MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE

(An Autonomous College)

Affiliated to Periyar University, Salem | Accredited by **NAAC** with '**A**' Grade

Recognized by **UGC** under Section 2(f) & 12 (B)

MUTHAYAMMAL
COLLEGE OF ARTS
AND SCIENCE
(Autonomous)
A UNIT OF VANETRA GROUP
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DEGREE OF BACHELOR OF COMPUTER APPLICATION

Learning Outcomes - Based Curriculum Framework
- Choice Based Credit System

Syllabus for B.C.A

(Semester Pattern)

(For Candidates admitted from the academic year 2021 -2022 and onwards)

MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE (Autonomous),RASIPURAM

Vision

To redefine the scope of higher education by infusing into each of our pursuits, initiatives that will encourage intellectual, emotional, social and spiritual growth, thereby nurturing a generation of committed, Knowledgeable and socially responsible citizens.

Mission

* To Ensure State of the world learning experience
* To Espouse value based Education
* To Empower rural education
* To Instill the sprite of entrepreneurship and enterprise
* To Create a resource pool of socially responsible world Citizens.

Department Of BCA

Vision

"To attain global recognition in computer science and applications, research and training to meet the growing needs of an Industry and Society."

Mission

- To impart quality education
- To develop Industry-Academia relationship
- To provide State-of-art research facility
- To train various technologies in the thrust areas of computer science and applications.

PROGRAMME EDUCATIONAL OBJECTIVES (PEO):

PEO1: Graduates will be able to promote learning environment to meet the industry expectation.

PEO2: Graduates will be incorporated the critical thinking with good Communication and Leadership skills to become a self-employed

PEO3: Graduates will be upholding the human values and environmental sustenance for the betterment of the society.

Graduate Attributes:

The Graduate attributes of BCA are

GA 1 Analytical Reasoning

GA 2 Critical Thinking

GA 3 Problem Solving Skills

GA 4 Communication Skills

GA 5 Leadership Quality

GA 6 Team work

GA 7 Lifelong Learning

PROGRAMME OUTCOMES (POs):

PO1: Graduates will acquire dynamic skills through proper perception of the course objectives that leads to scientific and analytical comprehension of the concepts.

PO2: Graduates will focus on sustainable goals that might bring about spherical developments.

PO3: Graduates will infuse a spirit converging on bricking a team work, interpersonal and administrative skills to think critically and execute effectively.

PO4: Graduates will apply reasoning appropriately to scale the humps in learning and solute them to the core.

PO5: Graduates will engage the skills obtained in independent and collaborative learning as a perennial process.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO1: To Recognize the Students career with necessary skills in the area related to Computer Applications.

PSO2: To Exemplifying the emerging technologies and provide innovative solutions to real-life Applications.

PSO3: To Execute the career in corporate sectors.

PSO4: To organize a concrete foundation and enrich the abilities to qualify for Employment, Higher Studies and Research in Computer Application and Data science with ethical values.

PSO5: To Build the student Career in Public sector, Government organizations and Educational Sectors.

MUTHAYAMMAL COLLEGE OF ARTS & SCIENCE (Autonomous)

BCA - Abstract under LOCF-CBCS Pattern with effect from 2021-2022 Onwards

Structure of Credit Distribution as per the TANSCHE / UGC Guidelines

S.No.	Study Components	Part	Sem I		Sem II		Sem III		Sem IV		Sem V		Sem VI		No.of Paper	Total Credit
			No.of Paper	Credit	No.of Paper	Credit	No.of Paper	Credit	No.of Paper	Credit	No.of Paper	Credit	No.of Paper	Credit		
1	LANGUAGE - I	I	1	3	1	3									2	6
2	LANGUAGE - II	II	1	3	1	3									2	6
3	DISCIPLINE SPECIFIC COURSE(DSC)-THEORY	III	1	4	2	8	3	12	3	12	2	7	2	8	13	51
4	DSC - PRACTICAL	III	1	2	1	2	1	2	1	2	2	4	1	2	7	14
5	GENERIC ELECTIVE COURSES(GEC)- THEORY	III	1	4	1	4	1	4	1	4					4	16
6	GEC PRACTICAL	III			1	2			1	2					2	4
7	DISCIPLINE SPECIFIC ELECTIVE COURSES(DSE)	III									2	8	2	8	4	16
8	PROJECT WORK	III											1	4	1	4
9	INTERNSHIP	III														
10	ONLINE - COMPETITIVE EXAMINATION	III											1	2	1	2
11	SKILL ENHANCEMENT COURSES(SEC)-SBEC	IV					1	2	1	2	1	2	1	2	4	8
12	NON MAJOR ELECTIVE COURSES(NMEC)	IV					1	2	1	2					2	4
13	PROFESSIONAL ENGLISH	IV	1	2	1	2									2	4
14	ABILITY ENHANCEMENT COMPULSORY COURSES(AECC)-EVS	IV			1	2									1	2
15	ABILITY ENHANCEMENT COMPULSORY COURSES(AECC)- VALUE EDUCATION - YOGA	IV	1	2											1	2
16	EXTENSION ACTIVITY	V											1	1	1	1
17	EXTRA CREDIT	VI												2		
	Cumulative Credits		7	20	9	26	7	22	8	24	7	21	9	27	47	140

Total No.of Subjects	47
Marks	4500

PART	No.of Credits
PART - I	6
PART - II	6
PART - III	107
PART - IV	20
PART - V	1
Grand Total	140
Extra Credit	2

7/2/23

HOD-Department of BCA,
Muthayammal College of Arts & Science
RASIPURAM - 637 408. Namakkal

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NAMAKKAL DISTRICT.

MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE(Autonomous) - Rasipuram - 637 408
Scheme of Examinations LOCF-CBCS Pattern
(for the Students Admitted from the Academic Year:2021-2022 Onwards)
Programme : BCA

S.No.	PART	STUDY COMPONENTS	COURSE_CODE	TITLE OF THE COURSE	Hrs./W		CREDIT POINTS	MAX.MARKS		
					Lect.	Lab.		CIA	ESE	TOTAL
SEMESTER - I										
1	I	LANGUAGE-I	21M1UFTA01	TAMIL - I	5	-	3	25	75	100
2	II	LANGUAGE-II	21M1UCEN01	ENGLISH - I	5	-	3	25	75	100
3	III	DSC THEORY - I	21M1UCAC01	PROBLEM SOLVING THROUGH C	6	-	4	25	75	100
4	III	GEC THEORY - I	21M1UMAA01	ALLIED - MATHEMATICS	5	-	4	25	75	100
5	III	DSC PRACTICAL - I	21M1UCAP01	PRACTICAL I: PROGRAMMING IN C	-	4	2	40	60	100
6	III	GEC PRACTICAL - I	21M2UMAAP2	ALLIED PRACTICAL: MATHEMATICS	-	2	-	-	-	-
7	IV	AECC - VALUE EDUCATION	21M1UVED01	VALUE EDUCATION: YOGA	1	-	2	25	75	100
8	IV	PROFESSIONAL ENGLISH - I	21M1UPES01	PROFESSIONAL ENGLISH FOR PHYSICAL SCIENCE I	2	-	2	25	75	100
				TOTAL	**24**	**6**	**20**	**190**	**510**	**700**
SEMESTER - II										
1	I	LANGUAGE - I	21M2UFTA02	TAMIL - II	5	-	3	25	75	100
2	II	LANGUAGE - II	21M2UCEN02	ENGLISH - II	5	-	3	25	75	100
3	III	DSC THEORY - II	21M2UCAC02	OBJECT ORIENTED PROGRAMMING WITH C++	4	-	4	25	75	100
4	III	DSC THEORY - III	21M2UCAC03	COMPUTER ORGANIZATION AND ARCHITECTURE	4	-	4	25	75	100
5	III	GEC THEORY - II	21M2UMAA02	ALLIED - MATHEMATICS	4	-	4	25	75	100
6	III	DSC PRACTICAL - II	21M2UCAP02	PRACTICAL II: PROGRAMMING IN C++	-	3	2	40	60	100
7	III	GEC PRACTICAL - I	21M2UMAAP2	ALLIED PRACTICAL: MATHEMATICS	-	2	2	40	60	100
8	IV	AECC - ENVIRONMENTAL STUDIES	21M2UES01	ENVIRONMENTAL STUDIES	1	-	2	25	75	100
9	IV	PROFESSIONAL ENGLISH - II	21M2UPES02	PROFESSIONAL ENGLISH FOR PHYSICAL SCIENCE II	2	-	2	25	75	100
				TOTAL	**25**	**5**	**26**	**255**	**645**	**900**
SEMESTER - III										
1	III	DSC THEORY - IV	21M3UCAC04	RELATIONAL DATABASE MANAGEMENT SYSTEMS	5	-	4	25	75	100
2	III	DSC THEORY - V	21M3UCAC05	OPERATING SYSTEM	5	-	4	25	75	100
3	III	DSC THEORY - VI	21M3UCAC06	DATA STRUCTURES & ALGORITHMS	5	-	4	25	75	100
4	III	GEC THEORY - III	21M3USTA08	ALLIED : APPLIED STATISTICS - I	4	-	4	25	75	100
5	III	DSC PRACTICAL - III	21M3UCAP03	PRACTICAL III: RDBMS	-	4	2	40	60	100
6	III	GEC PRACTICAL - II	21M4USTAP2	ALLIED PRACTICAL : STATISTICS	-	2	-	-	-	-
7	IV	SEC - PRACTICAL - I	21M3UCASP1	PRACTICAL : OFFICE AUTOMATION	-	3	2	40	60	100
8	IV	NMEC - I	21M3UMAN01	QUANTITATIVE APTITUDE -I	2	-	2	25	75	100
				TOTAL	**21**	**9**	**22**	**205**	**495**	**700**

S.No.	PART	STUDY COMPONENTS	COURSE_CODE	TITLE OF THE COURSE	Hrs./W		CREDIT POINTS	MAX.MARKS		
					Lect.	Lab.		CIA	ESE	TOTAL
SEMESTER - IV										
1	III	DSC THEORY - VII	21M4UCAC07	VISUAL PROGRAMMING	5	-	4	25	75	100
2	III	DSC THEORY - VIII	21M4UCAC08	MACHINE LEARNING	5	-	4	25	75	100
3	III	DSC THEORY - IX	21M4UCAC09	COMPUTER NETWORKS	5	-	4	25	75	100
4	III	GEC THEORY - IV	21M4USTA09	ALLIED : APPLIED STATISTICS - II	4	-	4	25	75	100
5	III	DSC PRACTICAL - IV	21M4UCAP04	PRACTICAL IV: VISUAL PROGRAMMING	-	4	2	40	60	100
6	III	GEC PRACTICAL - II	21M4USTAP2	ALLIED PRACTICAL : STATISTICS	-	2	2	40	60	100
7	IV	SEC - PRACTICAL - II	21M4UCASP2	PRACTICAL : HTML AND WEB DESIGN	-	3	2	40	60	100
8	IV	NMEC - II	21M4UMAN03	QUANTITATIVE APTITUDE -II	2	-	2	25	75	100
				TOTAL	**21**	**9**	**24**	**245**	**555**	**800**
SEMESTER - V										
1	III	DSC THEORY - X	21M5UCAC10	JAVA PROGRAMMING	5	-	4	25	75	100
2	III	DSC THEORY - XI	21M5UCAC11	OPEN SOURCE COMPUTING	4	-	3	25	75	100
3	III	DSC PRACTICAL - V	21M5UCAP05	PRACTICAL-V: PROGRAMMING IN JAVA	-	4	2	40	60	100
4	III	DSC PRACTICAL - VI	21M5UCAP06	PRACTICAL-VI: PROGRAMMING IN PYTHON	-	4	2	40	60	100
5	III	DSE - I		ELECTIVE - I	5	-	4	25	75	100
6	III	DSE - II		ELECTIVE - II	5	-	4	25	75	100
7	IV	SEC - THEORY - I	21M5UCAS01	CAMPUS TO CORPORATE TRANSMISSION	3	-	2	25	75	100
				TOTAL	**22**	**8**	**21**	**205**	**495**	**700**
SEMESTER - VI										
1	III	DSC THEORY - XII	21M6UCAC12	ARTIFICIAL INTELLIGENCE USING DEEP LEARNING	5	-	4	25	75	100
2	III	DSC THEORY - XIII	21M6UCAC13	CYBER SECURITY	5	-	4	25	75	100
3	III	DSE - III		ELECTIVE – III	5	-	4	25	75	100
4	III	DSE - IV		ELECTIVE – IV	5	-	4	25	75	100
5	III	DSC PRACTICAL - VII	21M6UCAP07	PRACTICAL-VII: ARTIFICIAL INTELLIGENCE	-	4	2	40	60	100
6	III	PROJECT WORK	21M6UCAPR1	PROJECT WORK	4	-	4	40	60	100
7	III	ONLINE - COMPETITIVE EXAMINATION	21M6UCAOE01	COMPUTER APPLICATION FOR COMPETITIVE EXAMINATION	-	-	2	100	-	-
8	IV	SEC - PRACTICAL - III	21M6UCASP3	COREL DRAW	-	2	2	40	60	100
9	V	EXTENSION ACTIVITY	21M6UEX01	EXTENSION ACTIVITY	-	-	1	100	-	-
				TOTAL	**24**	**6**	**27**	**420**	**480**	**700**
				OVERALL TOTAL	**137**	**43**	**140**	**1520**	**3180**	**4500**
10	VI	EXTRA		EXTRA CREDIT SWAYAM/MOOC ONLINE	-	-	**2**	-	-	-

7/2/23

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BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M1UCAC01	Problem Solving Through C	DSC THEORY - I	I	6	5	1	-	4
Objective	**To Understand the basic concepts of computer and basics of C language,Decision statements and Loop concepts and Evaluate the performance of Structure & File Management in C.**							

Unit	Course Content	Knowledge Levels	Sessions
I	Overview of Computers and Programming: Electronic Computers Then and Now , Computer Hardware, Computer Software , The Software Development Method, Applying the Software Development Method Professional Ethics for Computer Programmers Fundamentals of C Languages: History of C, Character Set, Identifiers and Overview of C:- Introduction - character set - C tokens - keyword & identifiers – constants – variables - data types – Declarations of variables ,operators - expressions - Evaluation of expression - Mathematical functions - Formatted input and output.	K1-K3	15
II	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.	K1-K2	16
III	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. The scope and lifetime of variables in functions.	K3	16
IV	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.	K4	15
V	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. Preprocessors.	K4	13
Course Outcome	**CO1:To Recall the Basics of C.**	**K1**	
	CO2:To Construct the sequence of the program and give logical outputs.	**K3**	
	CO3:To Demonstrate Strings & Functions Concepts in C program.	**K2**	
	CO4:To Analyze the Structure & Pointers in C program.	**K4**	
	CO5: To Evaluate the I/O operations in C program.	**K4**	

Learning Resources	
Text Books	1. Problem solving and program design in C / Jeri R. Hanly, Elliot B. Koffman. —7th ed.,PEARSON 2. E. Balagurusamy, Programming in ANSI C, fifth edition, Tata McGrawHill.
Reference Books	1. V. Rajaraman Computer Programming in C Prentice Hall of India Pvt Ltd, 1st Edition,2004 2. 2 Yashwvant Kanetkar Let us C BPB Publications 13th Edition, 2014
Website Link	1.http://www.learn-c.org/ 2.http://crasseux.com/books/ctutorial/

L-Lecture T-Tutorial P-Practical C-Credit

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M2UCAC02	Object Oriented Programming with C++	DSC THEORY - II	II	4	4	-	-	4
Objective	**To Understand the OOPs concepts,tokens,expressions and control structures using C++.**							

Unit	Course Content	Knowledge Levels	Sessions
I	Introduction to C++ - key concepts of Object-Oriented Programming –Advantages – Object Oriented Languages – I/O in C++ - C++ Declarations. Control Structures: - Decision Making and Statements: If ..else, jump, go to, break, continue, Switch case statements - Loops in C++ : for, while, do - functions in C++ - inline functions – Function Overloading.	K1	9
II	Classes and Objects: Declaring Objects – Defining Member Functions – Static Member variables and functions – array of objects –friend functions – Overloading member functions – Bit fields and classes – Constructor and destructor with static members.	K1-K2	8
III	Operator Overloading: Overloading unary, binary operators – Overloading Friend functions – type conversion – Inheritance: Types of Inheritance – Single, Multilevel, Multiple, Hierarchal, Hybrid, Multi path inheritance – Virtual base Classes – Abstract Classes.	K3	10
IV	Pointers – Declaration – Pointer to Class , Object – this pointer – Pointers to derived classes and Base classes – Arrays – Characteristics – array of classes – Memory models – new and delete operators – dynamic object – Binding, Polymorphism and Virtual Functions.	K4	9
V	Files – File stream classes – file modes – Sequential Read / Write operations – Binary and ASCII Files – Random Access Operation – Templates – Exception Handling - String – Declaring and Initializing string objects – String Attributes – Miscellaneous functions .	K4	9
Course Outcome	**CO1:To Identify the OOPs Concepts use functions and pointers in C++.**	**K1**	
	CO2:To Discuss tokens, expressions, and Control structures in C++.	**K1**	
	CO3:To Perform arrays,strings and create a programs using C++.	**K2**	
	CO4:To Classify the use of constructors and destructors in C++.	**K3**	
	CO5:To Construct the control errors Using Exception handling Mechanism.	**K4**	

Learning Resources

Text Books	1. E. Balagurusamy, —Object-Oriented Programming with C++", TMH 2013, 7 th Edition
Reference Books	1. Ashok N Kamthane, —Object-Oriented Programming with ANSI and Turbo C++", Pearson Education 2003. 2. Maria Litvin & Gray Litvin, —C++ for youll, Vikas publication 2002.
Website Link	NPTEL & MOOC courses titled Object oriented programming concepts using C++ 1.https://nptel.ac.in/courses/106/105/106105151/ 2. .http://www.learn-cpp.org/

L-Lecture T-Tutorial P-Practical C-Credit

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M2UCAC03	Computer Organization And Architecture	DSC THEORY - III	II	4	4	-	-	4

Objective	**To Recognize the various number systems, binary codes and their applications and facilitate the students in designing a logical circuits.In this courses Evaluate the concepts of K-MAP to simplify a Boolean expression.**

Unit	Course Content	Knowledge Levels	Sessions
I	Digital Principles: Definition for digital signals – Digital waveforms – Digital logic – Moving and Storing Digital Information – Digital Operations – Digital computers – Digital Integrated Circuits. Digital Logic: The Basic Gates - NOT, OR, AND –Universal Logic Gates – NOR, NAND – AND-OR- Invert Gates – Positive and Negative Logic.	K1	10
II	Combinational Logic Circuits: Boolean Laws And Theorems – Sum-of-products Method – Truth Table to Karnaugh Map – Pairs, Quads, and Octets – Karnaugh Simplification – Don't-care Conditions – Product-of-sums Simplification. Data-Processing Circuits: 16-to-1 Multiplexer – 1-to-16 De- multiplexer – BCD-to-decimal Decoder – Decimal-to-BCD Encoder – Exclusive-or Gates – Parity Generation and Application.	K2	9
III	Number Systems and Codes: Binary Number System – Binary-to-decimal Conversion – Decimal-to- binary Conversion – Octal Numbers – Hexadecimal Numbers – The ASCII Code – The Excess-3 Code – The Gray Code. Arithmetic Circuits: Binary Addition –Binary Subtraction – Unsigned Binary Numbers – Sign-magnitude Numbers - 2'S Complement Representation - 2'S Compliment Arithmetic.	K3	9
IV	Arithmetic Circuits: Arithmetic Building Blocks – The Adder - subtractor – Fast Adder – Arithmetic Logic Unit – Binary Multiplication and Division. Clocks and Timing Circuits: Clock Waveforms. Flip- Flops: RS Flip-flops – Edge-triggered D Flip-flops - Edge triggered JK Flip-flops – JK Master-slave Flip-flops.	K3-K4	8
V	Registers: Serial-In Serial-Out – Serial-In Parallel-Out – Parallel-In Serial-Out – Parallel-In Parallel-Out. Memory: Introduction - Magnetic Memory - Optical Memory - Memory Addressing - ROMs, PROMs, EPROMs and EEPROM –RAMs. A Simple Computer Design.	K4	9
Course Outcome	**CO1:To Recall the number systems and complements.**	**K1**	
	CO2: To Summarize the importance of canonical forms in the minimization or other optimization of Boolean formulas in general and digital circuits.	**K2**	
	CO3:To Solve the type of algorithms (Boolean algebra, Karnaugh map or Tabulation method).	**K3**	
	CO4:To Analyze the design procedures of Combinational and Arithmetic circuits.	**K4**	
	CO5:To Compare the memory fixation using RAM & ROM.	**K4**	

Learning Resources

Text Books	1. Donald P Leach, Albert Paul Malvino and Goutam Saha, ―Digital Principles and Applications,‖ 8th Edition,TMH, 2006.
Reference Books	1. Morris Mano, "Digital Logic and Computer Design," 4th Edition, Pearson, 2008 2. Thomas C Bartee, "Digital Computer Fundamentals," sixth edition, McGrawHill, 1985 3. Pradeep K. Sinha, Priti Sinha , "Computer Fundamentals," Sixth Edition, BPB Publications, 2007
Website Link	1.https://www.javatpoint.com/computer-organization-and-architecture-tutorial

L-Lecture T-Tutorial P-Practical C-Credit

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M3UCAC04	Relational Database Management Systems	DSC THEORY - IV	III	5	5	-	-	4

Objective	**To Evaluate data manipulation statements (DML) to update data in the Oracle Database Design and use PL/SQL programming structure that execute DB queries efficiently & handle runtime errors.**

Unit	Course Content	Knowledge Levels	Sessions
I	Introduction: Database System Applications – DBMS Vs. File System – View of Data – Data Model – Database Languages – Database users and Administrators – Transaction Management – Database System Structure – Application Architecture. Data Models: Basic Concepts – Constraint – Keys – ER Diagram – Weak Entity – Extended ER Features - Design of an ER Schema.	K1	12
II	Relational Model: Structure of Relational Databases – Relational Algebra. SQL: Background–Basic Structure – Set Operation – Aggregate Function – Null Values – Nested Sub Queries – Views – Modification of the Database – Data Definition Language – Embedded SQL – Dynamic SQL.	K2	11
III	Data Normalization: Pitfalls in Relational Database Design – Decomposition – Functional Dependencies – Normalization – First Normal Form – Second Normal Form – Third Normal Form – Boyce-Codd Normal Form – Fourth Normal Form – Fifth Normal Form –Denormalization – Database Security: Data Security Requirements – Protecting the Data within the Database – Granting and Revoking Privileges – Data Encryption.	K3	10
IV	PL/SQL: A Programming Language: History – Fundamentals – Block Structure – Comments – Data Types – Other Data Types – Declaration – Assignment Operation – Bind Variables – Substitution Variables – Printing – Arithmetic Operators. Control Structures and Embedded SQL: Control Structures – Nested Blocks – SQL in PL/SQL – Data Manipulation – Transaction Control Statements. PL/SQL Cursors and Exceptions: Cursors – Implicit & Explicit Cursors and Attributes – Cursor FOR loops – SELECT…FOR UPDATE – WHERE CURRENT OF Clause – Cursor with Parameters – Cursor Variables – Exceptions – Types of Exceptions.	K3	15
V	PL/SQL Composite Data Types: Records – Tables – Vs arrays. Named Blocks: Procedures – Functions – Packages – Triggers – Data Dictionary Views. .	K4	12
Course Outcome	**CO1:To Label the concepts of Database concepts.**	**K1**	
	CO2:To Explain the concepts of Relational Calculus.	**K2**	
	CO3:To Determine the logical design of the database using data modeling concepts such as entity relationship diagrams.	**K4**	
	CO4:To Categorize the programming skills in PL/SQL.	**K3**	
	CO5:To Convince a relational database using a relational database package, function and trigger.	**K4**	

Learning Resources

Text Books	1. A Silberschatz, H Korth, S Sudarshan, “Database System and Concepts”, McGraw-Hill, 5 th Edition, 2005. 2. Alexis Leon & Mathews Leon, “Fundamentals of DBMS”, Vijay Nicole Publications, 2 nd Edition, 2014. 3. Nilesh Shah, “Database Systems Using Oracle”, PHI, 2nd edition, 2004
Reference Books	1. Alexis Leon & Mathews Leon, “Essential of DBMS”, Vijay Nicole Publications, 2 nd Reprint, 2009.
Website Link	https://www.codecademy.com/article/what-is-rdbms-sql

L-Lecture T-Tutorial P-Practical C-Credit

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M3UCAC05	Operating System	DSC THEORY - V	III	5	5	-	-	4

Objective	**To Simplify the main components of OS and their working methods and choose the various scheduling policies of OS, to teach the different memory management techniques.**

Unit	Course Content	Knowledge Levels	Sessions
I	Operating Systems Overview: Introduction, operating system operations, process management, memory management, storage management, protection and security, distributed systems. operating systems structures: Operating system services and systems calls, system programs, operating system structure, operating systems generations.	K1	15
II	Process and CPU scheduling – Process concepts and scheduling, operation of processes, cooperating processes, threads and inter process communication – scheduling criteria, Scheduling Algorithm.	K2	12
III	Memory Management and Virtual memory – Logical versus Physical address, space, swapping, contiguous allocation, paging, segmentation, demand paging, demand segmentation, page replacement, page replacement algorithm.	K3	11
IV	Process Management and Synchronization – The critical section problem, synchronization hardware, semaphores, and classical problems of synchronization, Deadlocks – System Model, Dead locks characterization, Methods for Handling Dead locks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection and Recovery from Deadlock.	K3	10
V	File System: Concept of a file, access methods, directory structure, file system mounting, file sharing, protection. File system implementation: file system structure, file system implementation, directory implementation, allocation methods, free-space management, efficiency and performance, comparison of UNIX and windows.	K4	12
Course Outcome	**CO1:To Define the Introduction & Structures of Operating System.**	**K1**	
	CO2:To Explain the various concepts and features of Operating systems.	**K2**	
	CO3:To Determines the various operating systems with respect to characteristics and features.	**K3**	
	CO4:To Classify the algorithm of CPU Scheduling, Memory Scheduling and disk scheduling ,File System.	**K4**	
	CO5:To Evaluate the OS configurations & Memory Allocations.	**K4**	

Learning Resources

Text Books	1.Abraham Silberschatz, Peter Baer Galvin, Greg Gagne (2006), Operating System Principles, 7th edition, Wiley India Private Limited, New Delhi.
Reference Books	1. Charles Crowley, "Operating System: A Design- Oriented Approach", Tata Mc-Graw Hill., 1st Edition, 2001 2. Pabitra Pal, Choudhury, "Operating Systems: Principle and Design", Prentice Hall of India, 2009 Edition 3 J Archer Harris, "Schaum.s Outline of Operating Systems", Tata Mc-Graw Hill. ,2001 3. Stallings (2006), Operating Systems, Internals and Design Principles, 5th edition, Pearson Education, India.
Website Link	https://www.tutorialspoint.com/operating_system/os_overview.htm

L-Lecture T-Tutorial P-Practical C-Credit

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M3UCAC06	Data Structures & Algorithms	DSC THEORY - VI	III	5	5	-	-	4

Objective	**To Analyze and design algorithms with relevant techniques and Classify the tree and graph data structures & learn different sorting and searching algorithms.**

Unit	Course Content	Knowledge Levels	Sessions
I	Data Structures – Introduction to Data Structures, abstract data types. Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, circularly linked lists- Operations for Circularly linked lists, doubly linked list implementation, insertion, deletion and searching operations, applications of linked lists.	K1	12
II	Stack & Queue: Stack ADT - Applications - Evaluating arithmetic expressions- Conversion of Infix to Postfix- Recursion. Queue ADT – Priority Queue - applications of queues. Implementation of Stack ADT and palindrome checking using C. Implementation of Queue operations using arrays in C.	K2	13
III	Trees – Definitions, tree representation, properties of trees, Binary tree, Binary tree representation, binary tree properties, binary tree traversals, binary tree implementation, applications of trees.	K3	10
IV	Graphs:Definition – Representation of Graph – Breadth-first traversal - Depth-first traversal – Dynamic programming Technique– Greedy method - Dijkstra's algorithm – applications of graphs. Implementation of graph, graph traversal methods, finding shortest path using Dijkstra's algorithm in C.	K4	13
V	Searching & Sorting Algorithms: Divide and conquer methodology - Searching: Linear Search - Binary Search. Sorting: Insertion sort – Merge sort – Quick sort – Heap sort. Analysis of searching and sorting techniques. Implementation of linear search, binary search, insertion sort, merge sort and quick sort algorithms in C.	K4	12

Course Outcome	**CO1:To Define the linear data structures and solve its problems.**	**K1**
	CO2:To Discuss the linear and non-linear data structures like stacks, queues, and linked list.	**K3**
	CO3:To Apply the Tree Linear data structures in C.	**K4**
	CO4:To Perform graphs Traversal to solve the problems.	**K4**
	CO5: To illustrate the various searching and sorting algorithms.	**K4**

Learning Resources

Text Books	1.Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education,1997. 2.Fundamentals of Data structures in C, 2nd Edition, E.Horowitz, S.Sahni and Susan AndersonFreed, Universities Press. 3.Data structures A Programming Approach with C, D.S.Kushwaha and A.K.Misra, PHI.
Reference Books	1.Aho, Hopcroft and Ullman, "Data Structures and Algorithms", Pearson Education,1983. 2.S.Sridhar, "Design and Analysis of Algorithms", First Edition, Oxford University Press. 2014 3. Byron Gottfried, Jitender Chhabra, "Programming with C" (Schaum's Outlines Series), Mcgraw Hill Higher Ed., III Edition, 2010 4.Yashvant Kanetkar, "Data Structures Through C", BPB publications, II edition, 2003
Website Link	https://www.tutorialspoint.com/data_structures_algorithms/index.htm

L-Lecture T-Tutorial P-Practical C-Credit

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M4UCAC07	Visual Programming	DSC THEORY - VII	IV	5	5	-	-	4
Objective	**To Study the VB techniques and Evaluate the applications using VB.**							

Unit	**Course Content**	**Knowledge Levels**	**Sessions**
I	Visual Basic Definition - Features of Visual Basic – The Visual Basic Philosophy – Developing an Application. Creating an Application: The Tool Box – Project Explorer – The properties Window – The Form Window– What does Visual Basic 6 have for you to create applications. IDE, Forms and Controls: The Form.	K1	12
II	Variables in Visual Basic - Writing Code in Visual Basic: The Code Window – The Anatomy of a Procedure – Editor Features – For….Next Statement – Decision Maker. If – Loop – While Loop – # Select Case…..End Select #.	K2	10
III	Menus, Sub procedures and sub functions: Menus – Common Dialog Boxes – Writing General Procedures. Multiple Forms: Multiple Forms – Standard Code Modules-Variables and Constants in Multiple-Form Projects.	K3	11
IV	List Boxes and Combo boxes - Do/Loop – For/Next Loop – Using Msgbox Function – Using String Function – Arrays: Control Arrays – Single Dimension Array – For Each/Next Statements – User defined data types – Multidimensional Arrays.	K4	15
V	Introduction to Databases: Database Access – Working with the Data Control: The Data Control - Coding – Data Access Objects – The Jet Data Base Engine – Functions of the Jet Database Engine – SQL – The DAO Object Model. Crystal and Data Report: Crystal Reports – Data Reports	K4	12
Course Outcome	**CO1:To Recall the Outlines about Event Driven in GUI.**	**K1**	
	CO2:To Construct the Decision Making Statements of VB.	**K2**	
	CO3:To Illustrate the Database Connectivity in VB.	**K3**	
	CO4:To Construct the reports in VB software.	**K4**	
	CO5:To develop the VB applications.	**K4**	

Learning Resources	
Text Books	1. Gary Cornell, “Visual Basic 6 from the Ground up”, McGraw-Hill Education,1998
Reference Books	1. Mohammed Azam, “Programming with Visual Basic 6.0”, 1st Edition, Vikas Publishing House Pvt.Ltd., Chennai, 2001. 2. Julia Case Bradley and Anita C.Millspaugh, “Programming in Visual Basic 6.0”, Tata McGraw-HillEdition, 2011.
Website Link	http://www.youtube.com/watch?v=W0hkymvJzfI https://www.geeksforgeeks.org/introduction-to-visual-programming-language/

L-Lecture T-Tutorial P-Practical C-Credit

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M4UCAC08	Machine Learning	DSC THEORY - VIII	IV	5	5	-	-	4

Objective	**To Recognize the Artificial Intelligence and machine learning techniques and make the students to understand Machine Learning Models and Evaluate the student skills in machine learning.**

Unit	Course Content	Knowledge Levels	Sessions
I	Introduction to machine learning: Introduction, Types of machine learning, Applications of Machine Learning,Perspectives and issues in machine learning, Tools in machine learning, basic types of data in machine learning, exploring structure of data, data preprocessing. Performance metrics - accuracy, precision, recall, sensitivity, specificity, AUC, RoC, Bias Variance decomposition.	K1	13
II	Probabilistic and Stochastic Models: Bayesian Learning –Bayes theorem, Concept learning, Maximum likelihood, Bayes optimal classifier, Gibbs algorithm, Naive Bayes classifier,Expectation maximization and Gaussian Mixture Models,Hidden Markov models.	K2	13
III	Supervised learning: Introduction, Regression, Linear regression, Classification: Decision trees, k-Nereast Neighbours, Support Vector Machine, Logistic regression, Naïve Bayes, Random Forest. Artificial Neural Network: Introduction, Perceptrons, multi-layer networks and back propagation.	K3	11
IV	Unsupervised learning: Introduction, Supervised vs Unsupervised Cluster Analysis, K-means clustering, Hierarchical clustering. Dimension reduction: Principal Component Analysis, Linear Discriminant Analysis.	K4	12
V	Modelling, evaluation and Genetic algorithms: Building the model, Training a model, evaluating a model, improving a model. Genetic Algorithms – Representing hypothesis, Genetic operators and Fitness function and selection, Simple applications of the Genetic Algorithm.	K4	11

Course Outcome	**CO1:To Recall the Machine Learning Concepts.**	**K1**	
	CO2:To Summarize the Probabilistic and Stochastic Model.	**K2**	
	CO3:To Solve the Supervised learning Techniques.	**K3**	
	CO4:To Analyze the Unsupervised learning Techniques.	**K4**	
	CO5:To Build Modelling, evaluation and Genetic algorithms.	**K4**	

Learning Resources

Text Books	1. SaikatDutt, Subramanian Chandramouli, Amit Kumar Das, ―Machine Learning‖, Pearson Education. Chapters 1-3, 6-10. (unit I,II,III,IV,V) 2. ShaiShalev-Shwartz, Shai Ben-David, ―Understanding Machine Learning: From Theory to Algorithms‖, Cambridge University Press. Chapters 20, 23-24 (Unit III,IV). 3. Tom M.Mitchell - "Machine Learning" McGraw Hill Education (India) Private Limited, Chennai. Chapters 6,9 - (Unit - II & V).
Reference Books	1. T. Hastie, R. Tibshirani and J. Friedman, ―Elements of Statistical Learning‖,Springer. 2.Charu C. Aggarwal, ―DATA CLUSTERING Algorithms and Applications‖, CRC Press, 2014. 3. C. Bishop, ―Pattern Recognition and Machine Learning‖, Springer. 4. Ethem Alpaydin,"Introduction to Machine Learning‖, MIT Press, Prentice Hall of India, Third Edition 2014.
Website Link	http://www.geeksforgeeks.org/machine-learning/

L-Lecture T-Tutorial P-Practical C-Credit

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M4UCAC09	Computer Networks	DSC THEORY - IX	IV	5	5	-	-	4

Objective	**To understand the concept of Computer network and impart knowledge about networking and internet devices.**

Unit	Course Content	Knowledge Levels	Sessions
I	Introduction – Network Hardware - Software - Reference Models - OSI and TCP/IP Models - Example Networks: Internet, ATM, Ethernet and Wireless LANs - Physical Guided Transmission Media.	K1	13
II	Wireless Transmission - Communication Satellites - Telephone System: Structure, Local Loop, Trunks and Multiplexing and Switching. Data Link Layer: Design Issues - Error Detection and Correction.	K2	12
III	Elementary Data Link Protocols - Sliding Window Protocols - Data Link Layer in the Internet - Medium Access Layer - Channel Allocation Problem - Multiple Access Protocols - Bluetooth.	K3	11
IV	Network Layer - Design Issues - Routing Algorithms - Congestion Control Algorithms - IP Protocol - IP Addresses - Internet Control Protocols.	K4	12
V	Transport Layer - Services - Connection Management - Addressing, Establishing and Releasing a Connection - Simple Transport Protocol - Internet Transport Protocols (ITP) - Network Security: Cryptography.	K4	12
Course Outcome	**CO1:To Recall the concept of networks and its types.**	**K1**	
	CO2:To Describe the wireless communications.	**K2**	
	CO3:To Determine the data link protocols.	**K3**	
	CO4:To Classify the network design issues.	**K3**	
	CO5:To Analyze the connection issues of Networks.	**K4**	

Learning Resources

Text Books	1. A. S. Tanenbaum, ―Computer Networks‖, Prentice-Hall of India 2008, 4th Edition.
Reference Books	1. Stallings, ―Data and Computer Communications‖, Pearson Education 2012, 7th Edition. 2. B. A. Forouzan, ―Data Communications and Networking‖, Tata McGraw Hill 2007, 4th Edition. 3. F. Halsall, ―Data Communications, Computer Networks and Open Systems‖, Pearson Education 2008.
Website Link	NPTEL & MOOC courses titled Computer Networks https://nptel.ac.in/courses/106106091

L-Lecture T-Tutorial P-Practical C-Credit

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M5UCAC10	Java Programming	DSC THEORY - X	V	5	5	-	-	4

Objective	**To Recognize Java Basics,Branching & Looping Statements and study the concepts of threads,applets & Files in Java.**		
Unit	**Course Content**	**Knowledge Levels**	**Sessions**
I	Java Evolution – Simple Java Program – Java program structure – Java Tokens – Java Statements – JVM – Command Line Arguments – Constants, Variables, and Data Types – Operators and Expressions.	K1	13
II	Decision Making and Branching: Introduction – Decision Making with if Statement – The ?: Operator. Decision Making and Looping: Introduction – Jumps in Loops – Labelled Loops. Classes, Objects and Methods: Introduction – Defining a Class – Creating Objects – Accessing Class Members – Constructors – Methods Overloading – Static Members – Nesting of Methods – Inheritance – Overriding Methods – Final Variables and Methods – Final Classes – Finalizer Methods – Abstract Methods and Classes – Methods with Varargs –Visibility Control.	K2	11
III	Arrays, Strings and Vectors: Introduction – Types - Strings – Vectors – Wrapper Classes–Enumerated Types –Annotations. Interfaces: Introduction – Defining Interfaces – Extending Interfaces – Implementing Interfaces –Accessing Interface Variables – Packages: Introduction – Java API Packages – Using System Packages – Hiding Classes – Static Import.	K3	12
IV	Multithreaded Programming: Introduction – Creating Threads – Stopping and Blocking a Thread - Life cycle of a Thread – Synchronization – Implementing the Runnable interface – Inter thread Communication. Managing Errors and Exceptions: Introduction – Types of Errors –Exceptions – Applet Programming: Introduction – Write Applets - Building Applet code - Applet life cycle -Creating an Executable Applet – Designing a web page – Applet Tag – Adding Applet to HTML File – Running the applet – Applet Tags –Passing Parameters to Applets – Aligning the Display –Displaying Numerical values – Getting input from the user – Event handling.	K4	11
V	Graphics Programming: Introduction – The Graphics Class - Lines and Rectangles – Circles and Ellipses – Drawing Arcs – Drawing polygons – Line Graphs – Using Control Loops in Applets – Drawing Bar Charts. Managing I/O Files in Java: Introduction – Concept of stream – Stream classes – Byte stream classes – Character stream classes – Using stream – Using the file class – Creation of Files – Reading/Writing characters – Reading/Writing Bytes – Handling Primitive Data types – Concatenating and buffering Bytes - Random access files.	K4	13
Course Outcome	**CO1:To Identify the Java classes and methods using a subset of data types.**	**K1**	
	CO2:To Discuss about Decision Making Statements in Java.	**K2**	
	CO3:To Illustrate the Concepts of Arrays&Interfaces in Java.	**K3**	
	CO4:To Classify the threads & Applets in Java.	**K3**	
	CO5:To Justify the Graphics and File Management Concepts in Java.	**K4**	

Learning Resources	
Text Books	1. E. Balagurusamy, “Programming with Java,” 4th Edition, Tata McGraw Hill Pub. Ltd., New Delhi,2009.
Reference Books	1. Herbert Schild, "Java: The Complete Reference," Ninth Edition, Oracle Press, 2014 2. Rohit Khurana, "Programming with JAVA," VIKAS Pub., 2014
Website Link	https://www.guru99.com/java-tutorial.html

L-Lecture T-Tutorial P-Practical C-Credit

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M6UCAC11	Open Source Computing	DSC THEORY - XI	V	4	4	-	-	3
Objective	**The Students to learn and understand Python programming basics and paradigms and using various flow controls of Python Programming.** ▫							

Unit	Course Content	Knowledge Levels	Sessions
I	Introduction to Open Source Computing - Contrasting and comparing Open Source Vs Traditional Development Methodologies - historical evolution of the Open Source movement, society's adoption of Open Source software - Installation and working with Python, Python interpreter. Introduction to Python Programming Language: operators, variables, data types, Lists, Dictionaries, Sets, Tuples and Strings.	K1	10
II	Program Flow Control: Statements and Expressions, Control structures: if, else, elif, while loop, Loop manipulation using pass, continue, break and else.	K2	8
III	Functions: Definition, call, positional and keyword parameter. Default parameters, variable number of arguments. Modules: import mechanisms, Functional programming: map, filter, reduce, max, min. lambda function.	K3	9
IV	Object Oriented Programming: Class Definition - Creating Objects - Built-in Attribute Methods - Built-in Class Attributes- Destructors in Python – Encapsulation - Data Hiding –Inheritance - Method Overriding- Polymorphism.	K4	8
V	Files – Directories – Using Databases in Python Python MySQL Database Access- Install the MySQLdb and other Packages-Create Database Connection-CREATE, INSERT, READ Operation- DML and DDL operation with Databases.	K4	10
Course Outcome	**CO1:To Define the Basics of Python.**	**K1**	
	CO2:To Discuss the concepts of files and Make database connectivity in python programming language.	**K2**	
	CO3:To Solve the Functions & its Programs of Python.	**K2**	
	CO4:To Simplify the OOPs Concepts in Python.	**K3**	
	CO5:To Analyze the File Concepts.	**K4**	

Learning Resources	
Text Books	1.Bill Lubanovic, "Introducing Python", O"Reilly, First Edition-Second Release, 2014.
Reference Books	1.Mark Lutz, "Learning Python", O"Reilly, Fifth Edition, 2013. David M. Beazley,"Python Essential Reference", Developer"s Library, Fourth Edition, 2009 2.Charles Dierbach, Introduction to Computer Science Using Python: A Computational Problem-Solving Focus, John Wiley, 2012 3.Kenneth A. Lambert, The Fundamentals of Python: First Programs, 2011 Cengage Learning, ISBN: 9781111822705.
Website Link	https://www.w3schools.com/python/

L-Lecture T-Tutorial P-Practical C-Credit

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M6UCAC12	Artificial Intelligence using Deep Learning	DSC THEORY - XII	VI	5	5	-	-	4

Objective	**Students to Become familiar with basic principles of AI towards the problem solving, inference, perception, knowledge representation and Elucidate the basic knowledge representation,and learning methods of Artificial Intelligence and Deep Learning Models.**

Unit	Course Content	Knowledge Levels	Sessions
I	**INTRODUCTION:** Philosophy of artificial intelligence, Definitions - Evolution of AI - Applications of AI, Classification of AI- Intelligent Agents: Agents and Environment-Nature of Environment- Structure Environment. **SEARCHING BASED PROBLEM SOLVING :** Problem Solving Agent - Blind Search- Performance measures - Informed Search: Introduction to Heuristics-Variants of heuristic search-uniform cost, A*,Greedy - Overview of Hill Climbing – Simulated Annealing – Genetic Algorithms – Adversarial Search – Minimax, Alpha beta pruning.	K1	13
II	**KNOWLEDGE REPRESENTATION AND RESONING:** Logical systems – Knowledge Based systems, Propositional Logic – Constraints, Predicate Logic – First Order Logic, Inference in First Order Logic, Ontological Representations and applications Knowledge representation and reasoning through logic. **LEARNING SYSTEMS:** Machine learning, Forms of Learning – Types - Supervised, unsupervised, reinforcement learning, Learning Decision Trees, soft computing- Artificial Neural Network. EXPERT SYSTEMS &ANN: Introduction to Expert Systems- Architecture, Reasoning, and explanation-Knowledge Acquisition-Introduction to Natural Language Processing-Morphological Analysis-Syntax Analysis-Semantic Analysis.	K2	10
III	**CONVOLUTIONAL NEURAL NETWORKS:** Architectural Overview, Motivation, Layers, Filters, Parameter sharing, Regularization, Popular CNN Architectures: ResNet, AlexNet – Applications.	K3-K4	11
IV	**RECURRENT AND RECURSIVE NETS:** Recurrent Neural Networks, Bidirectional RNNs, Encoder-decoder sequence to sequence architectures - BPTT for training RNN, Long Short-Term Memory Networks, Computer Vision - Speech Recognition - Natural language Processing, Case studies in classification, Regression and deep networks.	K4	14
V	**DEEP LEARNING ARCHITECTURES:** Machine Learning and Deep Learning, Representation Learning, Width and Depth of Neural Networks, Learning Algorithms: Capacity - Over fitting - Under fitting - Bayesian Classification - Activation Functions:RELU, LRELU, ERELU, Unsupervised Training of Neural Networks, Restricted and Deep Boltzmann Machines , Auto Encoders.	K4	12
Course Outcome	**CO1:To Identify the Basics of Artificial Intelligence.**	**K1**	
	CO2:To Gain the knowledge about different methods.	**K2**	
	CO3:To Solve The Problem By Using algorithm based on Neural networks.	**K2**	
	CO4:To Construct the Applications of Deep Learning.	**K3**	
	CO5:To Create the real world applications in advanced techniques.	**K4**	

Learning Resources

Text Books	1.Stuart Russell and Peter Norvig Artificial Intelligence - A Modern Approach, Pearson Education India; 3rd edition, 2015. 2.Elaine Rich, Kevin Knight and Shiv Shankar B. Nair, Artificial Intelligence, 3rd edition, Tata McGraw Hill, 2019. 3.Wolfgang Ertel," Introduction to Artificial Intelligence", Second Edition, Springer, 2017. 4.Ian Goodfellow, YoshuaBengio, and Aaron Courville, "Deep Learning", First Edition, MIT Press, 2016. 5.Nikhil Buduma and Nicholas Lacascio, "Fundamentals of Deep Learning", First Edition, O.Reilly, 2017
Reference Books	1.Elaine Rich And Kevin Knight, Artificial Intelligence , Tata Mc Grew Hill Publisher,2nd Edition. 2. Dan W.Pattlan Goodfellow, "Deep Learning", MIT Press, 2017.
Website Link	https://www.simplilearn.com/tutorials/deep-learning-tutorial

L-Lecture T-Tutorial P-Practical C-Credit

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M6UCAC13	Cyber Security	CORE THEORY - XIII	VI	5	5	-	-	4

Objective	**The Students able to understand the Basic concepts of Cyber Security threats,risk,attack and vulnerabilities.**

Unit	Course Content	Knowledge Levels	Sessions
I	INTRODUCTION TO CYBER SECURITY: Introduction -Computer Security - Threats -Harm - Vulnerabilities - Controls - Authentication -Access Control and Cryptography – Web User Side - Browser Attacks - Web Attacks Targeting Users - Obtaining User or Website Data - Email Attacks.	K1	12
II	SECURITY IN OPERATING SYSTEM & NETWORKS: Security in Operating Systems - Security in the Design of Operating Systems –Root kit - Network security attack-Threats to Network Communications - Wireless Network Security - Denial of Service - Distributed Denial-of-Service.	K2	10
III	DEFENCES: SECURITY COUNTER MEASURES: Cryptography in Network Security - Firewalls - Intrusion Detection and Prevention Systems - Network Management - Databases - Security Requirements of Databases - Reliability and Integrity - Database Disclosure - Data Mining and Big Data.	K3	11
IV	PRIVACY IN CYBERSPACE: Privacy Concepts -Privacy Principles and Policies -Authentication and Privacy - Data Mining -Privacy on the Web - Email Security - Privacy Impacts of Emerging Technologies - Where the Field Is Headed.	K4	15
V	MANAGEMENT AND INCIDENTS: Security Planning - Business Continuity Planning - Handling Incidents - Risk Analysis - Dealing with Disaster - Emerging Technologies - The Internet of Things - Economics - Electronic Voting - Cyber Warfare- Cyberspace and the Law - International Laws - Cyber Crime - Cyber Warfare and Home Land Security.	K4	12
Course Outcome	**CO1:To Recognize the basics of cyber security.**	**K1**	
	CO2:To Discuss about securitry concepts.	**K2**	
	CO3:To Apply the Concepts of N/W security.	**K2**	
	CO4:To Illustrate the Privacy concepts in cyberspace.	**K3**	
	CO5:To Build the Emerging Technologies using Cyber security.	**K4**	

Learning Resources

Text Books	1. Charles P. Pfleeger Shari Lawrence Pfleeger Jonathan Margulies, Security in Computing, 5th Edition , Pearson Education , 2015
Reference Books	1. George K.Kostopoulous, Cyber Space and Cyber Security, CRC Press, 2013. 2. Martti Lehto, Pekka Neittaanmäki, Cyber Security: Analytics, Technology and Automation edited, Springer International Publishing Switzerland 2015 3. Nelson Phillips and Enfinger Steuart, ―Computer Forensics and Investigations‖, Cengage Learning, New Delhi, 2009.
Website Link	https://www.tutorialspoint.com/fundamentals_of_science_and_technology/cyber_crime_and_cyber_security.htm

L-Lecture T-Tutorial P-Practical C-Credit

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M5UCAE01	Software Engineering	DSE-I	V	5	5	-	-	4
Objective	**To Understand the concepts of software process and analysis,design of the Software life cycle models.**							

Unit	Course Content	Knowledge Levels	Sessions
I	Introduction to Software Engineering: The evolving role of software, Changing Nature of Software, Software myths. The software problem: Cost, schedule and quality, Scale and change.	K1	13
II	Software Process: Process and project, component software process, Software development process models: Waterfall model, prototyping, iterative development, relational unified process, time boxing model, Extreme programming and agile process, using process models in a project, Project management process.	K1-K2	10
III	Software requirement analysis and specification: Value of good SRS, requirement process, requirement specification, functional specifications with use-cases, other approaches for analysis, validation, Planning a software project: Effort estimation, project schedule and staffing, quality planning, risk management planning, project monitoring plan, detailed scheduling.	K3	10
IV	Software Architecture: Role of software architecture, architecture views, components and connector view, architecture styles for C & C view, documenting architecture design, evaluating architectures, Design: Design concepts, function-oriented design, object oriented design, detailed design, verification, metrics.	K4	14
V	Coding and Unit testing: Programming principles and guidelines, incrementally developing code, managing evolving code, unit testing, code inspection, metrics, Testing: Testing concepts, testing process, black-box testing, white-box testing, metrics.	K4	13
Course Outcome	**CO1:To Recall the various software process used in software development models.**	**K1**	
	CO2:To Describe the software specifications and classify the types of software requirements.	**K2**	
	CO3:To Determine the use of requirements model and convert into the design model and demonstrate use of software and user interface design principles.	**K2**	
	CO4:To Categorize the SCM and SQA,testing strategies in SDA.	**K3**	
	CO5: To Justify the SDLC in Software Project Development.	**K4**	

Learning Resources

Text Books	1. A Concise introduction to software engineering (undergraduate topics in computer science), Pankaj Jalote, Springer International Edition 2. Software Engineering, A Precise approach, Pankaj Jalote, Wiley. 3. Software Engineering, 3/e, & 7e Roger S.Pressman, TMH.
Reference Books	1. Software Engineering, 8/e, Sommerville, Pearson. 2. Software Engineering principles and practice, W S Jawadekar, TMH. 3. Software Engineering concepts, R Fairley, TMH.
Website Link	https://www.javatpoint.com/software-engineering-tutorial

L-Lecture T-Tutorial P-Practical C-Credit

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M5UCAE02	Web Technologies	DSE-II	V	5	5	-	-	4
Objective	**To know the Fundamental concepts of PHP scripting language & the basic structure of a web application and Summarizere the basics of MySQL database and the relationship between the client-side/server-side scripts.**							

Unit	Course Content	Knowledge Levels	Sessions
I	Introducing PHP – Basic development Concepts – Creating first PHP Scripts – Using Variable and Operators – Storing Data in variable – Understanding Data types – Setting and Checking variables Data types – Using Constants – Manipulating Variables with Operators.	K1	12
II	Controlling Program Flow: Writing Simple Conditional Statements - Writing More Complex Conditional Statements – Repeating Action with Loops – Working with String and Numeric Functions.	K2	11
III	Working with Arrays: Storing Data in Arrays – Processing Arrays with Loops and Iterations – Using Arrays with Forms - Working with Array Functions – Working with Dates and Times.	K3	11
IV	Using Functions and Classes: Creating User-Defined Functions - Creating Classes – Using Advanced OOP Concepts. Working with Files and Directories: Reading Files-Writing FilesProcessing Directories.	K4	13
V	Working with Database and SQL : Introducing Database and SQL- Using MySQL-Adding and modifying Data-Handling Errors – Using SQLite Extension and PDO Extension. Introduction XML—Simple XML and DOM Extension.	K4	13
Course Outcome	**CO1:To Identify the basic structure of a web application.**	**K1**	
	CO2:To Discuss the PHP with HTML concepts.	**K2**	
	CO3:To Perform and deploy the enterprise web applications by using HTML.	**K2**	
	CO4:To lassify the database connectivity using MySQL.	**K3**	
	CO5: To Evaluate the debug in PHP scripts.	**K4**	

Learning Resources	
Text Books	1.Vikram VASWANI, "PHP A Beginner's Guide ", Tata McGraw-Hill, 2008.
Reference Books	1. Steven Holzner – "The PHP Complete Reference" –Tata McGraw-Hill, 2007. 2. Steven Holzer "Spring into PHP5" – Tata McGraw Hill Edition, 2011
Website Link	https://www.w3schools.com/php/

L-Lecture T-Tutorial P-Practical C-Credit

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M5UCAE03	Big Data Analytics	DSE-III	V	5	5	-	-	4

Objective	**To understand the methodologies of big data analysis and its applications of computing techniques and technologies like Hadoop and map reduce.**

Unit	Course Content	Knowledge Levels	Sessions
I	Classification of Digital Data - Introduction to Big Data: Characteristics –Evolution – Definition - Challenges with Big Data - Other Characteristics of Data - Why Big Data - Traditional Business Intelligence versus Big Data – Data Warehouse and Hadoop Environment - Big Data Analytics: Classification of Analytics – Challenges - Big Data Analytics importance - Data Science – Data Scientist - Terminologies used in Big Data Environments - Soft State Eventual Consistency - Top Analytics Tools.	K1	13
II	Hadoop: Features – Advantages – Versions – Ecosystems – Distributions –Hadoop Versus RDBMS - Distributed Computing Challenges – History -Hadoop Overview - Use Case of Hadoop - Hadoop Distributors – HadoopDistributed File System - Processing Data with Hadoop - Managing Resourcesand Applications with Hadoop YARN - Interacting with Hadoop Ecosystem –Map Reduce: Mapper – Reducer – Combiner – Partitioner – Searching - Sorting– Compression	K2	12
III	Hadoop and R for Visualization: Background and fundamentals-moving data in and out of Hadoop-data serialization-applying Map Reduce patterns to big data- streaming big data-integrating R and Hadoop for statistics and more-predictive analytics with Mahout- Hacking with Hive-Programming pipelines with pig – HBase-MySQL-NoSQL- RHadoop.	K3	12
IV	NoSQL Databases: Advantages – Usage – Vendors – New SQL – Comparison of SQL, NoSQL and NewSQL -Mongo DB: Why Mongo DB - Terms used in RDBMS and Mongo DB - Data Types - Mongo DB Query Language Methods: Insert - Save– Update – Remove - Find – NULL – Count – Limit – Sort – Skip – Arrays –Aggregate – Map Reduce – Cursors in Mongo DB – Indexes – Import and Export – Jasper Report using Jasper soft – Connecting to Mongo DB, NoSQL Database.	K4	12
V	Frequent Item sets and Clustering: Mining Frequent Item sets - Market Based Model – Apriori Algorithm – Handling Large Data Sets in Main Memory – Limited Pass Algorithm – Counting Frequent Item sets in a Stream – Clustering Techniques – Hierarchical – K-Means – Clustering High Dimensional Data – CLIQUE And PROCLUS – Frequent Pattern based Clustering Methods –Clustering in Non Euclidean Space – Clustering for Streams and Parallelism.	K4	11
Course Outcome	**CO1:To Define about Big data Concepts using Hadoop.**	**K1**	
	CO2:To Discribe about Hadoop And Map reduce Programming.	**K2**	
	CO3:To Analyze about Hadoop and R for Visualization.	**K3**	
	CO4:To Illustrate the Mongo DB and Jasper Reports.	**K4**	
	CO5: To Determine the Frequent Item sets and Clustering in Hadoop.	**K4**	

Learning Resources

Text Books	1. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007. 2. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012. 3. Seema Acharya, Subhashini Chellappan, "Big Data and Analytics", Wiley Publications, First Edition, 2015.
Reference Books	1.. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & sons, 2012. 2. Glenn J. Myatt, "Making Sense of Data", John Wiley & Sons, 2007.
Website Link	https://www.javatpoint.com/what-is-big-data

L-Lecture T-Tutorial P-Practical C-Credit

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M5UCAE04	Mobile Computing	DSE-IV	V	5	5	-	-	4

Objective	**To Discuss about Mobile computing and its applications and learn basics of mobile computing & its types of communications,protocols and the security mechanisms used in Mobile Computing.**

Unit	Course Content	Knowledge Levels	Sessions
I	Mobile Computing : Introduction -Adaptability - The Key to Mobile Computing - Mechanisms for Adaptation Development or Incorporation of Adaptations in Applications. Mobility Management: Concept of Mobility Management - Location Management - Principles and Techniques. Technical and Other Limitations of Mobile Computing –Wireless Telephony – Cellular Concept- Multiple Access Techniques for Cellular System	K1	14
II	Emerging Technologies: Bluetooth – Radio Frequency Identification – Wireless Broadband - Mobile IP – Global System for Mobile Communications: Global System for Mobile Communications – GSM Architecture – GSM Entities - Call Routing in GSM – PLMN interfaces – GSM Addresses and Identifiers – Network Aspects in GSM- Mobility Management	K1-K2	11
III	General Packet Radio Service: Introduction – GPRS and Packet Data Network – GPRS Network Architecture – GPRS Network Operations – Data Services in GPRS – Applications for GPRS – Limitations for GPRS – Billing and Charging in GPRS – Enhanced Data Rates for GSM Evolution.	K3	11
IV	Wireless Application Protocol: Introduction – WAP – MMS –MMS Architecture – MMS Transaction flows – CDMA and 3G: Spread-Spectrum Technology – CDMA versus GSM- Wireless LAN: Introduction – advantages – Architecture – Mobile Ad hoc Networks and Sensor Networks – Wireless Access in Vehicular Environment- Satellite System: History - Applications - Basics - Routing- Localization - Handover. Wireless LAN.	K4	13
V	Security Issues in Mobile Computing: Introduction –Information Security – Security Techniques and Algorithms - Security Protocols – Public Key Infrastructure – Trust – Security Models – Security Frameworks for Mobile Environment – Next Generation Networks: Narrowband to Broadband – Multi Protocol Label Switching – Wireless Asynchronous Transfer Mode – Multimedia Broadcast Services – Future Trends.	K4	11

Course Outcome	**CO1:To Recall the new mobile application.**	**K1**	
	CO2:To Discuss about Bluetooth,mobile IP concepts.	**K2**	
	CO3:To Solve the adhoc network applications & protocols.	**K2**	
	CO4:To Simplify an existing or new protocol related to mobile environment.	**K3**	
	CO5: To Determine the mobile security techniques.	**K4**	

Learning Resources

Text Books	1. Frank Adelstein, Sandeep K.S., Gupta, Golden G. Richard III, Loren Schwibert Fundamentals of Mobile and Pervasive Computing, TMG Ed.Pvt.Ltd., New Delhi, 2005. Unit-I Chapter 1, Chapter 2 2. Rajesh Kumar Maurya, "Mobile Computing", Global Academic Publishers, New Delhi, 1 st Ed., 2012. Unit-I – Chapter 1, 3. Asoke K Talukder, Hasan Ahmed, Roopa R Yavagal,"Mobile Computing – Technology, Applications and Service Creation", Second Edition,Tata McGraw-Hill, 2010.
Reference Books	1. .Krzysztof Wesolowski , "Mobile Communication Systems" , Wiley, 2012. 2. UweHansmann, LotharMerk, Martin S. Nicklous, Thomas Stober, "Principles of Mobile Computing", Second Edition, Springer International Edition.2003
Website Link	1. http://www.tutorialspoint.com/mobile_computing/index. htm 2. http://www.tutorialspoint.com/gsm/index.htm

L-Lecture T-Tutorial P-Practical C-Credit

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M5UCAE05	Computer Graphics	DSE-V	V	5	5	-	-	4

Objective	**To Learn about computer graphics concepts and basic techniques.The students will be able to understand and apply the basic principles,techniques, 2D and 3D, Animation and algorithms.**

Unit	Course Content	Knowledge Levels	Sessions
I	Overview of graphics Systems: - Video Display Devices – Refresh Cathode-Ray tupes -Raster Scan Displays - Random Scan Displays – Color CRT Monitors –Direct view Storage tupes Flat – Panel Displays – Three Dimensional Viewing Devices -Stereoscopic and Virtual Reality Systems.	K1	13
II	Raster – Scan Systems Video Controller – Random – Scan Systems Video Controller – Random Scan Systems – Input devices – Hard-Copy Devices -Line Drawing Algorithms:Line Function- DDA Line Drawing Algorithms – Bresenham's Line Drawing Algorithms - Circle generating Algorithms - Properties of Ellipses.	K1-K2	12
III	Two Dimensional Geometric Transformation : - Basic Transformations - Translation – Rotation – Scaling – Matrix Representations and Homogeneous Coordinates – Other Transformations Reflections -Two Dimensional Viewing : Windows to view point coordinate Transformations – Clipping Operations – Point Clipping – Line Clipping – Curve Clipping – Text Clipping – Exterior Clipping.	K3	11
IV	Three Dimensional Concepts: Three Dimensional Display method – Parallel projection – Depth cueing visible line and surface – Three Dimensional Geometric and modeling Transformations: Translation – Rotation - Scaling – Composite Transformations. Three Dimensional Viewing: - Viewing pipeline – Viewing Coordinates – Projections – Parallel Projections – Perspective Projections.	K4	14
V	Visible Surface detection Methods : Classification VisibleSurface Detection Algorithms – Back Face Detection – Depth Buffer Method – A-Buffer Method –Scan line method – Depth sorting method – BSP tree method – Area Subdivision Method.	K4	10
Course Outcome	**CO1:To Define the basics & applications of computer graphics.**	**K1**	
	CO2:The students will Construct the problem using various algorithm design techniques in CG.	**K2**	
	CO3:To Perform 2d geometric transformations on graphics objects and their application in composite forms.	**K2**	
	CO4:To Calculate 3d geometric transformations on graphics objects and their application in composite forms.	**K3**	
	CO5: To Determine the projections and visible surface detection techniques for display of 3D scene on 2D screen.	**K4**	

Learning Resources

Text Books	1. Donald Hearn & M.Pauline Baker , "Computer Graphics",2nd Edition, 1996
Reference Books	1. John F. Hughes, Andries Van Dam, Morgan Mcguire, David F. Sklar, James D. Foley, Steven K. Feiner, Kurt Akeley, "Computer Graphics Principles and Practice" 3rd Edition, 2014 Pearson Education, Inc
Website Link	1. www.taylorfrancis.com 2.https://en.wikipedia.org/wiki/Computer_graphics_(computer_science)

L-Lecture T-Tutorial P-Practical C-Credit

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M5UCAE06	Ethical Hacking	DSE-VI	V	5	5	-	-	4
Objective	**To understand the Information & threats security and evaluate the ethical hacking network defense measures.**							

Unit	Course Content	Knowledge Levels	Sessions
I	Ethical Hacking Overview & Vulnerabilities: Understanding the importance of security-Concept of ethical hacking and essential Terminologies Threat- Attack- Vulnerabilities- Target of Evaluation Exploit. Phases involved in hacking.	K1	14
II	Foot printing - Introduction to foot printing- Understanding the information gathering methodology of the hackers- Tools used for the reconnaissance phase. Port Scanning - Introduction- using port scanning tools- Ping sweeps Scripting Enumeration-Introduction- Enumerating windows OS & Linux OS.	K2	11
III	System Hacking: Aspect of remote password guessing- Role of eavesdropping -Various methods of password cracking- Keystroke Loggers- Understanding Sniffers - Comprehending Active and Passive Sniffing- ARP Spoofing and Redirection DNS and IP Sniffing- HTTPS Sniffing.	K3	12
IV	Hacking Web services & Session Hijacking: Web application vulnerabilities- Application coding errors- SQL injection into Back-end Databases- Cross-site scripting- cross-Site request forging Authentication bypass- Web services and related flaws- Protective http headers Understanding Session Hijacking- Phases involved in Session Hijacking-Types of Session Hijacking- Session Hijacking Tools.	K4	13
V	Attacking Authentication: Attacking Session Management, Design Flaws in Authentication Mechanisms Attacking Forgotten Password Functionality, attacking Password change functions. Countermeasures to authentication attacks.	K4	10
Course Outcome	**CO1:To Identify the vulnerabilities/threats/attacks.**	**K1**	
	CO2:To Construct the potential countermeasures to advanced hacking techniques.	**K2**	
	CO3: To Illustrate the penetration & security testing and Use safe penetration techniques on the World Wide Web	**K3**	
	CO4:To Analyze the techniques used to break into an insecure web application and identify relevant countermeasures.	**K4**	
	CO5: To Design a computer against a variety of security attacks using various tools.	**K4**	

Learning Resources

Text Books	1. RajatKhare, "Network Security and Ethical Hacking", Luniver Press, 2006. 2. Thomas Mathew, "Ethical Hacking", OSB publishers, 2003.
Reference Books	1. Kimberly Graves, "Certified Ethical Hacker", Wiley India Pvt Ltd, 2010. 2. Michael T. Simpson, "Hands-on Ethical Hacking & Network Defense", Course Technology, 2010
Website Link	1. https://www.elsevier.com/books/ 2. https://www.elsevier.com/books/cyber-security-awareness-forlawyers 3. https://books.google.co.in/books

L-Lecture T-Tutorial P-Practical C-Credit

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M6UCAE07	Data Science	DSE-VII	V	5	5	-	-	4

Objective	**To provide an overview of a new language R used for data science and to introduce students to the R programming environment and related eco-system and thus provide them with an in demand skill-set, in both the research and business environments.**

Unit	Course Content	Knowledge Levels	Sessions
I	Introduction to Data Science: AI, Machine Learning and Data Science - Introduction to Data Science - Case for Data Science - Data Science Classification - Data Science Algorithms - Data Science Process: Prior Knowledge - Data Preparation - Modeling - Application – Knowledge - Data Exploration: Objective of Data Exploration - Datasets - Descriptive Statistics - Data Visualization - Roadmap for Data Exploration.	K1	14
II	Introduction to Data Science Process: The roles in a data science project - Stages of a data science project - Setting expectations. - Loading Data into R: Working with data from files - Working with relational databases.	K2	11
III	Exploring Data using R: Using summary statistics to spot problems - Spotting problems using graphics and visualization - Managing Data: Cleaning data - Sampling for modeling and validation. - Choosing and evaluating models: Mapping problems to machine learning tasks - Evaluating models - Validating models.	K3	12
IV	Statistics functions - Debugging, Profiling:Mean - Median - variance of the population - Estimated standard deviation - Standard scores – Sort – Rank – summary function - Debugging Tools in R - traceback() - debug() - recover() - Using system. Time () - Timing Longer Expressions - The R Profiler - Using summary Rprof().	K4	13
V	Unsupervised Methods: Cluster Analysis - Distances - Preparing the data – Hierarchical clustering with hclust() - The k-means algorithm - Assigning new points to clusters – Clustering takeaways. Association Rules - Overview of association rules - The example problem - Mining association rules with the arules package - Association rule takeaways.Simulation and Graphs: Generating Random Numbers - Setting random number seed - Simulating Linear Model - Loading and Processing Raw Data – Creating a Graph - density plots - dot plots, bar charts - line charts - pie charts - box plots - Scatter plots.	K4	10
Course Outcome	**CO1:To Recall the basic and advanced methods of data science and big data technology.**	**K1**	
	CO2:To summarize the data analytics techniques using r & examine the usage of various regression methods.	**K2**	
	CO3:To Predict the data science and big data analytics projects.	**K3**	
	CO4:To Classify the R Graphics and Tables to visualize Results of various statistical operations on data and Make use of the data by deploying r statistical tool.	**K4**	
	CO5: To Support the knowledge of R gained to data Analytics for real life applications to conduct analytics on large real life datasets.	**K4**	

Learning Resources

Text Books	1. Kotu, V., Deshpande, B, "Data Science: Concepts and Practice". Elsevier Science Publisher, 2018. 2. Zumel, Nina, and Mount, John, "Practical Data Science with R", Manning Publications, 2019. 3. Roger D. Peng, "R Programming for Data Science", Lean Publishing, (2015),ISBN: 9781365056826,1365056821.
Reference Books	1. Richard Hurley, "Data Science A Comprehensive Guide to Data Science, Data Analytics, Data Mining, Artificial Intelligence, Machine Learning, and Big Data", Ationa Publications, 2020 2. Thomas A. Runkler, "Data Analytics Models and Algorithms for Intelligent Data Analysis", Springer Vieweg, 2020. 3. Shah, Chirag,"A Hands-On Introduction to Data Science",Cambridge University Press,2020.
Website Link	https://www.geeksforgeeks.org/r-programming-for-data-science/

L-Lecture T-Tutorial P-Practical C-Credit

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M6UCAE08	Internet of Things	DSE-VIII	V	5	5	-	-	4

Objective	**To understand Smart Objects and IoT Architectures & various IOT-related protocol,build simple IoT Systems using Arduino and Raspberry Pi & understand data analytics and cloud in the context of IoT.**

Unit	Course Content	Knowledge Levels	Sessions
I	IoT& Web Technology, The Internet of Things Today, Time for Convergence, Towards the IoT Universe, Internet of Things Vision, IoT Strategic Research and Innovation Directions, IoT Applications, Future Internet Technologies, Infrastructure, Networks and Communication, Processes, Data Management, Security, Privacy & Trust, Device Level Energy Issues, IoT Related Standardization, Recommendations on ResearchTopics.	K1	13
II	M2M to IoT – A Basic Perspective– Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies. M2M to IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.	K2	12
III	IoT Architecture -State of the Art – Introduction, State of the art, Architecture. Reference Model- Introduction, Reference Model and architecture, IoT reference Model, IoT Reference Architecture- Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views.	K3	12
IV	IoT Architecture Introduction, IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications, Four Aspects in your Business to Master IoT, Value Creation from Big Data and Serialization, IoT for Retailing Industry, IoT For Oil and GasIndustry, Opinions on IoT Application and Value for Industry, Home Management, eHealth.	K4	13
V	Internet of Things Privacy, Security and Governance Introduction, Overview of Governance, Privacy and Security Issues, Contribution from FP7 Projects, Security, Privacy andTrust in IoT-Data-Platforms for Smart Cities, First Steps Towards a Secure Platform, Smartie Approach. Data Aggregation for the IoT in Smart Cities, Security.	K5	10
Course Outcome	**CO1:To Define the concept of IoT & Web Technology.**	**K1**	
	CO2:.To Discuss the M2M to IoT.	**K2**	
	CO3:To Determine the IoT Architecture.	**K3**	
	CO4:To Analyze the IoT Applications.	**K4**	
	CO5: To Evaluate the Implement IoT Privacy, Security and Governance.	**K5**	

Learning Resources

Text Books	Vijay Madisetti and ArshdeepBahga, "Internet of Things: (A Hands-on Approach)", Universities Press (INDIA) Private Limited 2014, 1st Edition.
Reference Books	1. Michael Miller, "The Internet of Things: How Smart TVs, Smart Cars, Smart Homes, and Smart Cities Are Changing the World", Pearson Education2015. 2. Francis da Costa, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", Apress Publications 2013, 1stEdition. 3. WaltenegusDargie, Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice", Wiley 2014. 4. CunoPfister, "Getting Started with the Internet of Things", O"Reilly Media2011.
Website Link	1.https://github.com/connectIOT/iottoolkit 2.https://www.arduino.cc/ 3.https://www.zettajs.org/

L-Lecture T-Tutorial P-Practical C-Credit

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M6UCAE09	Cloud Computing	DSE-IX	V	5	5	-	-	4

Objective	**To understand the concept of cloud computing & Learn the Programming models & service Provider working in cloud.**

Unit	Course Content	Knowledge Levels	Sessions
I	Computing Paradigms: 1.1 High-Performance Computing - Parallel Computing-Distributed Computing- Cluster Computing - Grid Computing- Cloud Computing – Biocomputing- Mobile Computing- Quantum Computing- Optical Computing - 1.11 Nanocomputing -Network Computing. Cloud Computing Fundamentals: Motivation for Cloud Computing- Defining Cloud Computing- Principles of Cloud computing- Cloud Ecosystem- Requirements for Cloud Services- Cloud Application- Benefits and Drawbacks.	K1	13
II	Cloud Computing Architecture and Management: Introduction- Cloud Architecture - Anatomy of the Cloud- Anatomy of the Cloud- Applications on the Cloud- Managing the Cloud - Migrating Application to Cloud.	K2	11
III	Cloud Deployment Models: Introduction -Private Cloud - Characteristics –Suitability- On-Premise Private Cloud- Outsourced Private Cloud-Advantages-Disadvantages - Public Cloud-Community Cloud-Hybrid Cloud. Cloud Service Models: Introduction - Infrastructure as a Service- Platform as a Service - Software as a Service- Other Cloud Service Models.	K3	13
IV	Programming Models for Cloud Computing: Introduction- Extended Programming Models for Cloud- New Programming Models Proposed for Cloud. Software Development in Cloud: Introduction- Different Perspectives on SaaS Development- New Challenges - Cloud-Aware Software Development Using PaaS Technology .	K4	13
V	Cloud Service Providers: Introduction- EMC- Google- Amazon Web Services- Microsoft- IBM- SAP Labs.- Salesforce- Rackspace- VMware- Manjrasoft. Open Source Support for Cloud: Introduction- Open Source Tools for IaaS- Open Source Tools for PaaS- Open Source Tools for SaaS.	K4	10
Course Outcome	**CO1:To Define the concepts of paradigm of computing.**	**K1**	
	CO2:To Describe the architecture of compute, storage cloud and delivery models.	**K2**	
	CO3:To Perform the key security and compliance challenges of cloud computing	**K3**	
	CO4: To Analyze the key techniques and organizational challenges.	**K4**	
	CO5: To determine the different characteristics of public, private and hybrid cloud deployment models.	**K4**	

Learning Resources

Text Books	1.K.Chandrasekaran, Essentials of Cloud Computing, CRC press
Reference Books	1.Borko Furht • Armando Escalante ,Handbook of Cloud Computing ,Springer,USA
Website Link	https://www.tutorialspoint.com/cloud_computing/index.htm

L-Lecture T-Tutorial P-Practical C-Credit

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M6UCAE10	Data mining & warehousing	DSE-X	V	5	5	-	-	4
Objective	**To Learn the basic concepts & importance of Association and Correlations Algorithms and various Classifiers. Understand the foundation of Clustering and Outlier Analysis, Data Ware house implementation.**							

Unit	Course Content	Knowledge Levels	Sessions
I	Introduction: Data mining application – data mining techniques – data mining case studies- the future of data mining – data mining software - Association rules mining: Introduction- basics- task and a naïve algorithm- apriori algorithm – improve the efficient of the apriori algorithm – mining frequent pattern without candidate generation (FP-growth) – performance evaluation of algorithms.	K1	13
II	Classification : Introduction – decision tree – over fitting and pruning - DT rules-- naïve bayes method- estimation predictive accuracy of classification methods - other evaluation criteria for classification method – classification software.	K2	11
III	Cluster analysis: cluster analysis – types of data – computing distances-types of cluster analysis methods - partitioned methods – hierarchical methods – density based methods – dealing with large databases – quality and validity of cluster analysis methods - cluster analysis software.	K3	13
IV	Web data mining: Introduction- web terminology and characteristics- locality and hierarchy in the web- web content mining-web usage mining- web structure mining – web mining software - Search engines: Search engines functionality- search engines architecture – ranking of web pages	K4	13
V	Data warehousing: Introduction – Operational data sources- data warehousing - Data warehousing design – Guidelines for data warehousing implementation - Data warehousing metadata - Online analytical processing (OLAP): Introduction – OLAP characteristics of OLAP system – Multidimensional view and data cube - Data cube implementation - Data cube operations OLAP implementation guidelines.	K4	10
Course Outcome	**CO1:To Recall the basics of data mining.**	**K1**	
	CO2:To Disuss the concept of Classification	**K2**	
	CO3:To Determine the concept of Cluter Analysis	**K3**	
	CO4:To Catagorize the Concept of web mining.	**K4**	
	CO5: To Evaluate the data warehouse implementation.	**K4**	

Learning Resources

Text Books	G.K. Gupta, "Introduction to Data mining with case studies", PHI Private limited, New Delhi, 2008. 2nd Edition, PHI , 201
Reference Books	Arun K Pujari, "Data Mining Techniques", Universities Press (India) Pvt. Ltd, February 2013.
Website Link	https://www.javatpoint.com/data-mining

L-Lecture T-Tutorial P-Practical C-Credit

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M6UCAE11	Neural Networks	DSE-XII	V	5	5	-	-	4
Objective	**To understand basics of neural networks and design the models use fuzzy logic & Systems**							

Unit	Course Content	Knowledge Levels	Sessions
I	Fundamentals of Neural Networks Basic Concepts of Neural Network-Human-Brain-Model of an Artificial Neuron-Neural network Architectures -Characteristics of Neural Networks-Learning Methods- History of Neural network research – Some application domains.	K1	13
II	Backpropagation Networks Architecture of Backpropagation Network-Back propagation Learning - Illustrations-Applications	K2	11
III	Adaptive Resonance Theory (ART) Introduction- ART1- ART2-Applications	K3	13
IV	Fuzzy Logic Fuzzy versus crisp-Crisp sets-Fuzzy Sets-crisp relations-Fuzzy Relations.	K4	13
V	Fuzzy systems Crisp logic-prdicate logic-Fuzzy Logic-Fuzzy Rule based system-Defuzzification Methods-Applications.	K4	10
Course Outcome	**CO1:To Define the basic architecture of Neural networks.**	**K1**	
	CO2:To Explain the back propagation networks.	**K2**	
	CO3:To Apply the knowledge about ART and its applications.	**K3**	
	CO4:To Analyze the Fuzzy logic.	**K4**	
	CO5: To Build Fuzzy systems.	**K4**	

Learning Resources

Text Books	1. S. Rajasekaran, G. A.VijayalakshmiPai, ―Neural Networks, Fuzzy Logic and Evolutionary Algorithms: Synthesis & Applications‖, Prentice-Hall of India Pvt. Ltd., II edition, 2017.
Reference Books	1. Fakhreddine O. Karray, Clarence De Silva, Soft Computing and Intelligent Systems Design, Pearson, 2009. 2. Sivanandam. S. N and Deepa S. N, Principles of Soft Computing, Wiley India, 2008
Website Link	https://www.javatpoint.com/artificial-neural-network

L-Lecture T-Tutorial P-Practical C-Credit

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M6UCAE12	Compiler Design	DSE-XII	V	5	5	-	-	4
Objective	**To focus on various designs, structuring and optimizing various phases of Compiler. It is also necessary to learn types of Grammar, Finite state machines, lex, yacc and related concepts of languages.**							

Unit	Course Content	Knowledge Levels	Sessions
I	Overview of the Translation Process, A Simple Compiler, Difference between interpreter, assembler and compiler. Overview and use of linker and loader, types of Compiler, Analysis of the Source Program, The Phases of a Compiler, Cousins of the Compiler, The Grouping of Phases, Lexical Analysis, Hard Coding and Automatic Generation Lexical Analyzers, Front-end and Back-end of compiler, pass structure.	K1	13
II	Lexical Analyzer Introduction to Lexical Analyzer, Input Buffering, Specification of Tokens, Recognition of Tokens, A Language for Specifying Lexical Analyzers, Finite Automata From a Regular Expression, Design of a Lexical Analyzer Generator, Optimization of DFA	K1-K2	11

III	Parsing Theory Top Down and Bottom up Parsing Algorithms, Top-Down Parsing, Bottom-Up Parsing, Operator-Precedence Parsing, LR Parsers, Using Ambiguous Grammars, Parser Generators, Automatic Generation of Parsers. Syntax-Directed Definitions, Construction of Syntax Trees, Bottom-Up Evaluation of S-Attributed Definitions, L-Attributed Definitions, syntax directed definitions and translation schemes	K3	13
IV	Error Recovery Error Detection & Recovery, Ad-Hoc and Systematic Methods. Intermediate Code Generation Different Intermediate Forms, Syntax Directed Translation Mechanisms And Attributed Mechanisms And Attributed Definition	K4	12
V	Code Generation Issues in the Design of a Code Generator, The Target Machine, Run-Time Storage Management, Basic Blocks and Flow Graphs, Next-Use Information, A Simple Code Generator, Register Allocation and Assignment, The DAG Representation of Basic Blocks, Peephole Optimization, Generating Code from DAGs, Dynamic Programming Code-Generation Algorithm, CodeGenerator Generators.	K4	11
Course Outcome	**CO1: To define the basic concepts and application of Compiler Design.**	**K1**	
	CO2:To discuss about the basic knowledge about Lexical Analyser,Intermediate Code Generation, Parser (Top Down and Bottom Up Design) and will able to understand strength of Grammar and Programming Language.	**K2**	
	CO3:To perform the various Code optimization techniques and error recovery mechanisms.	**K3**	
	CO4:To analyze error recovery and Intermediate Code Generation.	**K4**	
	CO5:To develop the design of code Generating.	**K4**	
Learning Resources			
Text Books	1. Compilers: Principles, Techniques and Tools By Aho, Lam, Sethi, and Ullman, Second Edition, Pearson, 2014		
Reference Books	1. Compilers: Principles, Techniques and Tools By Aho, Sethi, and Ullman, Addison-Wesley, 1986 2. Compiler Design in C By Allen I. Holub, Prentice-Hall/Pearson. 3. Advanced Compiler Design and Implementation By Muchnick, Morgan and Kaufmann, 1998.		
Website Link			

L-Lecture T-Tutorial P-Practical C-Credit

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M5UCAS01	CAMPUS TO CORPORATE TRANSMISSION	SEC THEORY- I	V	3	3	-	-	2

Objective	**To ensure the students to possesses the necessary skills and enable the person to cope up with the corporate culture and ethics.**

Unit	Course Content	Knowledge Levels	Sessions
I	Information Technology service: Introduction to BPS-History of BPS-Benefits-Case Study Introduction to BPM: History-Benefits-Case Study-Different between campus & Corporate.	K1	7
II	Corporate Etiquette: Need of Corporate Etiquette- Attitude -Golden Rules-Workplace-with colleagues-with subordinates-Importance of Etiquette. Professional Skill: Handshakes- Presenting the Business card- Corporate Dressing-Corporate Dress Code-Personal Hygiene- Office Jargons –Evaluations.	K2	5
III	Self Introduction - Soft Skills - Interpersonal Skills – Employability Skills – Soft Skills Training–Resume Preparation – Interview Tips and Questions Group Discussion – Importance – Types of GD – GD Skills – GD Etiquette – Essential Elements of a GD– Movements and Gestures to be avoided in a GD	K3	5
IV	Computer Operational Skill: MS-Word: Formatting-Graphics & Printing-Editing Word-Preparing document-Ms –Excel: Entering Data and formula-Formula Bar-Formatting Data and Formula-Filtering data-Chart Preparation. Ms - PowerPoint: Creating Presentation with Template- Creating PowerPoint Your Own design-Apply animation effects .Keyboard Skill-Principles-Efficiency-Basic Understanding of the direction of Fingers	K4	7
V	Communication Skills: Elementary Level: Grammar-Pronunciation. One on one basic Conversation Skill Practice: Intermediate Level English Communication: Reading, Listening Comprehension-Improving Vocabulary: Improving Writing Skills. Advanced Level English Communication: Recitation of Short Stories-Interview Skills-Group Discussion-Social Conversation Skills-Presentation Skills.	K4	6
Course Outcome	**CO1: To identify the students communication (Spoken, Written, and Presentation Skills)**	**K1**	
	CO2:To summarize the students confidence, develop self-esteem, and bring positive changes in the attitude and behavior of the participants.	**K2**	
	CO3:To determine the career-specific practical inputs along with sharing the expectations of the corporate.	**K3**	
	CO4: To analyze the inputs into writing their resumes to face interviews and learning corporate etiquette.	**K4**	
	CO5:To justify the personal development issues through detailed interaction and question answers sessions.	**K4**	

Learning Resources	
Text Books	From Campus to Corporate- K.K.Ramachandran,K.K.Karthick-PEARSON
Reference Books	Campus to Corporate -A Carrer Navigation Manual for Students,New Employees,Mentors & Managers-Dilip Mohapatra & Swati Karve
Website Link	https://www.learnvern.com/soft-skills-training/campus-to-corporate

L-Lecture T-Tutorial P-Practical C-Credit

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M1UCAC01	PROBLEM SOLVING THROUGH C	DSC THEORY - I	I	6	5	1	-	4

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	L	L	S	S	S
CO2	M	S	S	S	S	S	M	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	M	S	S	S	M	S	S	S
CO5	M	S	M	L	L	S	S	S	S	S
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	Home Test, E-Assignment
Teaching and Learning Methods	Presentation, Chalk & Talk
Assesment Methods	Assignment, Test, Quiz

Designed By	Verified By	Approved By

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M2UCAC02	Object Oriented Programming with C++	DSC THEORY - II	II	4	4	-	-	4

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	L	L	M	S	S
CO2	M	S	S	S	S	S	M	S	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	M	S	S	S	M	S	S	S
CO5	M	S	M	L	L	S	M	S	S	S
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	Home Test, E-Assignment
Teaching and Learning Methods	Presentation, Chalk & Talk
Assesment Methods	Assignment, Test, Quiz

Designed By	Verified By	Approved By

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M2UCAC03	Computer Organization And Architecture	DSC THEORY - III	II	4	4	-	-	4

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	L	M	M	S	S
CO2	M	S	S	S	S	S	M	S	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	M	S	S	S	M	S	S	S
CO5	M	S	M	L	L	S	M	M	S	S
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	Home Test, E-Assignment
Teaching and Learning Methods	Presentation, Chalk & Talk
Assesment Methods	Assignment, Test, Quiz

Designed By	Verified By	Approved By

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	L	T	P	C
21M3UCAC04	Relational Database Management Systems	DSC THEORY - IV	III	5	5	-	-	4

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	L	L	S	S	S
CO2	M	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	M	S	S	S	S
CO4	S	S	M	S	S	S	S	M	S	S
CO5	M	S	M	L	L	S	S	S	S	S
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	Home Test, E-Assignment
Teaching and Learning Methods	Presentation, Chalk & Talk
Assesment Methods	Assignment, Test, Quiz

Designed By	Verified By	Approved By

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M3UCAC05	Operating System	DSC THEORY - V	III	5	5	-	-	4

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	M	S	S	S	S
CO2	M	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	M	S	S	M	S	S	S	S
CO5	M	S	M	L	L	S	S	S	S	S
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	Home Test, E-Assignment
Teaching and Learning Methods	Presentation, Chalk & Talk
Assesment Methods	Assignment, Test, Quiz

Designed By	Verified By	Approved By

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M3UCAC06	Data Structures & Algorithms	DSC THEORY - VI	III	5	5	-	-	4

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	L	S	S	S	S
CO2	M	S	S	S	S	M	S	S	S	S
CO3	S	S	S	S	S	S	M	S	S	S
CO4	S	S	M	S	S	S	S	M	S	S
CO5	M	S	M	L	L	S	S	S	S	S
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	Home Test, E-Assignment
Teaching and Learning Methods	Presentation, Chalk & Talk
Assesment Methods	Assignment, Test, Quiz

Designed By	Verified By	Approved By

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M4UCAC07	Visual Programming	DSC THEORY - VII	IV	5	5	-	-	4

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	M	M	S	S	S
CO2	M	S	S	S	S	M	S	S	S	S
CO3	S	S	S	S	S	S	M	S	S	S
CO4	S	S	M	S	S	S	S	M	S	S
CO5	M	S	M	L	L	M	S	S	S	S
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	Home Test, E-Assignment
Teaching and Learning Methods	Presentation, Chalk & Talk
Assesment Methods	Assignment, Test, Quiz

Designed By	Verified By	Approved By

MAHENDRA COLLEGE OF ARTS & SCIENCE
RASIPURAM
637 408
Tamil Nadu

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M4UCAC08	Machine Learning	DSC THEORY - VIII	IV	5	5	-	-	4

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	M	M	S	S	S
CO2	M	S	S	S	S	M	S	S	S	S
CO3	S	L	S	S	M	S	M	S	S	S
CO4	S	M	M	S	S	S	S	M	S	S
CO5	M	S	M	L	L	M	S	S	S	S
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	Home Test, E-Assignment
Teaching and Learning Methods	Presentation, Chalk & Talk
Assesment Methods	Assignment, Test, Quiz

Designed By	Verified By	Approved By

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M4UCAC09	Computer Networks	DSC THEORY - IX	IV	5	5	-	-	4

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	L	M	S	S	S
CO2	M	S	S	S	S	M	S	S	S	S
CO3	S	S	S	S	S	M	M	S	S	S
CO4	S	S	M	S	S	S	S	M	S	S
CO5	M	S	M	L	L	M	S	S	S	S
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	Home Test, E-Assignment
Teaching and Learning Methods	Presentation, Chalk & Talk
Assesment Methods	Assignment, Test, Quiz

Designed By	Verified By	Approved By

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M5UCAC10	Java Programming	DSC THEORY - X	V	5	5	-	-	4

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	L	L	S	S	S
CO2	M	S	S	S	S	M	S	S	S	S
CO3	S	S	S	S	S	M	S	S	S	S
CO4	S	S	M	S	S	S	S	M	S	S
CO5	M	S	M	L	L	M	S	S	S	S
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	Home Test, E-Assignment
Teaching and Learning Methods	Presentation, Chalk & Talk
Assesment Methods	Assignment, Test, Quiz

Designed By	Verified By	Approved By

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M6UCAC11	Open Source Computing	DSC THEORY - XI	V	4	4	-	-	3

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	L	M	S	S	S
CO2	M	S	S	S	S	M	S	S	S	S
CO3	S	S	S	S	S	L	M	M	S	S
CO4	S	S	M	S	S	S	S	M	S	S
CO5	M	S	M	L	L	M	S	S	S	S
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	Home Test, E-Assignment
Teaching and Learning Methods	Presentation, Chalk & Talk
Assesment Methods	Assignment, Test, Quiz

Designed By	Verified By	Approved By

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M5UCAS01	CAMPUS TO CORPORATE TRANSMISSION	SEC THEORY-I	V	3	3	-	-	2

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	L	M	S	S	S
CO2	M	S	S	S	S	M	M	S	S	S
CO3	S	S	S	S	S	M	S	S	S	S
CO4	S	S	M	S	S	M	S	S	S	S
CO5	M	S	M	L	L	M	S	S	S	S
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	Home Test, E-Assignment
Teaching and Learning Methods	Presentation, Chalk & Talk
Assesment Methods	Assignment, Test, Quiz

Designed By	Verified By	Approved By

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M6UCAC12	ARTIFICIAL INTELLIGENCE USING DEEP LEARNING	DSC THEORY - XII	VI	5	5	-	-	4

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	L	L	S	S	S
CO2	M	S	S	S	S	M	M	S	S	S
CO3	S	S	S	S	S	L	M	M	S	S
CO4	S	S	M	S	S	S	S	M	S	S
CO5	M	S	M	L	L	M	S	S	S	S
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	Home Test, E-Assignment
Teaching and Learning Methods	Presentation, Chalk & Talk
Assesment Methods	Assignment, Test, Quiz

Designed By	Verified By	Approved By

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M6UCAC13	Cyber Security	DSC THEORY - XIII	VI	5	5	-	-	4

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	L	M	S	S	S
CO2	M	S	S	S	S	M	S	S	S	S
CO3	S	S	S	S	S	L	M	S	S	S
CO4	S	S	M	S	S	M	S	S	S	S
CO5	M	S	M	L	L	M	S	S	S	S
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	Home Test, E-Assignment
Teaching and Learning Methods	Presentation, Chalk & Talk
Assesment Methods	Assignment, Test, Quiz

Designed By	Verified By	Approved By

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M5UCAE01	Software Engineering	DSE-I	V	5	5	-	-	4

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	L	L	S	S	S
CO2	M	S	S	S	S	M	S	S	S	S
CO3	S	S	S	S	S	L	M	S	S	S
CO4	S	S	M	S	S	M	M	S	S	S
CO5	M	S	M	L	L	M	S	S	S	S
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	Home Test, E-Assignment
Teaching and Learning Methods	Presentation, Chalk & Talk
Assesment Methods	Assignment, Test, Quiz

Designed By	Verified By	Approved By

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M5UCAE02	Web Technologies	DSE-II	V	5	5	-	-	4

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	L	M	S	S	S
CO2	M	S	S	S	S	L	S	S	S	S
CO3	S	S	S	S	S	L	M	M	S	S
CO4	S	S	M	S	S	M	S	S	S	S
CO5	M	S	M	L	L	M	S	S	S	S
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	Home Test, E-Assignment
Teaching and Learning Methods	Presentation, Chalk & Talk
Assesment Methods	Assignment, Test, Quiz

Designed By	Verified By	Approved By

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards							
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M5UCAE03	Big Data Analytics	DSE-III	V	5	5	-	-	4

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	L	M	S	S	S
CO2	M	S	S	S	S	M	S	S	S	S
CO3	S	S	S	S	S	L	M	S	S	S
CO4	S	S	M	S	S	M	M	S	S	S
CO5	M	S	M	L	L	M	S	S	S	S
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	Home Test, E-Assignment
Teaching and Learning Methods	Presentation, Chalk & Talk
Assesment Methods	Assignment, Test, Quiz

Designed By	Verified By	Approved By

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M5UCAE04	Mobile Computing	DSE-IV	V	5	5	-	-	4

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	M	S	S	S	S
CO2	M	S	S	S	S	M	S	S	S	S
CO3	S	S	S	S	S	L	M	S	S	S
CO4	S	S	M	S	S	M	S	S	S	S
CO5	M	S	M	L	L	M	S	S	S	S
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	Home Test, E-Assignment
Teaching and Learning Methods	Presentation, Chalk & Talk
Assesment Methods	Assignment, Test, Quiz

Designed By	Verified By	Approved By

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M5UCAE05	Computer Graphics	DSE-V	V	5	5	-	-	4

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	M	M	S	S	S
CO2	M	S	S	S	S	M	S	S	S	S
CO3	S	S	S	S	S	L	M	S	S	S
CO4	S	S	M	S	S	L	S	S	S	S
CO5	M	S	M	L	L	M	M	S	S	S
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	Home Test, E-Assignment
Teaching and Learning Methods	Presentation, Chalk & Talk
Assesment Methods	Assignment, Test, Quiz

Designed By	Verified By	Approved By

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M5UCAE06	Ethical Hacking	DSE-VI	V	5	5	-	-	4

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	L	M	S	S	S
CO2	M	S	S	S	S	M	M	S	S	S
CO3	S	S	S	S	S	L	M	M	S	S
CO4	S	S	M	S	S	M	S	S	S	S
CO5	M	S	M	L	L	M	M	S	S	S
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	Home Test, E-Assignment
Teaching and Learning Methods	Presentation, Chalk & Talk
Assesment Methods	Assignment, Test, Quiz

Designed By	Verified By	Approved By

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M6UCAE07	Data Science	DSE-VII	VI	5	5	-	-	4

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	M	M	S	S	S
CO2	M	S	S	S	S	L	M	S	S	S
CO3	S	S	S	S	S	L	M	S	S	S
CO4	S	S	M	S	S	M	S	S	S	S
CO5	M	S	M	L	L	L	M	S	S	S
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	Home Test, E-Assignment
Teaching and Learning Methods	Presentation, Chalk & Talk
Assesment Methods	Assignment, Test, Quiz

Designed By	Verified By	Approved By

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards							
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M6UCAE08	Internet of Things	DSE-VIII	VI	5	5	-	-	4

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	M	M	S	S	S
CO2	M	S	S	S	S	M	M	S	S	S
CO3	S	S	S	S	S	L	M	M	S	S
CO4	S	S	M	S	S	M	S	S	S	S
CO5	M	S	M	L	L	M	M	S	S	S
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	Home Test, E-Assignment
Teaching and Learning Methods	Presentation, Chalk & Talk
Assesment Methods	Assignment, Test, Quiz

Designed By	Verified By	Approved By

MADURAI KAMARAJ UNIVERSITY COLLEGE OF ARTS & SCIENCE
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637 408
Tamil Nadu

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M6UCAE09	Cloud Computing	DSE-IX	VI	5	5	-	-	4

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	M	M	S	S	S
CO2	M	S	S	S	S	M	M	S	S	S
CO3	S	S	S	S	S	M	S	S	S	S
CO4	S	S	M	S	S	S	S	S	S	S
CO5	M	S	M	L	L	S	S	S	S	S
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	Home Test, E-Assignment
Teaching and Learning Methods	Presentation, Chalk & Talk
Assesment Methods	Assignment, Test, Quiz

Designed By	Verified By	Approved By

MADURAI KAMARAJ COLLEGE OF ARTS & SCIENCE
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637 408
Tamil Nadu

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M6UCAE10	Data Mining & Warehousing	DSE-X	VI	5	5	-	-	4

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	L	M	S	S	S
CO2	M	S	S	S	S	M	M	S	S	S
CO3	S	S	S	S	S	M	S	S	S	S
CO4	S	S	M	S	S	M	S	S	S	S
CO5	M	S	M	L	L	S	S	S	S	S
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	Home Test, E-Assignment
Teaching and Learning Methods	Presentation, Chalk & Talk
Assesment Methods	Assignment, Test, Quiz

Designed By	Verified By	Approved By

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M6UCAE11	Neural Networks	DSE-XI	VI	5	5	-	-	4

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	L	M	M	S	S
CO2	M	S	S	S	S	M	M	S	S	S
CO3	S	S	S	S	S	M	S	S	S	S
CO4	S	S	M	S	S	M	S	S	S	S
CO5	M	S	M	L	L	S	S	S	S	S
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	Home Test, E-Assignment
Teaching and Learning Methods	Presentation, Chalk & Talk
Assesment Methods	Assignment, Test, Quiz

Designed By	Verified By	Approved By
Mrs.N.Padmavathi Mr.K.Vijayakumar	Dr.V.Vijayadeepa	

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M6UCAE12	COMPILER DESIGN	DSE-XII	VI	5	5	-	-	4

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	L	M	S	S	S
CO2	M	S	S	S	S	M	S	S	S	S
CO3	S	S	S	S	S	M	S	S	S	S
CO4	S	S	M	S	S	L	M	S	S	S
CO5	M	S	M	L	L	M	S	S	S	S
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	Home Test, E-Assignment
Teaching and Learning Methods	Presentation, Chalk & Talk
Assesment Methods	Assignment, Test, Quiz

Designed By	Verified By	Approved By

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M1UCAP01	PROGRAMMING IN C	DSC PRACTICAL - I	I	4	-	-	4	2
Objective	**To Understand the concept of a programs and variables how a variable is declared and how it can be change and Understand the concept of a looping statements.**							
S.No.	**List of Expriments / Programmes**						**Knowledge Levels**	**Sessions**
1	Develop a C program to print prime numbers within the range of integers given.						K1	5
2	Develop a C Program to find the sum and average of given N numbers.						K1	4
3	Develop a C Program using all decision making and looping statements.						K2	4
4	Develop a C Program to arrange the given numbers in ascending /descending order.						K2	4
5	Develop a C Program to perform matrix multiplication.						K2	4
6	Develop a C Program to manipulate string functions.						K3-K4	4
7	Develop a C Program to find the Fibonacci series for a give number using recursive function.						K3-K4	4
8	Develop a C Program to show Call by Value and Call by Reference.						K3-K4	4
9	Develop a C program to swap two numbers using pointers.						K3-K4	4
10	Develop a C Program to update the student's details using various file modes.						K4	4
11	Develop a C Program to copy the content of one file to another file .						K4	4
Course Outcome	**CO1: To Recall the syntax rules for numerical constants and variables, data types.**						**K1**	
	CO2: To Exaplain the Usage of Arithmetic operator, Conditional operator, logical operator and relational operators and other C constructs.						**K2**	
	CO3:To Solve the C programs using decision making, branching, looping constructs.						**K3**	
	CO4: To Analyze the code reusability with functions and pointers.						**K4**	
	CO5: To Contruct the File Concepts using C.						**K4**	
Learning Resources								
Text Books	1. Problem solving and program design in C / Jeri R. Hanly, Elliot B. Koffman. —7th ed.,PEARSON 2. E. Balagurusamy, Programming in ANSI C, fifth edition, Tata McGrawHill.							
Reference Books	1. V. Rajaraman Computer Programming in C Prentice Hall of India Pvt Ltd, 1st Edition,2004 2. 2 Yashwvant Kanetkar Let us C BPB Publications 13th Edition, 2014							
Website Link	1) https://wptripura.nic.in/C%20Programming%20Lab.pdf 2) https://www.guru99.com/c-programming-tutorial.html							

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M2UCAP02	PROGRAMMING IN C++	DSC PRACTICAL - II	II	3	-	-	3	2
Objective	**To develop the C++ programming concepts using Classes & objects**							
S.No.	**List of Expriments / Programmes**						**Knowledge Levels**	**Sessions**
1	Write a C++ program to create a class ARITHMETIC which consists of a FLOAT and an INTEGER variable. Write member functions ADD(),SUB(), MUL(), DIV() to perform addition, subtraction, multiplication, division respectively. Write a member function to get and display values.						K1	3
2	Write a C++ program to create a class FLOAT that contains one float data member. Overload all the four Arithmetic operators so that they operate on the object FLOAT.						K1	3
3	Write a C++ program to create a class STRING. Write a Member Function to initialize, get and display stings. Overload the operators ++ and == to concatenate two Strings and to compare two strings respectively.						K2	3
4	Write a C++ program to create class, which consists of EMPLOYEE Detail like E_Number, E_Name, Department, Basic, Salary, Grade. Write a member function to get and display them. Derive a class PAY from the above class and write a member function to calculate DA, HRA and PF depending on the grade.						K2	3
5	Write a C++ program to create a class SHAPE which consists of two VIRTUAL FUNCTIONS Calculate_Area() and Calculate_Perimeter() to calculate area and perimeter of various figures. Derive three classes SQUARE, RECTANGLE, TRIANGE from class Shape and Calculate Area and Perimeter of each class separately and display the result.						K2	3
6	Write a C++ program using Function Overloading to read two Matrices of different Data Types such as integers and floating point numbers. Find out the sum of the above two matrices separately and display the sum of these arrays individually.						K3-K4	3
7	Write a program to convert an Infix Expression to Postfix Expression using Arrays.						K3-K4	3
8	Write a C++ program to create a class to implement the data structure STACK. Write a constructor to initialize the TOP of the STACK. Write a member function PUSH() to insert an element and member function POP() to delete an element. Check for overflow and underflow conditions.						K3-K4	3
9	Write a C++ program to check whether the given string is a palindrome or not using Pointers.						K3-K4	3
10	Write a C++ program to merge two files into a single file.						K4	3
Course Outcome	**CO1: To Define the given problem statements to create basic program designs.**						**K1**	
	CO2: To Explain the different functions for input and output, various data types, basic operators, files and functions.						**K2**	
	CO3:To Demonstrate basic object oriented and structured programming concepts.						**K3**	
	CO4: To Illustrate the Concepts of Pointers in C++.						**K4**	
	CO5: To Evaluate the concepts of Files in C++.						**K4**	
Learning Resources								
Text Books	E. Balagurusamy, —Object-Oriented Programming with C++", TMH 2013, 7 th Edition							
Reference Books	1. Ashok N Kamthane, —Object-Oriented Programming with ANSI and Turbo C++", Pearson Education 2003. 2. Maria Litvin & Gray Litvin, —C++ for youll, Vikas publication 2002.							
Website Link	NPTEL & MOOC courses titled Object oriented programming concepts using C++ 1.https://nptel.ac.in/courses/106/105/106105151/ 2. .http://www.learn-cpp.org/							

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M3UCAP03	RDBMS	DSC PRACTICAL - III	III	4	-	-	4	2
Objective	**To Learn data manipulation statements (DML) to update data in the Oracle Database Design in PL/SQL and describe the features and syntax of PL/SQL and Handle the runtime errors.**							

S.No.	**List of Expriments / Programmes**	**Knowledge Levels**	**Sessions**
1	Data Definition of Base Tables	K1	6
2	DDL with Primary key constraints.	K1	5
3	DDL with constraints and verification by insert command.	K2	6
4	Data Manipulation of Base Tables and Views.	K2	4
5	Demonstrate the Query commands.	K2	6
6	Write a PL/SQL code block that will accept an account number from the user and debit an amount of Rs. 2000 from the account if the account has a minimum balance of 500 after the amount is debited. The Process is to fired on the Accounts table.	K3	4
7	Write a PL/SQL code block to calculate the area of the circle for a value of radius varying from 3 to 7. Store the radius and the corresponding values of calculated area in a table Areas. Areas – radius, area.	K3	6
8	Write a PL/SQL block of code for reversing a number. (Example: 1234 as 4321).	K3	4
9	Create a transparent audit system for a table Client master (client no, name, address, Bal_due). The system must keep track of the records that are being deleted or updated. The functionality being when a record is deleted or modified the original record details and the date of operation are stored in the audit client (client no, name, bal_due, operation, user-id, opdate) table, then the delete or update is allowed to go through.	K4	4
Course Outcome	**CO1: Knowledge about database concepts data modelling and normalization**	**K1**	
	CO2: Overview of oracle 9i and oracle SQL *plus	**K2**	
	CO3: Understand PL/SQL, data types, operators and control statements	**K3**	
	CO4: Understand database management and retrieval	**K4**	
	CO5: Students are able to create tables and make modifications	**K4**	

Learning Resources	
Text Books	Alexis Leon & Mathews Leon, “Essential of DBMS”, Vijay Nicole Publications, 2 nd Reprint, 2009.
Reference Books	Rdbms Relational Database Management System: A User Guide Paperback – Import, 3 October 2017- Gerard Blokdyk
Website Link	1. https://www.youtube.com/watch?v=CAanqvvDsTw 2. Oracle

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M3UCASP1	OFFICE AUTOMATION	SEC PRACTICAL -I	III	3	-	-	3	2
Objective	**To Understand Microsoft Office Applications and the students can be Able to do office and document work smoothly with the help of computers.**							

S.No.	List of Expriments / Programmes	Knowledge Levels	Sessions
1	a)Starting MS_WORD, Creating, Saving, Printing (With Options), Closing and Exiting. b)Study of Word – Menu / Toolbars	K1	3
2	a)Create a document, save it and edit the document as follows: i) Cut, Copy, Paste options. ii) Find and Replace options. iii) Undo and Redo options. b)Format the document: i) Using Bold, Underline and Italic. ii) Change Character style and size. iii) Formatting paragraph: Center, Left aligns & Right align. iv) Changing paragraph and line spacing, Using Bullets and Numbering in Paragraphs. v) Creating Hanging Paragraphs.	K1	3
3	Using tab settings enhancing the documents (Header, Footer, Page Setup, Border, Page number, watermarking, Orientation and Print Preview).	K2	3
4	Insert tables and pictures in a document as follows i) Creating Tables in a document, Selecting Rows & Column sort the record ii) Insert a picture – edit size and add name of the picture above it. iii) Also do basic text formatting like – bold, italic, underline, alignments etc in table.	K2	3
5	MS-EXCEL a) Create a worksheet, moving/ copying/ inserting/ deleting rows and columns (usage of cut, paste, commands, copying a single cell, copying a range of data, filling up a cell. Undo command, inserting a row, column, deleting rows and columns). b) Formatting worksheets i) Bold style, ii) Italic style, iii) Font size changing, iv) Formatting numbers Auto fill, date format, Currency format	K2	3
6	Open an excel and create fields as follows S. No¤ Name of the student¤ M1¤ M2¤ M3¤ M4¤ M5 TOTAL¤ AVG¤ RESULT¤ GRADE i) Enter S. No, Name, marks for 10 students ii) Find total and average using formula. iii) Find Result whether the student is pass or fail and also assign grade as per our college norms iv) Insert a column chart showing the comparison of marks in different subjects of different students	K3	3
7	Creating charts i) Using Chart wizard ii) Changing Chart type (Pie, Bar, Line) iii) Inserting titles for the axes X, Y iv) Changing Colors v) Printing Charts	K3-K4	3
8	MS-POWERPOINT 8. i) Creating a presentation using auto content wizard ii) Different views in PowerPoint presentation iii) Printing a presentation / Importing- Exporting files iv) Creating Organization chart in PowerPoint	K4	3
9	MS-ACCESS: Prepare a payroll for employee database of an organization with the following details: Employee ID, Employee Name, Date of Birth, Department and Designation, Date Of Appointment, Basic Pay, Dearness Allowance and other deductions if any. Perform queries for different categories	K4	3
10	a) Create a forms for the Student database b) Create a report for the employee database	K4	3

Course Outcome	**CO1: Students can Create a Word document with customized template.**	**K1**	
	CO2: Student know how Word document with integrated Excel chart.	**K2**	
	CO3: Create slide presentations that include text, graphics, animation, and transitions.	**K3**	
	CO4: Identify the names and functions of the PowerPoint interface.	**K4**	
	CO5: Student can Store data in the form of tables and edit or customise them later as per the requirement of the user	**K4**	
Learning Resources			
Text Books	MS Office 2000 for Everyone, 1/e-Sanjay Saxena,Vikas Publishing		
Reference Books	Mastering MS Office [Print Replica] Kindle Edition by Bittu Kumar (Author) Format: Kindle Edition		
Website Link	Best FREE Microsoft Courses with Certification Online (2022) (guru99.com)		

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M4UCAP04	VISUAL PROGRAMMING	DSC PRACTICAL - IV	IV	4	-	-	4	2
Objective	**The Students will upgrade their knowledge in the field of Visual Programming.**							
S.No.	**List of Expriments / Programmes**						**Knowledge Levels**	**Sessions**
1	Construction of an Arithmetic Calculator (Simple).						K1	5
2	Writing simple programs using loops and decision making statements. a. Generate Fibonacci series. b. Find the sum of N numbers. c. To display the numbers/symbols in triangle format.						K1	5
3	Write a program to create a menu and MDI Forms.						K2	4
4	Write a program to create a simple input screen with four basic controls to read input and write it to a file.						K2	4
5	Write a program to display files in a directory using DriveListBox, DirListBox and FileListBox control and open, edit and save text file using Rich text box control.						K2	5
6	Write a program to illustrate Common Dialog Control and to open, edit and save text file						K3	4
7	Write a program to develop windows based installation file with Student Registration form and Login form using database access.						K3	5
8	Develop a program to Insert, update, delete a Record in database using ADO						K4	5
9	Write a program to implement Personal Information System using MDI and Standard ADODC controls and reports.						K4	4
10	Write a program to implement animation using timers.						K5	4
Course Outcome	**CO1: To Define the list the visual programming concepts.**						**K1**	
	CO2: To Summarize the Data Base Connectivity.						**K2**	
	CO3: To Illutrate the control structures in VB.						**K3**	
	CO4: To Categorize the Design using controls in VB.						**K4**	
	CO5: To Determine the Students prepare various projects by using visual programming.						**K5**	
Learning Resources								
Text Books	1. Gary Cornell, "Visual Basic 6 from the Ground up", McGraw-Hill Education,1998							
Reference Books	1. Mohammed Azam, "Programming with Visual Basic 6.0", 1st Edition, Vikas Publishing House Pvt.Ltd., Chennai, 2001. 2. Julia Case Bradley and Anita C.Millspaugh, "Programming in Visual Basic 6.0", Tata McGraw-HillEdition, 2011.							
Website Link	http://www.youtube.com/watch?v=W0hkymvJzfI https://www.geeksforgeeks.org/introduction-to-visual-programming-language/							

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M4UCASP2	HTML AND WEB DESIGN	SEC PRACTICAL - II	IV	3	-	-	3	2
Objective	**To Develop skills in analyzing the usability of a web site and Understand how to plan and conduct user research related to web usability with HTML and CSS.**							
S.No.	**List of Expriments / Programmes**						**Knowledge Levels**	**Sessions**
1	Design a page having suitable background color and text color with title “My First Web Page” using all the attributes of the Font tag.						K1	3
2	Create a HTML document giving details of your [Name, Age], [Address, Phone] and [Register Number, Class] aligned in proper order using alignment attributes of Paragraph tag						K1	3
3	Write HTML code to design a page containing some text in a paragraph by giving suitable heading style.						K2	3
4	Create a page to show different character formatting (B, I, U, SUB, SUP) tags.						K2	3
5	Create a web page with an appropriate image towards the left hand side of the page, when user clicks on the image another web page should open.						K2	3
6	Create web Pages using Anchor tag with its attributes for external links.						K3	3
7	Write a HTML code to create a web page with pink color background and display moving message in red color.						K4	3
8	Create a web page, showing an ordered list and unordered list of names of all the Arts Programme (Branches) in your institution.						K4	3
9	Create a HTML document containing a nested list showing a content page of any book.						K4	3
10	Create the following table in HTML with Dummy Data: Reg. Number Student Name Year/Semester Date of Admission						K5	3
Course Outcome	**CO1:To Recall the Basic tags of HTML programming language.**						**K1**	
	CO2: To Summarize the Html tags for Crating Design.						**K2**	
	CO3:To Determine the Attributes.						**K3**	
	CO4: To Categorize the Types of List in Html.						**K4**	
	CO5: To Determine the Various Attributes for Creating Tables.						**K5**	
Learning Resources								
Text Books	1.C Xavier, “World Wide Web with HTML”, Tata McGraw Hill Education, 2000. 2. H.M.Deital, P.J. Deital,“Internet and World Wide Web – How to Program”, 4th Edition “PHI Learning.							
Reference Books	1.Raj Kamal, “Internet and Web Technologies”, 7th Reprint, Tata McGraw Hill Education, 2007.							
Website Link	https://www.w3schools.com/html/html_basic.asp							

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M5UCAP05	PROGRAMMING IN JAVA	DSC PRACTICAL - V	V	4	-	-	4	2
Objective	**To acquire knowledge on creation of software components using JAVA and Learn the Concept of Exception Handling & Multithreads.**							

S.No.	**List of Expriments / Programmes**	**Knowledge Levels**	**Sessions**
1	Write a program to find the Area of Square, Rectangle and Circle using Method Overloading.	K1	5
2	Write a program to sort the given list of names.	K1	4
3	Write a program to multiply the given two matrices.	K2	4
4	Write a program to design a class to represent a bank account. Include the following: Data Members: Name of the depositor, Account number, Type of account, and Balance amount in the account.Methods: To assign initial values, To deposit an amount, To withdraw an amount after checking balance, and To display the name and balance.	K2	5
5	Write a program that import the user defined package and access the Member variable of classes that contained by Package.	K2	5
6	Write a program to handle the Exception using try and multiple catch blocks.	K3	4
7	Write a program to illustrate the use of multithreads.	K3	4
8	Write a program to create student registration form using applet with Name, Address, Sex, Class, Email-id.	K4	4
9	Write a program to draw the line, rectangle, oval, text using the graphics method.	K4	5
10	Write a program to create a sequential file that could store details about five products. Details include product code, cost, and number of items available and are provided through the keyboard. Compute and print the total value of all the five products.	K5	5
Course Outcome	**CO1: Gain the knowledge of Method overloading & Sorting Methods**		
	CO2: Design and implement Matrix Formation & Decision Making Statements		
	CO3: Gain the knowledge about Packages		
	CO4: Gain knowledge of Applets & Graphics Packages		
	CO5: Design and Develop various application by using Files		

Learning Resources	
Text Books	1. E. Balagurusamy, “Programming with Java,” 4th Edition, Tata McGraw Hill Pub. Ltd., New Delhi,2009.
Reference Books	1. Herbert Schild, "Java: The Complete Reference," Ninth Edition, Oracle Press, 2014 2. Rohit Khurana, "Programming with JAVA," VIKAS Pub., 2014
Website Link	https://www.guru99.com/java-tutorial.html

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M5UCAP06	PROGRAMMING IN PYTHON	DSC PRACTICAL - VI	V	4	-	-	4	2
Objective	**Python programming is intended for software engineers, system analysts, program managers and user support personnel who wish to learn the Python programming language.**							
S.No.	**List of Expriments / Programmes**						**Knowledge Levels**	**Sessions**
1	Write a Python program using format function to convert the temperature from Fahrenheit to Celsius						K1	5
2	Write a Python program using IF statement and ELSE-IF header to display the number of days in a month given by user						K1	4
3	Write a Python program using while loop, IF statement to count the coins entered by user, to sum up to a particular amount						K2	4
4	Write a Python program using FOR loop and tuple for a password encryption/Decryption program						K2	5
5	Write a Python program using functions for temperature conversion program						K2	5
6	Write a Python program using tuple assignment to complete GPA(Semester and Cumulative) for a given student						K3	4
7	Write a Python program using STACK module for determining whether a given string is a palindrome						K4	4
8	Write a Python program for writing and reading text titles						K4	4
9	Write a Python program using string methods to count the occurrences of a word in a text file						K4	5
10	Give a Python program to demonstrate inheritance						K5	5
Course Outcome	**CO1: Interpret the fundamental Python syntax and semantics and be fluent in the use of Python control flow statements.**						**K1**	
	CO2: Express proficiency in the handling of strings and functions.						**K2**	
	CO3: Determine the methods to create and manipulate Python programs by utilizing the data structures like lists, dictionaries, tuples and sets.						**K3**	
	CO4: Identify the commonly used operations involving file systems and regular expressions.						**K4**	
	CO5: Articulate the Object-Oriented Programming concepts such as encapsulation, inheritance and polymorphism as used in Python.						**K5**	
Learning Resources								
Text Books	1.Bill Lubanovic, "Introducing Python", O¨Reilly, First Edition-Second Release, 2014.							
Reference Books	1.Mark Lutz, "Learning Python", O¨Reilly, Fifth Edition, 2013. David M. Beazley,"Python Essential Reference", Developer˝s Library, Fourth Edition, 2009							
Website Link	https://www.w3schools.com/python/							

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M6UCAP07	ARTIFICIAL INTELLIGENCE	DSC PRACTICAL - VII	VI	4	-	-	4	2
Objective	**The goal is to acquire knowledge on intelligent systems and agents, formalization of knowledge, reasoning with and without uncertainty.**							

S.No.	List of Expriments / Programmes	Knowledge Levels	Sessions
1	Implementation of DFS for water jug problem using PYTHON	K1	5
2	Implementation of BFS for tic-tac-toe problem using PYTHON	K1	4
3	Implementation of TSP using heuristic approach using PYTHON	K2	5
4	Implementation of Simulated Annealing Algorithm using PYTHON	K2	5
5	Implementation of Hill-climbing to solve 8- Puzzle Problem	K2	4
6	Implementation of Towers of Hanoi Problem using PYTHON	K3	4
7	Implementation of A* Algorithm using PYTHON	K4	4
8	Implementation of Hill Climbing Algorithm using PYTHON	K4	4
9	Implementation Expert System with forward chaining using CLIPS	K4	4
10	Implementation Expert System with backward chaining using PYTHON	K5	6
Course Outcome	**CO1: To implement the DFS using Python**		
	CO2:To implement the TSP using Python		
	CO3: Understand the concept of Hanoi Problems		
	CO4: To Know the Concept of 8-puzzle.		
	CO5: To understand of Hill Climbing Algorithm using PYTHON		

Learning Resources	
Text Books	1.Stuart Russell and Peter Norvig Artificial Intelligence - A Modern Approach, Pearson Education India; 3rd edition, 2015. 2.Elaine Rich, Kevin Knight and Shiv Shankar B. Nair, Artificial Intelligence, 3rd edition, Tata McGraw Hill, 2019.
Reference Books	1.Elaine Rich And Kevin Knight, Artificial Intelligence , Tata Mc Grew Hill Publisher,2nd Edition. 2. Dan W.Pattlan Goodfellow, “Deep Learning”, MIT Press, 2017.
Website Link	https://www.simplilearn.com/tutorials/deep-learning-tutorial

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M6UCASP3	COREL DRAW	SEC PRACTICAL - III	VI	2	-	-	2	2
Objective	**To develop their creative thinking towards design & learn about how to use font and color effects in designing and CorelDraw creates the interest in designing AND learn about logo, letter head designs.**							

S.No.	**List of Expriments / Programmes**	**Knowledge Levels**	**Sessions**
1	Create a simple design using tools, import and exports objects in CorelDraw.	K1	2
2	Create a design using different fonts and color effects in CorelDraw.	K1	2
3	Draw a flower using pen/shape tools.	K2	2
4	Create a design to implement table structure using CorelDraw.	K2	1
5	Design a logo using CorelDraw	K2	1
6	Design a simple Business card	K3	2
7	Create a letter head for an organization using CorelDraw.	K4	2
8	Design wrapper for a book.	K4	1
9	Create an invitation design for an event.	K4	1
10	Designing a flex for an event, export that flex into jpg and pdf format.	K5	1
Course Outcome	**CO1: Ability to understand basic concept of designing**	**K1**	
	CO2:To analyze the requirement of designing	**K2**	
	CO3: To know about the creation of logo, letter head, Business card, invitations.	**K3**	
	CO4: To know about the various export options.	**K4**	
	CO5: To create a new features in designing field.	**K5**	

Learning Resources	
Text Books	Corel Draw Training Guide by Prof. Satish Jain, BPB Publications
Reference Books	CorelDRAW! 5: The Professional Reference,Deborah Miller,New Riders Pub., 1994
Website Link	https://www.javatpoint.com/coreldraw-basics

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M1UCAP01	PROGRAMMING IN C	DSC PRACTICAL - I	I	4	-	-	4	2

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	L	M	S	S	S
CO2	M	S	S	S	S	S	M	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	M	S	S	S	M	S	S	S
CO5	M	S	M	L	L	S	S	S	S	S
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	E-Assignment
Teaching and Learning Methods	Presentation, Chalk & Talk
Assesment Methods	Model Practical - I Model Practical - II

Designed By	Verified By	Approved By

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M2UCAP02	PROGRAMMING IN C++	DSC PRACTICAL - II	II	3	-	-	3	2

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	L	M	S	S	S
CO2	M	S	S	S	S	S	M	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	M	S	S	S	M	S	S	S
CO5	M	S	M	L	L	S	S	S	S	S
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	E-Assignment
Teaching and Learning Methods	Presentation, Chalk & Talk
Assesment Methods	Model Practical - I Model Practical - II

Designed By	Verified By	Approved By

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M3UCAP03	RDBMS	Core Practical - III	III	4	-	-	4	2

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	M	M	S	S	S
CO2	M	S	S	S	S	M	M	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	M	S	S	S	M	S	S	S
CO5	M	S	M	L	L	M	S	S	S	S
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	E-Assignment
Teaching and Learning Methods	Presentation, Chalk & Talk
Assesment Methods	Model Practical - I Model Practical - II

Designed By	Verified By	Approved By

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M3UCASP1	OFFICE AUTOMATION	SEC PRACTICAL -I	III	3	-	-	3	2

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	M	S	S	S	S
CO2	M	S	S	S	S	M	S	S	S	S
CO3	S	S	S	S	S	S	M	S	S	S
CO4	S	S	M	S	S	S	M	S	S	S
CO5	M	S	M	L	L	M	S	S	S	S
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	E-Assignment
Teaching and Learning Methods	Presentation, Chalk & Talk
Assesment Methods	Model Practical - I Model Practical - II

Designed By	Verified By	Approved By

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M4UCAP04	VISUAL PROGRAMMING	DSC PRACTICAL - IV	IV	4	-	-	4	2

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	M	M	S	S	S
CO2	M	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	M	M	S	S
CO4	S	S	M	S	S	M	M	S	S	S
CO5	M	S	M	L	L	M	S	S	S	S
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	E-Assignment
Teaching and Learning Methods	Presentation, Chalk & Talk
Assesment Methods	Model Practical - I Model Practical - II

Designed By	Verified By	Approved By

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M4UCASP2	HTML AND WEB DESIGN	SEC PRACTICAL- II	IV	3	-	-	3	2

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	L	M	S	S	S
CO2	M	S	S	S	S	M	S	S	S	S
CO3	S	S	S	S	S	S	M	M	S	S
CO4	S	S	M	S	S	M	S	S	S	S
CO5	M	S	M	L	L	M	M	S	S	S
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	E-Assignment
Teaching and Learning Methods	Presentation, Chalk & Talk
Assesment Methods	Model Practical - I Model Practical - II

Designed By	Verified By	Approved By

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M5UCAP05	PROGRAMMING IN JAVA	DSC PRACTICAL - V	V	4	-	-	4	2

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	M	M	S	S	S
CO2	M	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	M	S	S	M	S	S	S	S
CO5	M	S	M	L	L	M	S	S	S	S
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	E-Assignment
Teaching and Learning Methods	Presentation, Chalk & Talk
Assesment Methods	Model Practical - I Model Practical - II

Designed By	Verified By	Approved By

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M5UCAP06	PROGRAMMING IN PYTHON	DSC PRACTICAL - VI	V	4	-	-	4	2

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	L	M	S	S	S
CO2	M	S	S	S	S	L	S	S	S	S
CO3	S	L	S	S	M	S	S	M	S	S
CO4	S	M	M	S	S	M	S	S	S	S
CO5	M	S	M	L	L	M	S	S	S	S
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	E-Assignment
Teaching and Learning Methods	Presentation, Chalk & Talk
Assesment Methods	Model Practical - I Model Practical - II

Designed By	Verified By	Approved By

BCA Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M6UCAP07	ARTIFICIAL INTELLIGENCE	DSC PRACTICAL - VII	VI	4	-	-	4	2

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	M	M	S	S	S
CO2	M	S	S	S	S	M	S	S	S	S
CO3	S	S	S	S	S	S	M	M	S	S
CO4	S	S	M	S	S	S	S	S	S	S
CO5	M	S	M	L	L	M	M	S	S	S
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	E-Assignment
Teaching and Learning Methods	Presentation, Chalk & Talk
Assesment Methods	Model Practical - I Model Practical - II

Designed By	Verified By	Approved By