

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	U21CAN42	WEB DESIGNING LAB	L	T	P	C
NME -II			2	-	-	2

Cognitive Level	K1: Recall	K2: Understand	K3: Apply	K4: Analyze

Objectives

1	To understand the web design softwares.
2	To impart the knowledge in designing the static web pages using HTML.
3	To develop computer skills of web page designing using CSS.
4	To make to understand of using Dreamweaver.

LAB EXERCISES

1. Creating a company in Tally.ERP9
2. Single & Multi Ledger Creation
3. Single & Multi group Creation
4. Contra Voucher
5. Payment Voucher
6. Receipt Voucher
7. Purchase Voucher
8. Sales Voucher
9. Debit Note
10. Balance Sheet
11. Profit and Loss Account
12. Trial Balance
13. Creating sales and purchase ledgers for GST compliance in Tally ERP9

WEB RESOURCES:

1. https://www.webdesigninglab.com/
2. https://tutorial.techaltum.com/webdesigning.html
3. https://www.w3schools.com/

CO	COURSE OUTCOMES	CL
1.	Understand the basic terms in Tally	**K2, K3, K4**
2.	Impart the practical knowledge in entering ledger and journal	**K2, K3, K4**
3	Practice to prepare the balance sheet	**K2, K3, K4**
4.	Gain knowledge in preparing bills and reports	**K2, K3, K4**
5.	Increase the job opportunity in learning Tally software practically.	**K2, K3, K4**

MAPPING OF COs WITH POs AND PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	M	M	M	M	M	S	S	M
CO2	S	S	M	S	M	S	M	M	S	S	S
CO3	S	S	M	M	M	S	M	M	S	M	S
CO4	M	S	M	S	M	S	S	M	S	S	S
CO5	S	M	S	S	M	M	M	M	M	S	S

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

SEMESTER – V

COURSE CODE	U21CAT51	OBJECT ORIENTED PROGRAMMING USING JAVA	L	T	P	C
CORE - VIII			5	-	-	4
Cognitive Level		**K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyze				

Objectives	
1	To understand the object-oriented paradigm in the Java programming language.
2	To know about the Package and Interfaces.
3	To Understand about Applets.
4	The use of Java in a variety of technologies and on different platforms.

UNIT I: OOPS FUNDAMENTALS

Fundamentals of Object Oriented Programming - Basic Concepts of Object-Oriented Programming –Benefits of OOP –Applications of OOP. Java Evolution – overview of Java Language

UNIT II: **CONTROL STRUCTURES**

Constants, Variables and Data types. Operators and Expressions – Decision Making and Branching.

UNIT III: INHERTIANCE

Decision Making and Looping - Classes, Objects and Methods – Arrays, Strings and Vectors. Interfaces: Multiple Inheritance.

UNIT IV: PACKAGES AND EXCEPTION

Packages: Putting classes together – Multithreaded Programming – Managing errors and Exception.

UNIT V: APPLET

Applet Programming – Graphics Programming – Introduction to AWT packages – Introduction to Swings - Managing Input Output in Files in Java.

TEXT BOOK:

1. E.Balagurusamy, Programming with Java, Sixth Edition – McGrawHill Education Private Limited, 2019

REFERENCE BOOKS:

1. Patrick Naughton, Herbert Schildt, “The Complete Reference Java 2”, India: McGraw Hill, 5th Edition, 2006.
2. Dr.K.Somasundaram, “Introduction to Java Programming”, India: Jaico Publishing House, 2006.

WEB RESOURCES:

1. https://www.javatpoint.com/cpp-programs
2. https://www.geeksforgeeks.org/c-plus-plus/
3. https://www.programiz.com/cpp

CO	COURSE OUTCOMES	CL
1.	Describe the basics of OOP and the syntax of Java language	**K2, K3,**
2.	Discuss Input/Output functions with file manipulations using I/O Streams.	**K2, K3**
3	Analyze GUI programming applications using AWT packages.	**K2, K3**
4.	Plan to Develop Java based Applications using GUI and user interface and database Connectivity	**K2, K3**
5.	Understand file stream concepts	**K2, K3, K4**

MAPPING OF COs WITH POs AND PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	M	M	M	M	M	S	S	M
CO2	S	S	M	S	M	S	M	M	S	S	S
CO3	S	S	M	M	M	S	M	M	S	M	S
CO4	M	S	M	S	M	S	S	M	S	S	S
CO5	S	M	S	S	M	M	M	M	M	S	S

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	U21CAT52	COMPUTER NETWORKS	L	T	P	C
CORE-IX			5	-	-	4

Cognitive Level **K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyze

Objectives

1	To Build an understanding of the fundamental concepts of computer networking and prompt the student to learn advanced networking.
2	To Understand the working principles of various application protocols
3	To know about the Working with routing algorithms.
4	To explain about the networking configuration

UNIT I: INTRODUCTION

Introduction: Uses of Computer Networks–Types of Computer Networks-Network Technology – Examples of Networks – Network protocols-Reference Models – Network Standardization.

UNIT II: **PHYSICAL LAYER**

Physical Layer: Guided Transmission Media – Wireless Transmission – The public switched Telephone system – Cellular Networks – Communication satellites.

UNIT III: DATA LINK LAYER

Data Link Layer & Medium Access Layer – Data Link Layer - Design Issues – Elementary Data link protocols – Multiple Access Protocols – Ethernet, Wireless LAN, Bluetooth.

UNIT IV: NETWORK & TRANSPORT LAYER

Network Layer & Transport Layer: Network Layer Design Issues – Routing Algorithms – Transport Layer- The Transport Service – Elements of Transport Protocol.

UNIT V: APPLICATION LAYER

Application Layer &Security: DNS- E-Mail - Security – Cryptography – Digital Signature – Social Issues.

TEXT BOOK:

1. Andrew S. Tanenbaum, Amsterdam, Nick Feamster, David J. Wetherall, “Computer Networks”, 6 th Edition, Pearson, 2021

REFERENCE BOOKS:

1. Behrouz A. Forouzan, “Data Communications and Networking”, Fifth Edition, TMH, 2013.
2. Andrew S. Tanenbaum, David J. Wetherall, “Computer Network”, Fifth Edition, Pearson Education, 2011.

WEB RESOURCES:

1. https://www.javatpoint.com/types-of-computer-network
2. https://www.geeksforgeeks.org/basics-computer-networking/
3. https://www.tutorialspoint.com/computer_fundamentals/computer_networking.htm
4. https://www.guru99.com/types-of-computer-network.html

CO	COURSE OUTCOMES	CL
1.	Explain the concepts of various reference models, Internet and protocols	**K2, K3,**
2.	Identify different transmission media and topologies	**K2, K3**
3	Distinguish error detection and error correction of data	**K2, K3**
4.	Implement routing algorithms to determine the optimal path	**K2, K3**
5.	Impart the concepts of security issues in networks	**K2, K3, K4**

MAPPING OF COs WITH POs AND PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	M	M	M	M	M	S	S	M
CO2	S	S	M	S	M	S	M	M	S	S	S
CO3	S	S	M	M	M	S	M	M	S	M	S
CO4	M	S	M	S	M	S	S	M	S	S	S
CO5	S	M	S	S	M	M	M	M	M	S	S

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	U21CAT53	OPERATING SYSTEM	L	T	P	C
CORE - X			5	-	-	4

Cognitive Level	K1: Recall	K2: Understand	K3: Apply	K4: Analyze

Objectives	
1	To introduce various components of computer hardware and operating systems.
2	To discuss the structure of operating system, its functions and algorithms.
3	To understand the working of operating system, its structures and functioning
4	To Learn various algorithms used in operating systems.

UNIT I: PROCESS MANAGEMENT

Introduction - What is operating system do-operating System structure-operating system services-user operating system interface -system calls-Operating system design and implementation--operating –system structure. Process Management- Process scheduling-operations on processes Interprocess communication –Threads and concurrency-overview- multithreading models.

UNIT II: CPU SCHEDULING

CPU scheduling-Basic concepts-scheduling criteria-scheduling algorithms-Multi-Processor scheduling. Process Synchronization: Critical-Section Problem-Hardware support for Synchronization- Semaphores-Synchronization Examples-Classical Problems of Synchronization.

UNIT III: DEADLOCK

Deadlocks: Deadlock Characterization- Methods for Handling Deadlocks-Deadlock Prevention-Avoidance-Detection-Recovery. Main Memory: Background-Contiguous Memory Allocation-paging- Structure of the page table-swapping.

UNIT IV: MEMORY MANAGEMENT

Virtual Memory: Demand Paging-Copy on Write-Page Replacement-Allocation of Frames-Thrashing- Mass Storage Structure- RAID structure.

UNIT V: FILE ORGANIZATION

File System Interface: File Concepts- Access Methods Directory Structures –Protection-File System Implementation-File System Structures–Allocation Methods-Free Space Management. System Security: Security Problems – Program Threats –System and Network Threats.

TEXT BOOK:

1. Abraham Silberschatz, Peter Galvin, Greg Gagne, “Operating System Concepts”, Wiley, 10th Edition, 2018.

REFERENCE BOOKS:

1. Andrew S Tanenbaum, Herbert Bos, “Modern Operating Systems”, 4e Fourth Edition, Pearson Education, 2016.
2. Abraham Silberschatz, Peter Galvin, Greg Gagne, “Operating System Concepts”, Wiley,8th Edition, 2008.

WEB RESOURCES:

1. https://edu.gcfglobal.org/en/computerbasics/understanding-operating-systems/1/
2. https://whatis.techtarget.com/definition/operating-system-OS
3. https://www.computerhope.com/jargon/o/os.htm
4. https://www.geeksforgeeks.org/introduction-of-operating-system-set-1/
5. https://www.guru99.com/operating-system-tutorial.html

CO	COURSE OUTCOMES	CL
1.	Understand the types, design, implementation of operating system and I/O programming concepts.	**K2, K3,**
2.	Recognize the management of main and virtual memory schemes.	**K2, K3**
3	Analyze different scheduling algorithms and the management of devices.	**K2, K3**
4.	Understand and manage the information system using OS	**K2, K3**
5.	Understand the File concepts in Operating Systems.	**K2, K3, K4**

MAPPING OF COs WITH POs AND PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	**S**	**S**	**M**	**M**	**M**	**M**	**M**	**M**	**S**	**S**	**M**
CO2	**S**	**S**	**M**	**S**	**M**	**S**	**M**	**M**	**S**	**S**	**S**
CO3	**S**	**S**	**M**	**M**	**M**	**S**	**M**	**M**	**S**	**M**	**S**
CO4	**M**	**S**	**M**	**S**	**M**	**S**	**S**	**M**	**S**	**S**	**S**
CO5	**S**	**M**	**S**	**S**	**M**	**M**	**M**	**M**	**M**	**S**	**S**

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	U21CAP54	OBJECT ORIENTED PROGRAMMING USING JAVA LAB	L	T	P	C
CORE - XI			-	-	5	4

Cognitive Level	K1: Recall	K2: Understand	K3: Apply	K4: Analyze

Objectives

1	Gain knowledge about basic Java language syntax and semantics to write Java programs and use concepts such as variables, conditional and iterative execution methods etc.
2	To understand the fundamentals of object-oriented programming in Java, including defining classes, objects, invoking methods etc and exception handling mechanisms.
3	To Understand the principles of inheritance, packages and interfaces
4	The Student can develop software in the Java programming language.

LAB EXERCISES

1. Arrays and flow control statements.
2. Run time exception And I/O exception.
3. Multi- Threading.
4. Layout Management.
5. GUI Components (Labels, Check box, Menus, Text, etc.)
6. Event Handling (Focus Events, Key Events, Paint Events, Text Events, Mouse Events, Window Events, Etc.)
7. Animation and Images.
8. Java Applet.
9. Java files management methods.
10. Java Streams.
11. JDBC (Java Database Connectivity).

WEB RESOURCES:

1. https://www.javatpoint.com/cpp-programs
2. https://www.geeksforgeeks.org/c-plus-plus/
3. https://www.programiz.com/cpp

CO	COURSE OUTCOMES	CL
1.	Solve problems using OOPs concept in Java	**K2, K3,**
2.	Implement simple software using JAVA	**K2, K3**
3	Implement the Input/Output functions with file manipulations using I/O Streams.	**K2, K3**
4.	Implement the GUI programming applications using AWT packages.	**K2, K3**
5.	Understand the concepts of database connectivity	**K2, K3, K4**

MAPPING OF COs WITH POs AND PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	M	M	M	M	M	S	S	M
CO2	S	S	M	S	M	S	M	M	S	S	S
CO3	S	S	M	M	M	S	M	M	S	M	S
CO4	M	S	M	S	M	S	S	M	S	S	S
CO5	S	M	S	S	M	M	M	M	M	S	S

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	U21CAT54	CLOUD COMPUTING	L	T	P	C
CORE -XII			5	-	-	4
Cognitive Level	**K1:** Recall	**K2:** Understand **K3:** Apply **K4:** Analyze				

Objectives	
1	To understand the cloud computing concepts
2	To analyze the implementation of virtualization
3	To interpret the security issues and threats
4	To explore various web services

UNIT I: INTRODUCTION

Cloud Computing – An Overview: Introduction – History of Cloud Computing – Characteristics of Cloud – Cloud Computing Model. Issues and Challenges for Cloud Computing – Advantages and Disadvantages of Cloud computing – Security, Privacy and Trust – Virtualization – Threats to Cloud Computing – Next Generation of Cloud Computing. Cloud Computing Architecture: Introduction – Cloud Architecture – Cloud Computing models – Comparisons of Service models – Deployment Models – Identity as a Service (IDaaS).

UNIT II: **TECHNICAL FOUNDATIONS**

Virtualization in Cloud: Introduction – Virtualization – Implementation of Virtualization– Virtualization support at the OS level – Middleware Support for Virtualization –Advantages of Virtualization – Application Virtualization – Virtualization Implementations Techniques – Hardware Virtualization – Types of Virtualization – Load balancing in Cloud Computing – Logical Cloud Computing Model – Virtualization for Data-Centre.

UNIT III: FOORT PRINTING

Security Issues and Challenges in Cloud Computing: Introduction – Security Challenges in Cloud Computing – Information Security in Cloud Computing – Security, Privacy and Trust. Security Management: Introduction – Security Reference Architecture – Security Issues in Cloud Computing – Classification of Security Issues – Types of Attackers – Security Risks in Cloud Computing – Security Threats against Cloud Computing – Novel Security Approaches.

UNIT IV: MALWARE THREATS

Web Services: Introduction – Amazon Web Services – Microsoft Azure – Google App Engine. Data Security and Privacy: Introduction – Data Security – Privacy.

UNIT V: SESSION AND FIREWALL

Cloud Computing Applications: Introduction – Business Applications – Finance and Banking Application – Cloud Computing in Education. Mobile Cloud Computing: Introduction – Need of Mobile Cloud Computing – Mobile Computing Architecture – Technologies of MCC – MCC Applications – Issues in MCC – Challenges in Building Applications – Platforms.

TEXT BOOK:

Pachghare .V.K., “Cloud Computing” , PHI Learning Private Limited, 2016

REFERENCE BOOKS:

1. Anthony T.Velte, Toby J.Velte& Robert Elsenpeter, “Cloud Computing - A Practical Approach”, 5th Reprint. New Delhi: Tata McGraw-Hill Education Private Limited, 2011.
2. Barrie Sosinsky, “Cloud Computing Bible”, Reprint 2011. India: Wiley India Private Limited, 2011.

CO	COURSE OUTCOMES	CL
1.	Understand the need for cloud computing.	**K2, K3**
2.	Comprehend virtualization concept in cloud.	**K2, K3**
3	Get an idea of security threats in cloud.	**K2, K3**
4.	Know the available web services.	**K2, K3**
5.	Understand the applications of cloud computing	**K2,K3**

MAPPING OF COs WITH POs AND PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	**S**	**S**	**M**	**M**	**M**	**M**	**M**	**M**	**S**	**S**	**M**
CO2	**S**	**S**	**M**	**S**	**M**	**S**	**M**	**M**	**S**	**S**	**S**
CO3	**S**	**S**	**M**	**M**	**M**	**S**	**M**	**M**	**S**	**M**	**S**
CO4	**M**	**S**	**M**	**S**	**M**	**S**	**S**	**M**	**S**	**S**	**S**
CO5	**S**	**M**	**S**	**S**	**M**	**M**	**M**	**M**	**M**	**S**	**S**

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	U21CAE531	CHOICE -I	L	T	P	C
ELECTIVE - III		INTERNET OF THINGS	3	-	-	3

Cognitive Level	K1: Recall	K2: Understand	K3: Apply	K4: Analyze

Objectives	
1	In this course, student will explore various components of Internet of things such as Sensors, internetworking and cyber space.
2	In the end they will also be able to design and implement IoT circuits and solutions.
3	Students will understand the concepts of Internet of Things and can able to build IoT applications.
4	In this course, student will explore various components of Internet of things such as Sensors, internetworking and cyber space.

UNIT I:Introduction to IoT

Defining IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT, Communication models & APIs.

UNIT II: **IoT& M2M**

Machine to Machine, Difference between IoT and M2M, Software define Network .

UNIT III: Network & Communication aspects

Wireless medium access issues, MAC protocol survey, Survey routing protocols, Sensor deployment & Node discovery, Data aggregation & dissemination.

UNIT IV: Challenges in IoT

Design challenges, Development challenges, Security challenges, Other challenges - Domain specific applications of IoT Home automation, Industry applications, Surveillance applications, OtherIoT applications.

UNIT V: Developing IoTs

Introduction to Python, Introduction to different IoT tools, Developing applications through IoT tools, Developing sensor based application through embedded system platform, Implementing IoT concepts with python.

TEXT BOOK:

1. Vijay Madisetti, ArshdeepBahga, “Internet of Things: A Hands-On Approach”, Orient Blackswan Private Limited , New Delhi, 2015

REFERENCE BOOKS:

1. RMD SundaramShriram K Vasudevan, Abhishek S Nagarajan, “Internet of Things”, Wiley Publications, 2019

WEB RESOURCES:

1. https://www.tutorialspoint.com/internet_of_things/index.htm
2. https://www.javatpoint.com/iot-internet-of-things
3. https://www.guru99.com/iot-tutorial.html

CO	COURSE OUTCOMES	CL
1.	Understand the concepts of Internet of Things	**K2, K3,**
2.	Analyze basic protocols in wireless sensor network	**K2, K3**
3	Design IoT applications in different domain and be able to analyze their performance	**K2, K3**
4.	Implement basic IoT applications on embedded platform	**K2, K3**
5.	Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks	**K3**

MAPPING OF COs WITH POs AND PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	**S**	**S**	**M**	**M**	**M**	**M**	**M**	**M**	**S**	**S**	**M**
CO2	**S**	**S**	**M**	**S**	**M**	**S**	**M**	**M**	**S**	**S**	**S**
CO3	**S**	**S**	**M**	**M**	**M**	**S**	**M**	**M**	**S**	**M**	**S**
CO4	**M**	**S**	**M**	**S**	**M**	**S**	**S**	**M**	**S**	**S**	**S**
CO5	**S**	**M**	**S**	**S**	**M**	**M**	**M**	**M**	**M**	**S**	**S**

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	U21CAE532	CHOICE - II	L	T	P	C
ELECTIVE - III		E-COMMERCE	3	-	-	3

Cognitive Level	K1: Recall	K2: Understand	K3: Apply	K4: Analyze

Objectives

1	To establish knowledge about computers and to acquaint the basic concepts of e-commerce.
2	To instill idea of convergence of business relationship through recent technologies.
3	To impart the business knowledge into Computer Application students.
4	To identify, define and differentiate the various modes of electronic commerce.

UNIT I: Introduction to computers

Introduction to computers- Importance of Computers- Computer Applications in various Areas of Business- General Application of Computers in Various Fields. Fundamentals of Computers: Classification of Computers- Basic Principles of operation of Digital Computer- Computer system- computer virus- Development of computers and Computer Generation- Computer Number System.

UNIT II: **Electronic commerce**

Electronic commerce – Introduction – Business Models of e-Commerce - B2B e-commerce and EDI – Business Applications of e-commerce. Infrastructure for e-commerce – Communication networks for e-commerce.

UNIT III: Network services

Secure messaging – payment systems in e-commerce – Structured electronic documents. **Cryptocurrency**: Understanding Cryptocurrency - Types of Cryptocurrency - Advantages and Disadvantages.

UNIT IV: E-online Banking

e-online Banking: Introduction Concepts and Meaning-Need for computerization-Electronic delivery channels-Automated Teller Machine(ATM)-Electronic Fund Transfer(EFT)-uses computerization in clearing houses-Telebanking-Electronic Money Transfer(EMT) - e-Cheque Financial Transactions Terminals - MICR Cheques-e-Banking in India. Android Applications– Introduction-Concept-Applications. V-Commerce: Introduction and Features.

UNIT V: E-Commerce Technology

E-Commerce Technology – Security Issues in e-Commerce – Legal and Ethical Issues - Role of social media in e-Commerce Industry-M-Commerce and WAP - Mobile Commerce Risk, Security and Payment Methods - Mobile money-infrastructure and fraud prevention for M-payment - Current Trends in electronic world – e-Waste – e-Surveillance – e-Governance - e-Care.

TEXT BOOK:

1., R.Saravana Kumar R.ParameswaranT.Jayalakshmi, S.Chand, “Information Technology (Unit I)” , 2015.
2. V. Rajaraman , “Essentials of E-Commerce Technology(Unit II,III)”, PHI Learning Private Limited, 2015.
3. Dr.C.S.Rayudu, “e-Commerce e-Business (Unit IV)”, Himalaya publishing house, 2015.
4. Dr. U.S. PandeyEr. SaurabhShukla S. Chand, “e-Commerce and Mobile Commerce Technologies (Unit II,V)”, 2015.

REFERENCE BOOKS:

1. S. Jaiswal, “Doing Business on the Internet e-Commerce (Electronic Commerce for Business)”, Galgotia Publications, 2015.
2. CSV Murthy, “e-Commerce– Concepts, Models, Strategies”, Himalaya Publishing House, 2015.
3. Ravi Kalakota Andrew B. Whinston, “Frontiers of e-Commerce”, Pearson Education, 2015.

CO	COURSE OUTCOMES	CL
1.	Enumerate the technological changes in trade.	**K2, K3,**
2.	Explain E-commerce on business models and strategy	**K2, K3**
3	Interpret various terminologies of electronic commerce.	**K2, K3**
4.	Explain the mobile commerce introduction.	**K2, K3**
5.	Understand the e-commerce technology and security issues.	**K2, K3, K4**

MAPPING OF COs WITH POs AND PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	**S**	**S**	**M**	**M**	**M**	**M**	**M**	**M**	**S**	**S**	**M**
CO2	**S**	**S**	**M**	**S**	**M**	**S**	**M**	**M**	**S**	**S**	**S**
CO3	**S**	**S**	**M**	**M**	**M**	**S**	**M**	**M**	**S**	**M**	**S**
CO4	**M**	**S**	**M**	**S**	**M**	**S**	**S**	**M**	**S**	**S**	**S**
CO5	**S**	**M**	**S**	**S**	**M**	**M**	**M**	**M**	**M**	**S**	**S**

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	U21CAE533	CHOICE -III	L	T	P	C
ELECTIVE -III		INFORMATION SECURITY	3	-	-	3
Cognitive Level	**K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyze					
Objectives	1. To able to know the IT security concepts. 2. To able to know about the database security concepts etc. 3. Describes about Information Security. 4. Describe about Cryptography Ciphers.					

UNIT I: Introduction

Introduction: Security, Attacks, Computer Criminals.

UNIT II: Cryptography

Cryptography: Substitution ciphers, Transposition ciphers, Confusion, Diffusion, Symmetric, Asymmetric, Encryption, DES, Uses of Encryption, Hash Function, Key exchange, Digital Signatures, Digital Certificates.

UNIT III: Program Security

Program Security: Secure Programs, Non malicious program errors, malicious codes virus, Trap doors, Salami attacks, covert channels, Control against program.

UNIT IV: Database Security

Database Security: Requirements, Reliability, Integrity, Sensitive data, Inference, Multilevel Security.

UNIT V: Network Security

Security in Networks: Threats in Networks vs. Networks security controls, Firewalls, Intrusion detection systems, Secure e-mails.

TEXT BOOKS:

1. William Stallings, "Network Security Essentials Applications and Standards, 6/E,Pearson Education Publications, 2018.

REFERENCE BOOKS:

1. Forouzan –"Cryptography and network security", 3rd Edition, **McGraw Hill** Education, Publication, 2015.

CO	COURSE OUTCOMES	CL
1.	Knowledge of Cryptography and Network Security	**K2, K3,**
2.	Knowledge of security management and incident response	**K2, K3**
3	Knowledge of security in software and operating systems	**K2, K3**
4.	Knowledge of data security and secure system development	**K2, K3**
5.	Develop basic understanding of security, cryptography, system attacks and defenses against them.	**K2, K3, K4**

MAPPING OF COs WITH POs AND PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	**S**	**S**	**M**	**M**	**M**	**M**	**M**	**M**	**S**	**S**	**M**
CO2	**S**	**S**	**M**	**S**	**M**	**S**	**M**	**M**	**S**	**S**	**S**
CO3	**S**	**S**	**M**	**M**	**M**	**S**	**M**	**M**	**S**	**M**	**S**
CO4	**M**	**S**	**M**	**S**	**M**	**S**	**S**	**M**	**S**	**S**	**S**
CO5	**M**	**S**	**M**	**S**	**M**	**S**	**S**	**M**	**S**	**S**	**S**

S – Strongly Correlating-3 Marks M- Moderately Correlating-2W-Weakly Correlating

COURSE CODE	U21CAS53	OPERATING SYSTEM LAB	L	T	P	C
SKILL BASED ELECTIVE			-	-	2	2

Cognitive Level	K1: Recall	K2: Understand	K3: Apply	K4: Analyze

Objectives

1	To develop network-based applications.
2	To run various UNIX commands on a standard UNIX/LINUX Operating system.
3	To do shell programming on UNIX OS.
4	To understand and handle UNIX system calls.

LAB EXERCISES

1. Creation of a child, orphan and Zombie process.
2. IPC using pipes.
3. IPC using message queues.
4. Simulation of FCFS process scheduling.
5. Simulation of ROUND ROBIN process scheduling.
6. Simulation of SJF process scheduling.
7. Demonstration of process synchronization using signals.
8. Demonstration of process synchronization using semaphores.
9. Deadlock avoidance using banker's algorithm.
10. A program to simulate Bankers Algorithm for Deadlock Prevention.
11. A program to simulate FIFO Page Replacement Algorithm
12. A program to simulate LRU Page Replacement Algorithm

WEB RESOURCES:

1. http://www.ibiblio.org/g2swap/byteofpython/read/
2. http://docs.python.org/3/tutorial/index.html
3. http://interactivepython.org/courselib/static/pythonds.

CO	COURSE OUTCOMES	CL
1.	Learn and implement basic Linux commands.	**K2, K3,K4**
2.	Understand the operating system concepts practically	**K2, K3,K4**
3.	Demonstrate different process scheduling and executing algorithm	**K2, K3,K4**
4.	Do shell programming on LINUX OS	**K2, K3,K4**
5.	Understand the shell programming concepts	**K2, K3,K4**

MAPPING OF COs WITH POs AND PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	M	M	M	M	M	S	S	M
CO2	S	S	M	S	M	S	M	M	S	S	S
CO3	S	S	M	M	M	S	M	M	S	M	S
CO4	M	S	M	S	M	S	S	M	S	S	S
CO5	S	M	S	S	M	M	M	M	M	S	S

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

SEMESTER – VI

COURSE CODE	U21CAT61	PYTHON PROGRAMMING	L	T	P	C
CORE XIII			4	-	-	4

Cognitive Level	K1: Recall	K2: Understand	K3: Apply	K4: Analyze

Objectives	
1	To develop a basic understanding of Python programming language.
2	To be fluent in the use of procedural statements, assignments, conditional statements, loops, method calls and arrays.
3	To design, code, and test small Python programs that meet requirements expressed in English.
4	To Solve problems requiring the writing of well-documented programs in the Python language, including use of the logical constructs of that language

UNIT I: INTRODUCTION

Overview of Programming: Structure of a Python Program, Elements of Python.

Introduction to Python: Python Interpreter, Using Python as calculator, Python shell, Indentation. Atoms, Identifiers and keywords, Literals, Strings, Operators (Arithmetic operator, Relational operator, Logical or Boolean operator, Assignment, Operator, Ternary operator, Bit wise operator, Increment or Decrement operator).

UNIT II: CREATING PYTHON PROGRAMS:

Creating Python Programs: Input and Output Statements, Control statements (Looping-while Loop, for Loop, Loop Control, Conditional Statement- if...else, Difference between break, continue and pass).

UNIT III: STRUCTURES

Structures: Numbers, Strings, Lists, Tuples, Dictionary, Date & Time, Modules, Defining Functions, Exit function, default arguments.

UNIT-IV: FUNCTIONS AND MODULES

Functions and Modules: Defining a function, calling a function, Advantages of functions, types of functions, function parameters, Formal parameters, Actual parameters, global and local variables, Anonymous functions, List comprehension Importing module, Creating & exploring module

UNIT V: FILE I/O

Python File Input-Output: Opening and closing files, various types of file modes, reading and writing to files, manipulating directories – iterators and their problem solving applications.

TEXT BOOK:

1. David Amos, Python Basics – A Practical introduction to Python", 4th Edition, Realpython.com tutorial team, 2016

REFERENCE BOOKS:

1. P. K. Sinha&PritiSinha , "Computer Fundamentals", BPB Publications, 2007.
2. Dr. Anita Goel, "Computer Fundamentals", Pearson Education, 2010.
3. T. Budd, Exploring Python, TMH, 1st Ed, 2011
4. Allen Downey, Jeffrey Elkner, Chris Meyers, "How to think like a Computer Scientist: Learning with Python", Freely available online, 2012

WEB RESOURCES:

1. http://www.ibiblio.org/g2swap/byteofpython/read/
2. http://docs.python.org/3/tutorial/index.html
3. http://interactivepython.org/courselib/static/pythonds.

CO	COURSE OUTCOMES	CL
1.	Understand the basic Python programming concepts	**K2, K3**
2.	Impart the knowledge in developing python programming	**K2, K3**
3.	Understands the skill in structures.	**K2, K3**
4.	Understands the knowledge in functions and methods of python.	**K2, K3**
5.	Understand about the file concepts in python.	**K2, K3**

MAPPING OF COs WITH POs AND PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	**S**	**S**	**M**	**M**	**M**	**M**	**M**	**M**	**S**	**S**	**M**
CO2	**S**	**S**	**M**	**S**	**M**	**S**	**M**	**M**	**S**	**S**	**S**
CO3	**S**	**S**	**M**	**M**	**M**	**S**	**M**	**M**	**S**	**M**	**S**
CO4	**M**	**S**	**M**	**S**	**M**	**S**	**S**	**M**	**S**	**S**	**S**
CO5	**S**	**M**	**S**	**S**	**M**	**M**	**M**	**M**	**M**	**S**	**S**

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	U21CAT62	COMPUTER GRAPHICS AND MULTIMEDIA	L	T	P	C
CORE -XIV			5	-	-	4
Cognitive Level	**K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyze					
Objectives						
1.	Introduce the concepts of computer graphics.					
2.	Gain knowledge about graphics hardware devices and software used.					
3.	Understand the two dimensional graphics and their transformations.					
4.	Understand the three dimensional graphics and their transformations.					

UNIT I:Introduction to Graphics

Application of Computer graphics- Video display devices- Raster scan systems- Random scan system- Graphics monitor- Input devices- Hard copy devices.

Points & lines- DDA &Bresenham's line drawing algorithm- Circle generating algorithms- Ellipse-generating algorithms- Other curves - Character generator.

UNIT II: **Translation and Transformation**

Translation- Rotation- Scaling- Matrix representations & homogeneous coordinates- Composite transformation- Reflection & Shear.

UNIT III: Clipping

The viewing pipeline- Viewing coordinate reference frame- Window to view port coordinate transformation- Viewing functions- Clipping functions- Point clipping- Line clipping- Polygon clipping- Curve clipping- Text clipping- Exterior clipping.

UNIT IV: Multimedia

Introduction – History of Multimedia – Resources for Multimedia developers – types of product.
Text and graphics: Elements of text data files – Using text in multimedia Application – Hypertext – Elements of Graphics – Images and color – Graphics files and application formats – Obtaining images for Multimedia use – using Graphics in Applications.

UNIT V: Audio & Video Processing

Digital Audio and video : Characteristics of sound and digital audio – Digital Audio Systems – MIDI – Audio file formats – Using Audio in Multimedia Applications Audio for content – Background as video – Characteristics of Digital video – Digital Video – Data Sizing – Video capture and play – back Systems – Computer Animation

TEXT BOOK:

1. Donald Hearn and M.Pauline Baker , Computer Graphics, PHI, Second Edition 2002
2. David Hillman – Multimedia Technology and Applications – Galgotia Publications Pvt. Ltd., 1998 .
3. Tay Vaughan, Multimedia Making It Work – TMH, 1996.

REFERENCE BOOKS**:**

1. A.D. Greenberg and S. Greenberg, "Digital Images: A Practical Guide", TMH 1995.
2. J.Jeffcoate, Multimedia in Practice – PHI 1998.

CO	COURSE OUTCOMES	CL
1.	Design two dimensional graphics.	**K2, K3,**
2.	Apply two dimensional transformations.	**K2, K3**
3	Design two and three dimensional graphics.	**K2, K3**
4.	Apply clipping techniques to graphics.	**K2, K3**
5.	Design animation sequences using multimedia techniques	

MAPPING OF COs WITH POs AND PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	M	M	M	M	M	S	S	M
CO2	S	S	M	S	M	S	M	M	S	S	S
CO3	S	S	M	M	M	S	M	M	S	M	S
CO4	M	S	M	S	M	S	S	M	S	S	S
CO5	S	M	S	S	M	M	M	M	M	S	S

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	U21CAP65	PYTHON PROGRAMMING LAB	L	T	P	C
CORE- XVI			-	-	6	4
Cognitive Level	**K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyze					
Objectives						
1.	To develop a basic understanding of Python programming language.					
2.	To be fluent in the use of procedural statements, assignments, conditional statements, loops, method calls and arrays through practicals					
3.	To design, code, and test small Python programs that meet requirements.					
4.	To Solve problems requiring the writing of well-documented programs in the Python language, including use of the logical constructs of that language					

LAB EXERCISES

1. Write a menu driven program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice.
2. WAP to calculate total marks, percentage and grade of a student. Marks obtained in each of the three subjects are to be input by the user. Assign grades according to the following criteria:
    1. Grade A: Percentage >=80
    2. Grade B: Percentage>=70 and <80
    3. Grade C: Percentage>=60 and <70
    4. Grade D: Percentage>=40 and <60
    5. Grade E: Percentage<40
3. Write a menu-driven program, using user-defined functions to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.
4. WAP to find the given number is odd or even.
5. WAP to display the first n terms of Fibonacci series.
6. WAP to find factorial of the given number.
7. WAP to find sum of the following series for n terms: 1 – 2/2! + 3/3! - - - - - n/n!
8. WAP to calculate the sum and product of two compatible matrices.
9. WAP to compute the sum 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 + 10 recursively:
10. WAP to generate password.
11. Using a stack evaluate an arithmetic expression.
12. Write a program to find the roots of a quadratic equation
13. Write a Python Program to check whether the given string is palindrome or not using built in string manipulation methods.
14. Write a Python Program to read a word and prints the number of letters, vowels and percentage of vowels in the word using dictionary.
15. Write a Python Event driven Program for file operations Press 1: to open file in read mode 2: open the file in write mode 3: current position of the file pointer #4: Reposition the pointer at the beginning 5: exit.

WEB RESOURCES:

1. http://www.ibiblio.org/g2swap/byteofpython/read/
2. http://docs.python.org/3/tutorial/index.html
3. http://interactivepython.org/courselib/static/pythonds .

CO	COURSE OUTCOMES	CL
1.	Develop and execute programs using Operators and control Structures	**K2, K3,K4**
2.	explain the basic Python programming concepts	**K2, K3,K4**
3.	Design and execute programs using OOPs concepts a	**K2, K3,K4**
4.	Interpret various files concept	**K2, K3,K4**
5.	Develop functions in Python	**K2, K3,K4**

MAPPING OF COs WITH POs AND PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	**S**	**S**	**M**	**M**	**M**	**M**	**M**	**M**	**S**	**S**	**M**
CO2	**S**	**S**	**M**	**S**	**M**	**S**	**M**	**M**	**S**	**S**	**S**
CO3	**S**	**S**	**M**	**M**	**M**	**S**	**M**	**M**	**S**	**M**	**S**
CO4	**M**	**S**	**M**	**S**	**M**	**S**	**S**	**M**	**S**	**S**	**S**
CO5	**S**	**M**	**S**	**S**	**M**	**M**	**M**	**M**	**M**	**S**	**S**

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	U21CAT63	MOBILE APPLICATIONS	L	T	P	C
CORE- XV			-	-	6	4

Cognitive Level	**K1:** Recall	**K2:** Understand	**K3:** Apply	**K4:** Analyze

Objectives

1	To Understand the requirements of Mobile programming environment.
2	To Learn about basic methods, tools and techniques for developing Apps
3	To Explore and practice App development on Android Platform
4	To Develop working prototypes of working systems for various uses in daily lives.

UNIT I : INTRODUCTION TO ANDROID OPERATING SYSTEM:

Definition of Android – Open Handset Alliance – Android Ecosystem – Need for Android – Android Versions – Features of Android – Android Architecture – Stack Linux Kernel. **Configuration of Android Environment**: Operating System – Java JDK – Android SDK – Android Development Tools (ADT) – Android Virtual Devices (AVDs) – Emulators – Steps to install and configure Eclipse and SDK.

UNIT II :**CREATING ANDROID APPLICATION**

Creating the First Android Application: Directory Structure. Android User Interface: Understanding the components of a screen – Linear Layout – Absolute Layout – Frame Layout – Relative Layout – Table Layout. **Designing Your User Interface with View**: TextView – Button - A standard push button – ImageButton – EditText.

UNIT III: DESIGNING YOUR USER INTERFACE WITH VIEW

Designing Your User Interface with View: CheckBox – ToggleButton – RadioButton and RadioGroup – Progress Bar – AutoComplete TextView – Spinner – ListView – GridView – ImageView – ScrollView – Custom Toast Alert – Time and Date Picker.

UNIT IV: ACTIVITY

Activity: Introduction – Intent – Intent_filter – Activity Life Cycle – Broadcast Life Cycle – Service.

UNIT V: SQLITE DATABASE IN ANDROID

SQLite Database in Android: SQLite Database – Need for SQLite – Creation and connection of the database – Extracting value from Cursors – Transactions.

TEXT BOOK:

Prasanna Kumar Dixit, "Android", Vikas Publishing House Private Ltd. , 2014

REFERENCE BOOKS:

1. Reto Meier, "Professional Android 4 Application Development", John Wiley & Sons Inc., 2012
2. John Horton, "Android programming for Beginners", 2nd Edition, 2018.
3. Head, "First Android Development: A Brain-Friendly Guide", 2nd Edition, 2017.

CO	COURSE OUTCOMES	CL
1.	Gain basic idea of XML and using it to develop an Android application.	**K2, K3,**
2.	Familiarize themselves with the concept of UI components and SQLite Database.	**K2, K3**
3.	Implement GUI concepts in Android Platform.	**K2, K3**
4.	Build any application for Android devices.	**K2, K3**
5.	Implement an application using Mobile Apps Layouts and Events	**K2, K3**

MAPPING OF COs WITH POs AND PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	M	M	M	M	M	S	S	M
CO2	S	S	M	S	M	S	M	M	S	S	S
CO3	S	S	M	M	M	S	M	M	S	M	S
CO4	M	S	M	S	M	S	S	M	S	S	S
CO5	S	M	S	S	M	M	M	M	M	S	S

S – Strongly Correlating-3 Marks M- Moderately Correlating-2 MarksW-Weakly Correlating -1 mark

COURSE CODE	U21CAR61	CORE XVII – Project	L	T	P	C
			-	-	6	4

- **Project Report**

A student should select a topic for the Project Work at the end of the third semester itself and submit the Project Report at the end of the fourth semester. The Project Report shall not exceed 75 typed pages in Times New Roman font with 1.5 line space.

- **Project Evaluation**

There is a Viva Voce Examination for Project Work. The Guide and an External Examiner shall evaluate and conduct the Viva Voce Examination. The Project Work carries 100 marks (Internal: 25 Marks; External (Viva): 75 Marks).

COURSE CODE	U21CAE641	CHOICE-I	L	T	P	C
ELECTIVE IV		R PROGRAMMING	3	-	-	3

Cognitive Level	K1: Recall	K2: Understand	K3: Apply	K4: Analyze

Objectives	
1	To learn R-Programming environment and libraries
2	To understand the basics in R programming in terms of constructs, control statements and built-in functions
3	To analyze to apply R programming for matrix and vector processing
4	To visualize data using graphs and chart

UNIT I: INTRODUCTION

Getting R - Downloading R - R Version -32-bit vs. 64-bit - Installing - Installing on Windows - Installing on Mac OS X - Installing on Linux - Microsoft R Open - Conclusion. The R Environment - Command Line Interface - RStudio - RStudio Projects - RStudio Tools - Git Integration - Microsoft Visual Studio - R Packages - Installing Packages - Uninstalling Packages - Loading Packages - Unloading Packages - Building a Package

UNIT II: **BASICS OF R**

Basics of R - Basic Math - Variables - Variable Assignment - Removing Variables - Data Types - Numeric Data - Character Data - Dates - Logical. Vectors - Vector Operations - Factor Vectors. Calling Functions - Function Documentation - Missing Data- Pipes - Advanced Data Structures - data.frames - Lists - Matrices - Arrays.

UNIT III: READING DATA INTO R

Reading Data into R - Reading CSVs - read_delim- fread. Excel Data - Reading from Databases - Data from Other Statistical Tools- R Binary Files- Data Included with R - Extract Data from Web Sites - Simple HTML Tables - Scraping Web Data - Reading JSON Data

UNIT IV: GRAPHICS IN R

Statistical Graphics - Base Graphics- Base Histograms - Base Scatterplot -Boxplots. ggplot2 - ggplot2 Histograms and Densities- ggplot2 Scatterplots - ggplot2 Boxplots and Violins Plots - ggplot2 Line Graphs - Themes. **Writing R functions** - Hello, World! - Function Arguments- Default Arguments - Extra Arguments- Return Values- do.call

UNIT V: CONTROL STATEMENTS

Control Statements - if and else - switch – if…else - Compound Tests. **Loops**, the Un-R Way to Iterate - for Loops - while Loops - Controlling Loops. Group Manipulation - Apply Family - aggregate - plyr - ddply- llply-plyr Helper Functions - Speed versus Convenience - data.table - Keys - data.table Aggregation

TEXT BOOK:

1. Jared P. Lander , Addison-Wesley Professional, “R for Everyone: Advanced Analytics and Graphics”, 2nd Edition, 2017

REFERENCE BOOKS:

1. Gardener M., “Beginning R: The Statistical Programming Language”, Wiley India Pvt. Ltd., New Delhi, First Edition, 2017.
2. Kabacoff R.I., “R in Action: Data analysis and graphics with R”, Manning publications company, Shelter Island, Second Edition, 2011.
3. Andrie de Vries and. JorisMeys, “R Programming for Dummies”, Wiley India Private Ltd., New Delhi, Second Edition, 2015.

WEB RESOURCES:
1. https://www.coursera.org/learn/r-programming 2. tutorialspoint.com/r/index.htm 3. https://www.w3schools.com/r/default.asp

CO	COURSE OUTCOMES	CL
1.	Understand the basic concepts of R	**K2, K3,**
2.	Impart the basic knowledge of R programming	**K2, K3**
3	Understand how to read the data in R tool	**K2, K3**
4.	Implement the knowledge of using graphics in R	**K2, K3**
5.	Impart the concepts of control structures in R	**K2, K3, K4**

MAPPING OF COs WITH POs AND PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	**S**	**S**	**M**	**M**	**M**	**M**	**M**	**M**	**S**	**S**	**M**
CO2	**S**	**S**	**M**	**S**	**M**	**S**	**M**	**M**	**S**	**S**	**S**
CO3	**S**	**S**	**M**	**M**	**M**	**S**	**M**	**M**	**S**	**M**	**S**
CO4	**M**	**S**	**M**	**S**	**M**	**S**	**S**	**M**	**S**	**S**	**S**
CO5	**S**	**M**	**S**	**S**	**M**	**M**	**M**	**M**	**M**	**S**	**S**

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	U21CAE642	CHOICE-II	L	T	P	C
ELECTIVE IV		PHP with MySQL	3	-	-	3

Cognitive Level	K1: Recall	K2: Understand	K3: Apply	K4: Analyze

Objectives

1	To study the Web Programming concepts
2	To make use of PHP elements
3	To examine the working environment with WAMP, LAMP and XAMPP
4	To interpret the concepts of MySQL

UNIT I: GENESIS OF PHP

Introducing PHP: Use of PHP – the evolution of PHP. First PHP script: Installing PHP – other ways to run PHP - creating first script. PHP Language Basics: Using variables – data types – operators and expression – constants. Decision and loops: Making decisions – doing repetitive tasks with loops – making decision and looping. Strings: Creating and accessing strings – searching strings – replacing text within strings – *dealing with upper and lowercase – formatting strings.

UNIT II: **ARRAYS AND FUNCTIONS**

Arrays: Creating arrays – accessing array elements – looping through arrays with foreach – multidimensional arrays – manipulating arrays. Functions: Calling functions – working with variable functions – writing our own functions. Objects: Object oriented programming – advantages of OOP – understanding basic OOP concepts – creating classes and objects in PHP – creating and using properties – working with methods – automatically loading class files – storing objects as strings.

UNIT III: USING PHP WITH HTML

Handling HTML forms with PHP: Capturing form data with PHP - dealing with multi-value fields - generating web forms with PHP - storing PHP variables in forms - creating file upload forms - redirecting after a form submission. Preserving state with query strings, cookies, and sessions: Saving state with query strings - *working with cookies - using PHP sessions to store data. Working with files and directories: Getting information on files - opening and closing files - reading and writing to files - working with file permissions - copying, renaming, and deleting files - working with directories - building a text editor.

UNIT IV: PHP WITH MySQL

Introducing databases and SQL: Setting up MySQL - connecting to MySQL from PHP. Retrieving data from MySQL with PHP: Setting up the book club database - *retrieving data with select - creating a member record viewer. Manipulating MySQL data with PHP: Inserting records - updating records - deleting records - building a member registration application - creating a members' area - creating a member manager application.

UNIT V: PHP AND OUTSIDE WORLD

Generating images with PHP: Creating images - manipulating images - using text in images. String matching with regular expressions: Regular Expression - pattern matching in PHP - replacing text - altering matching behavior with pattern modifiers - splitting a string with a regular expression. Working with XML: XML Document Structure – reading XML Documents with PHP – writing and manipulating XML documents with PHP- doing XML the easy way with simple XML – working with XSL and XSLT.

TEXT BOOK:

Doyle. M., "Beginning PHP 5.3", First Edition, Wiley Publications Ltd., Indianapolis, 2010.

REFERENCE BOOKS:

1. Bayross.I., and S. Shah., "PHP 5.1 for Beginners", Tenth reprint, Shroff Publishers and Distributors, Mumbai, 2011.
2. Nixon.R., "Learning PHP, MySQL ,JavaScript and CSS", Second Edition, O'Reilly Media, Sebastopol, 2012.
3. Rao.M.N., "Fundamentals of Open Source Software" , First Edition, Prentice Hall of India Pvt Ltd., New Delhi, 2014.
4. Sklar.D., "Learning PHP 5", First Edition, O Reilly Media, Sebastopol, 2004.
5. Ullman.L., "PHP and MySQL for Dynamic websites: Visual Quick Pro Guide", Fourth edition, Dorling Kindersley India Private Ltd, New Delhi, 2011.

CO	COURSE OUTCOMES	CL
1.	Understand E-commerce and its Technological Aspects	**K2, K3,**
2.	Impart the knowledge of Consumer Oriented E Commerce	**K2, K3**
3	Understand the importance and working of Electronic Data Interchange.	**K2, K3**
4.	Understand Security in E Commerce	**K2, K3**
5.	Understand important issues in E Commerce	**K2, K3, K4**

MAPPING OF COs WITH POs AND PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	**S**	**S**	**M**	**M**	**M**	**M**	**M**	**M**	**S**	**S**	**M**
CO2	**S**	**S**	**M**	**S**	**M**	**S**	**M**	**M**	**S**	**S**	**S**
CO3	**S**	**S**	**M**	**M**	**M**	**S**	**M**	**M**	**S**	**M**	**S**
CO4	**M**	**S**	**M**	**S**	**M**	**S**	**S**	**M**	**S**	**S**	**S**
CO5	**S**	**M**	**S**	**S**	**M**	**M**	**M**	**M**	**M**	**S**	**S**

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

NON-MAJOR ELECTIVE

(OFFERED BY PARENT DEPARTMENT)

COURSE CODE		WEB DESIGNING USING HTML LAB	L	T	P	C
NME - I			2	-	-	2
Cognitive Level	K1: RecallK2: UnderstandK3: ApplyK4: Analyze					

OBJECTIVES:

1. To Use formatting tags in HTML
2. To recognize How to Insert the Image file in web pages.
3. To understand How to navigate through web pages.
4. To become Master in creating Web pages using basic HTM tags.

LAB Exercises

1. Web page creation using head, title, body, h1 – h6.
2. Web page creation using formatting tags (bold, italic, underline etc)
3. Ordered list
4. Unordered list
5. Definition list
6. Marquee creation
7. Web page with images
8. Web page creation with various font styles and body colors.
9. Hyper link
10. Tables
11. Frames
12. Forms

COURSE OUTCOMES:

On the Successful completion of the course, students will be able to

CO1: Understand the concepts of webpage - K2

CO2: Analyze various tags in HTML – K4

CO3: Gain knowledge in creating webpage – K1

CO4: Design new webpages using HTML – K3

CO5: Recognize to navigate the web pages using HTML – K2

MAPPING OF CO'S WITH PO'S AND PSO'S

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

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE		PHOTO DESIGNING TOOLS	L	T	P	C
NME - II			2	-	-	2
Cognitive Level	K1: RecallK2: UnderstandK3: ApplyK4: Analyze					

OBJECTIVES:

1. To navigate Photoshop's Workspace, Create & setup documents
2. To Understand about the Layers and Masking.
3. To work with effects, filters and adjustments
4. To create a broad range of design skills pertaining to publication & web design.

Exercises

1. Album preparation
2. Invitation Preparation
3. Wall Papers
4. Visiting Card
5. Background Changing and Removing
6. Birthday Card
7. Friendship Card
8. Wedding invitation Card
9. Cloning an Image
10. Flex Designing
11. Photo Editing
12. Book Cover

COURSE OUTCOMES

On completion of the course, the student will be able to

CO1: Design real world applications using photoshop – K3

CO2: Analyze new features in Photoshop – K4

CO3: Develop new drawings using Photoshop – K3

CO4: Expertise to work with Photoshop – K1

CO5: Design skills pertaining to publication & web design – K3

MAPPING OF CO'S WITH PO'S AND PSO'S

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

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

VALUE ADDED PROGRAMME

COURSE CODE	U21CAV51	QUANTITATIVE APTITUDE	Hours	C
SEMESTER -V			30	2

OBJECTIVES	
1.	To equip with the relevant skills to appear for various competitive examinations.
2.	To acquire right skills to tackle aptitude problems.
3.	To improve mental calculations.
4.	To improve the speed of solving problems

UNIT I : Numbers-HCF & LCM of numbers –Decimal fraction
UNIT II : Average- Problems on numbers – Problems on Ages
UNIT III : Percentage – Profit &loss- Ratio& Proportion
UNIT IV : Time &work – Time & Distance – Problems on Trains
UNIT V: Simple Interest – Compound Interest - Permutation & Combination.
TEXT BOOK Agarwal, R.S. "Quantitative Aptitude for Competitive Examinations", New Delhi: S.Chand Publications, Seventh Revised Edition, Reprint 2008.

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