DEPARTMENT OF COMPUTER SCIENCE

COURSE STRUCTURE & SYLLABI
(For the students admitted from year 2023-2024 onwards)

Programme: Computer Applications (BCA)

Since 1951

JAMAL MOHAMED COLLEGE (AUTONOMOUS)
Accredited with A++ Grade by NAAC (4th Cycle) with CGPA 3.69 out of 4.0
(Affiliated to Bharathidasan University)
TIRUCHIRAPPALLI – 620 020

B.C.A

Sem	Course Code	Part	Course Category	Course Title	Ins. Hrs/ Week	Credit	CIA	ESE	Total
I	23U1LT1/LA1/LF1/ LH1/LU1	I	Language - I		6	3	25	75	100
	23UCN1LE1	II	English - I	English for Communication - I	6	3	25	75	100
	23UCA1CC1	III	Core - I	Programming in C	5	5	25	75	100
	23UCA1CC2P		Core - II	Programming in C Lab - Practical	3	3	20	80	100
	23UCA1AC1		Allied - I	Numerical and Statistical Methods	5	4	25	75	100
	23UCA1AC2		Allied - II	Digital Electronics	3	2	25	75	100
	23UCN1AE1	IV	AECC - I	Value Education	2	2	-	100	100
				Total	**30**	**22**			**700**
II	23U2LT2/LA2/LF2/ LH2/LU2	I	Language - II		6	3	25	75	100
	23UCN2LE2	II	English - II	English for Communication - II	6	3	25	75	100
	23UCA2CC3	III	Core - III	Programming in Java	5	5	25	75	100
	23UCA2CC4P		Core - IV	Programming in Java Lab - Practical	3	3	20	80	100
	23UCA2AC3		Allied - III	Operations Research	5	4	25	75	100
	23UCA2AC4		Allied - IV	Game Theory and Its Applications	3	2	25	75	100
	23UCN2SS	IV	Soft Skills Development	Soft Skills Development	2	2	-	100	100
	23UCN2CO	V	Community Outreach	JAMCROP	-	-	-	-	@
	23U4BT1 / 23U4AT1		Basic Tamil - II / Advanced Tamil - II	எழுத்தும் இலக்கியமும் அறிமுகம் - I / தமிழ் இலக்கியமும் வரலாறும் - I /	-	-	-	100 #	-
	@**Only grades will be given**			**Total**	**30**	**22**			**700**
III	23U3LT3/LA3/LF3/ LH3/LU3	I	Language - III		6	3	25	75	100
	23UCN3LE3	II	English - III	English for Communication - III	6	3	25	75	100
	23UCA3CC5	III	Core - V	Data Structures	4	4	25	75	100
	23UCA3CC6P		Core - VI	Data Structures Lab - Practical	3	3	20	80	100
	23UCA3AC5		Allied - V	Principles of Accountancy	4	4	25	75	100
	23UCA3AC6P		Allied - VI	Accounting Package Lab - Practical	3	2	20	80	100
	23UCA3GE1	IV	Generic Elective - I		2	2	-	100	100
	23UCN3AE2		AECC - II	Environmental Studies	2	2	-	100	100
				Total	**30**	**23**			**800**
IV	23U4LT4/LA4/LF4/ LH4/LU4	I	Language - IV		6	3	25	75	100
	23UCN4LE4	II	English - IV	English for Communication - IV	6	3	25	75	100
	23UCA4CC7	III	Core - VII	Database Management Systems	6	6	25	75	100
	23UCA4CC8P		Core - VIII	RDBMS Lab - Practical	3	3	20	80	100
	23UCA4AC7		Allied - VII	Scripting Languages	4	4	25	75	100
	23UCA4AC8P		Allied - VIII	Scripting Languages Lab - Practical	3	2	20	80	100
	23UCA4GE2	IV	Generic Elective - II		2	2	-	100	100
	23UCN4EL		Experiential Learning	Internship	-	2	-	100	100
	23UCN4EA	V	Extension Activities	NCC, NSS, etc.	-	1	-	-	-
	23U4BT2 / 23U4AT2		Basic Tamil - II / Advanced Tamil - II	எழுத்தும் இலக்கியமும் அறிமுகம் - II / தமிழ் இலக்கியமும் வரலாறும் - II	-	-	-	100 #	-
				Total	**30**	**26**			**800**
V	23UCA5CC9	III	Core - IX	Software Engineering	6	6	25	75	100
	23UCA5CC10		Core - X	Operating Systems	5	5	25	75	100
	23UCA5CC11		Core - XI	Python Programming	5	5	25	75	100
	23UCA5CC12P		Core - XII	Python Programming Lab - Practical	4	4	20	80	100
	23UCA5DE1AT/BT		Discipline Specific Elective - I (a)		4	4	10	40	50
	23UCA5DE1AP/BP		Discipline Specific Elective - I (b)		2	1	10	40	50
	23UCA5SE1	IV	Skill Enhancement Course - I	Digital Marketing	2	1	-	100	100
	23UCA5SE2P		Skill Enhancement Course - II	Digital Marketing Lab - Practical	2	1	-	100	100
	23UCA5EC1		Extra Credit Course - I *	Online Course	-	*	-	-	-
				Total	**30**	**27**			**700**
VI	23UCA6CC13	III	Core - XIII	Data Communications and Networking	5	5	25	75	100
	23UCA6CC14T		Core - XIV (a)	Web Framework	4	4	10	40	50
	23UCA6CC14P		Core - XIV (b)	Web Framework Lab - Practical	2	2	10	40	50
	23UCA6CC15		Core - XV	Cyber Security	5	5	25	75	100
	23UCA6PW		Project Work	Project Work	5	4	-	100	100
	23UCA6DE2A/2B		Discipline Specific Elective - II		4	4	25	75	100
	23UCA6DE3AP/BP		Discipline Specific Elective - III		4	3	20	80	100
	23UCN6AE3	IV	AECC - III	Gender Studies	1	1	-	100	100
	23UCA6EC2		Extra Credit Course - II *	Online Course	-	*	-	-	-
	23UCAECA		Extra Credit Course for all **	Online Course	-	*	-	-	-
	23UCN6ECA1		Extra Credit Course for all +	Entrepreneurship Development	-	+	-	-	-
	* Programme Specific Online Course for Advanced Learners **** Any Online Course for Enhancing Additional Skills** **+ Course for Enhancing Entrepreneurial Skills**			**Total**	**30**	**28**			**700**
				Grand Total		**148**			**4400**

GENERIC ELECTIVE COURSES

Semester	Course Code	Course Title
III	23UCA3GE1	Office Automation
IV	23UCA4GE2	Image Editing Tools

Self-Study Course – Basic and Advanced Tamil

(Applicable to the candidates admitted from the academic year 2023 -2024 onwards)

Semester	Course Code	Course Title
II	23U2BT1	Basic Tamil – I (எழுத்தும் இலக்கியமும் அறிமுகம் - I)
	23U2AT1	Advanced Tamil – I (தமிழ் இலக்கியமும் வரலாறும் - I)
IV	23U4BT2	Basic Tamil – II (எழுத்தும் இலக்கியமும் அறிமுகம் - II)
	23U4AT2	Advanced Tamil – II (தமிழ் இலக்கியமும் வரலாறும் - II)

Mandatory

Basic Tamil Course - I and II are offered for the students who have not studied Tamil Language in their schools and college.

Advanced Tamil Course - I and II are offered for those who have studied Tamil Language in their schools but have opted for other languages under Part - I.

DISCIPLINE SPECIFIC ELECTIVES

Semester	Course Code	Course Title
V	23UCA5DE1AT	VB .Net
	23UCA5DE1BT	C# .Net Programming
	23UCA5DE1AP	VB .Net Lab - Practical
	23UCA5DE1BP	C# .Net Programming Lab - Practical
VI	23UCA6DE2A	PHP Programming
	23UCA6DE2B	Data Science using R
	23UCA6DE3AP	PHP Programming Lab - Practical
	23UCA6DE3BP	R Programming Lab - Practical

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
I	23UCA1CC1	CORE – I	5	5	25	75	100

Course Title	Programming in C

SYLLABUS		
Unit	**Contents**	**Hours**
I	Getting Started with C - C Instructions– Decision Control Structure: The if Statement – The if-else Statement - Use of Logical Operators - * The Conditional Operators *	15
II	The Loop Control Structure: The while Loop –The for Loop – The break Statement – The continue Statement – The do-while Loop – The odd loop. Case Control Structure: Decisions using switch – switch Versus if-else Ladder - *The goto keyword*.	15
III	Functions and Pointers: Passing values between Functions – Scope Rule of Functions – Calling Convention – Using Library Functions – Advanced Features of Functions – *Adding Functions to the Library *. The C Preprocessor: Features of C Preprocessor – Macro Expansion – File Inclusion – Conditional Compilation – if and elif Directives – Miscellaneous Directives – The Build Process.	15
IV	Arrays – More on Arrays – Pointers and Arrays – Two dimensional Arrays – Array of Pointers – Three-Dimensional Array Strings: More about Strings – Pointers and Strings – Standard Library String Functions – Two-Dimensional Array of Characters – *Array of Pointers to Strings* – Limitation of Array of Pointers to Strings.	15
V	Structures: Array of Structures – Additional Features of Structures – Uses of Structures. Console Input / Output –Types of I/O – Console I/O Functions. File Input / Output: Data Organization – File Operations – Counting Characters, Tabs, Spaces – A File-Copy Program – File Opening Modes. – * String (Line) I/O in Files * - Record I/O in Files	15
VI	**Current Trends (For CIA only) –** Debugging with GDB, Random numbers, Simulation	

…… Self Study

Text Book(s):
YashavantKanetkar, Let Us C, BPB Publications, New Delhi, 13th Edition, 2013

Reference Book(s):
1. E. Balagurusamy, Programming in ANSI C, Tata McGraw Hill Education Private Ltd., Fifth Edition, 2011. 2. D. Ravichandran, Programming in C, New Age International (P) Ltd., First Edition, 1996.

Web Resource(s):
1. https://www.programiz.com/c-programming.

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Use C language as the base for higher level course in programming	**K1**
CO2	Understand the basic constructs of programming languages	**K2**
CO3	Apply structured approach in program design	**K3**
CO4	Apply suitable logic in solving problems	**K3**
CO5	Develop applications to solve real world problems	**K5**

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	3	2	3	3	3	2	3	0	2	2.3
CO2	2	2	2	2	2	2	2	2	2	2	2.0
CO3	3	3	3	2	2	3	3	2	2	2	2.5
CO4	3	2	3	3	2	2	3	3	2	3	2.6
CO5	2	2	1	3	3	2	1	3	3	3	2.3
Mean Overall Score											2.34
Correlation											High

Mean Overall Score = Sum of Mean Score of Cos / Total Number of Cos

Mean Overall Score	Correlation
< 2	Low
≥ 2 and < 2	Medium
≥ 2	High

Course Coordinator: Dr. O. S. Abdul Qadir

Semester	Course Code	Course Category	Hours/Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
I	23UCA1CC2P	CORE – II	3	3	20	80	100

Course Title	Programming in C Lab - Practical

Write a Program in C

1. Using assignment statements
2. Using assignment statements
3. To demonstrate Logical operators
4. Using While, Do-While & For Loop
5. Using Switch
6. To illustrate the use of Functions& Pointers
7. Using Macro definitions to test whether a character is uppercase or lowercase
8. To make use of arrays
9. To manipulate Strings
10. To manipulate String
11. Using console, I/O Functions.
12. Using console, I/O Functions.

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Apply the control statements to solve the simple problems	**K3**
CO2	Apply the functions and pointers to solve the real time tasks	**K3**
CO3	Apply the Macro functions and illustrate	**K3**
CO4	Implements I/O functions, solve day to day to problems	**K3**
CO5	Create a real time applications using Streams	**K5**

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	3	2	3	3	0	2	3	3	2.4
CO2	2	2	2	2	3	2	3	0	2	3	2.1
CO3	3	2	2	2	3	2	3	0	2	3	2.2
CO4	2	2	3	0	2	3	2	3	3	3	2.3
CO5	3	3	0	2	3	0	2	3	2	3	2.1
										Mean Overall Score	2.22
										Correlation	High

Mean Overall Score = Sum of Mean Score of Cos / Total Number of Cos

Mean Overall Score	Correlation
< 2	Low
≥ 2 and < 2	Medium
≥ 2	High

Course Coordinator: Dr. O. S. Abdul Qadir

Semester	Course Code	Course Category	Hours/Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
I	23UCA1AC1	ALLIED – I	5	4	25	75	100

Course Title	Numerical and Statistical Methods

SYLLABUS		
Unit	Contents	Hours
I	Solution of algebraic and transcendental equations- Bisection method- Method of Successive Approximation or the Iteration method– * Newton Raphson Method * (This unit contains Problems only).	15
II	Solution of System of Linear Equations – Gauss Elimination Method, Gauss Jordan Method, Gauss Jacobi Method– *Gauss Seidel Method*(This unit contains Problems only).	15
III	Measures of Central Tendency – Measures of Dispersion-*Measures of skewness*. (This unit contains Problems only).	15
IV	Theory of Probability – Definitions of Probability – Sample Space –* Probability of an Event *– Independence of Events – Theorems on Probability – Conditional Probability – Baye's Theorem	15
V	Correlation (two variables only) – Karl Pearson's Correlation Coefficient and its properties. Spearman's rank correlation coefficient (repeated and non-repeated). Lines of regression – Definition – **Properties of regression coefficients** – Simple problems.	15

…… Self Study

Text Book(s):
1. Dr. P. Kandasamy, Dr. K. Thilagavathy, Dr. K. Gunavathi, Numerical Methods, S. Chand, First Edition, 2008 2. S.C. Gupta, V.K. Kapoor, Fundamentals of Mathematical Statistics, Sulthan Chand & Sons, Eleventh Edition, 2002. UNIT I : Chapter 3 – Section 3.1, 3.2, 3.4 **(T.B.1)** UNITII : Chapter 4 - Section: 4.2,4.8, 4.9 **(T.B.1)** UNITIII : Chapter 2 - Section: 2 to 2.9 Chapter 3 – Section 3.3 to 3.7, 3.13 **(T.B.2)** UNITIV : Chapter 4 - Section-4.5 to 4.8 **(T.B.2)** UNITV : Chapter 10 - Section: 10.3, 10.6, 10.7.1, 10.7.3, 10.7.4**(T.B.2)**
Reference Book(s):
1. S.S. Sastry, Introductory Methods of numerical analysis, Prentice Hall of India Pvt. Ltd., 2004
2. S.C. Gupta, V.K. Kapoor, Elements of Mathematical Statistics, Sultan Chand & Sons, 2009
Web Resource(s):
1. https://nptel.ac.in/courses/111107105
2.https://nptel.ac.in/courses/111/106/111106112/

	Course Outcomes	
Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Remember methods for algebraic and transcendental equations with examples	**K1**
CO2	Demonstrate and discuss System of Linear Equations with examples	**K2**
CO3	Apply domain knowledge for Measures of Central Tendency and skewness.	**K3**
CO4	Examine and illustrate the examples of Conditional Probability	**K4**
CO5	Classification and study of Bivariate distributions with examples.	**K5**

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	1	2	3	1	3	2	1	3	3	2.2
CO2	2	2	3	2	1	3	3	2	3	1	2.2
CO3	3	2	3	2	2	2	2	2	2	3	2.3
CO4	2	1	3	2	3	3	2	3	3	3	2.5
CO5	2	3	3	1	2	3	2	3	2	3	2.4
Mean Overall Score											2.32
Correlation											Medium

Mean Overall Score = Sum of Mean Score of Cos / Total Number of Cos

Mean Overall Score	Correlation
< 2	Low
≥ 2 and < 2	Medium
≥ 2	High

Course Coordinator: Dr. V. Krishnan

Semester	Course Code	Course Category	Hours/Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
I	23UCA1AC2	Allied - II	3	2	25	75	100

Course Title	Digital Electronics

SYLLABUS		
Unit	**Contents**	**Hours**
I	Number Systems and Codes: Binary, Decimal, Octal and hexadecimal number systems – Conversion from one system to another – Binary Addition – Binary Subtraction –* Sign-magnitude numbers and 2's complement representation * - Binary subtraction using Complements - SubBinary Code (8421, Gray, Excess-3)	9
II	Digital Logic: The Basic Gates - AND, OR, NOT - Universal Logic Gates – NOR, NAND. Boolean Laws and Theorems –Simplification – Sum of Products Method – Karnaugh Simplification (upto 3 variables)	9
III	Combinational logic circuits: Multiplexers – Demultiplexers –Decoders -Encoders. Arithmetic Building Blocks – Half adder – Half subtractor – Full adder – Full subtractor – *Adder - subtractor*.	9
IV	Sequential Logic Circuits: Flip Flops – RS Flip Flops – D Flip Flops- T Flip Flops – JK Flip-flops - * Shift Registers (Serial-In-Serial-Out)*.	9
V	D/A and A/D Conversion – Variable Resistor Network – Binary Ladder – D/A Converter – D/A Accuracy and Resolution – A/D Converters – *Simultaneous Method *.	9
VI	**Current Trends (For CIA only):** Organization of Computer System, Memory Unit, I/O devices	

…… Self Study

Text Book(s):
Donald P Leach, Albert Paul Malvino, GoutamSaha, Digital Principles and Applications, Tata McGraw Hill Education Private Limited, New Delhi, Sixth Edition, 2002 UNIT I　　　: Chapter 5 & 6 (6.1, 6.2, 6.4, 6.5) UNIT II　　　: Chapter 2 & 3 UNIT III　　　: Chapter 4 (4.1 - 4.3 & 4.6) & 6 (6.7 - 6.8) UNIT IV　　　: Chapter 8 & 9 UNIT V　　　: Chapter 12 (12.1 – 12)

Reference Book(s):
1. Thomas C. Bartee, Digital Computer Fundamentals, Tata McGraw Hill, 6th Edition, 25th Reprint, 2006. 2. M.Morris Mano, Digital Logic and Computer Design, Pearson India, 2017 3. Floyd, Digital Fundamentals, Pearson Education, 2005

Web Resource(s):
1. https://www.javatpoint.com/digital-computers 2. https://www.britannica.com/technology/digital-computer 3. https://www.pdfdrive.com/digital-computer-fundamentals-computer-architecture-e5719965.html

Course Outcomes

Upon successful completion of this course, the student will be able to:

CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Understand the number systems and usage of Binary codes in Computer System	K1, K2
CO2	Solve the Sum of Products functions using Boolean laws and theorems	K3
CO3	Simplify the 3-variable expressions using Karnaugh Map method	K4
CO4	Explain the operating principles of combinational circuits, sequential circuits, ADC and DAC converters	K5
CO5	Evaluate Boolean expressions using gated networks	K5

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	3	2	3	1	3	3	3	3	1	2.5
CO2	3	3	2	3	2	3	2	3	2	1	2.4
CO3	3	3	3	2	1	3	3	2	3	2	2.5
CO4	2	3	3	3	2	3	3	3	2	2	2.6
CO5	3	3	3	3	2	3	2	3	3	2	2.7
										Mean Overall Score	2.54
										Correlation	High

Mean Overall Score = Sum of Mean Score of COs / Total Number of COs

Mean Overall Score	Correlation
< 2	Low
≥ 2 and < 2	Medium
≥ 2	High

Course Coordinator: Dr. S. Abdul Saleem

Semester	Course Code	Course Category	Hours/Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
II	23UCA2CC3	CORE – III	5	5	25	75	100

Course Title	Programming in Java

SYLLABUS		
Unit	Contents	Hours
I	Introduction – Need of object oriented programming – Principles of Object Oriented Language – Applications of OOP - History of Java – Java Essentials – Java Virtual Machine – Java Features - Java Programming Constructs: Variables – Primitive Data Types – Identifier – Literals – * Operators – Expressions * – Primitive Type conversion and Casting – Flow of Control	15
II	Classes and Objects: Classes – Objects – Class Declarations – Creating Objects – Methods – Constructors – Class Variables and Methods – this keyword – Arrays – Command-Line arguments - Inheritance: Inheritance VS Aggregation – Overriding Method – super keyword – * final keyword * – Abstract class	15
III	Interfaces, Packages and Enumerations: Interfaces – Packages – Access Protection – java.lang.Package – String class – * StringBuffer Class * - Exception: Introduction – Exception Types – Exception Handling Techniques – User Defined Exception - Multithreading: Introduction – Multithreading – java.lang.Thread – Main Thread – Creation of new Threads – Thread.State	15
IV	Input/Output: Introduction – java.io.File – Reading and Writing Data – Randomly Accessing a File – Serialization - Event Handing: Event Delegation Model – java.awt.event – Sources of events – Event Listeners – Adapter Classes.	15
V	Abstract Window Toolkit: Introduction – Components and Containers – Button – Label – Checkbox – Radio Buttons - TextField and TextArea – Container Class - Layouts: FlowLayout – GridLayout - * BorderLayout * - Menu – Scrollbar.	15
VI	**Current Trends (For CIA only) –** DevOps, Spring Framework, Hibernate	

…… Self Study

Text Book(s):
Sachine Malhotra, Saurabh Choudhary, Programming in Java, Oxford University Press, Revised Second Edition, 2018.

Reference Book(s):
1. P. Radha Krishna, Object Oriented Programming through JAVA, Universities Press, 2008.   2. Herbert Schildt, The Complete Reference Java, Fifth Edition, Tata McGraw-Hill, 2015.

Web Resource(s):
1. https://www.programiz.com/java-programming   2. https://www.javatpoint.com/java-tutorial

	Course Outcomes	
CO No.	**CO Statement**	**Cognitive Level (K-Level)**

Upon successful completion of this course, the student will be able to:

CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Understand the basic building blocks, control statements, arrays and strings in Java Programming	**K2**
CO2	Understand the concepts of classes, objects, inheritance, polymorphism, packages and interfaces	**K2**
CO3	Apply the exception handling mechanism in single and multithreaded programming	**K3**
CO4	Develop the window based programs from basic level to file operations using Applet	**K3**
CO5	Appraise the simple applications using AWT components	**K5**

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	2	3	2	3	2	2	3	2	2.4
CO2	2	0	2	3	2	3	2	2	2	3	2.1
CO3	2	3	2	2	0	2	2	3	2	3	2.1
CO4	3	3	3	2	0	3	2	3	0	2	2.1
CO5	2	3	3	3	3	2	3	0	2	2	2.3
										Mean Overall Score	2.27
										Correlation	High

Mean Overall Score = Sum of Mean Score of Cos / Total Number of Cos

Mean Overall Score	Correlation
< 2	Low
≥ 2 and < 2	Medium
≥ 2	High

Course Coordinator: Mr. M. Kamal

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
II	23UCA2CC4P	CORE – IV	3	3	20	80	100

Course Title	Programming in Java Lab - Practical

1. Using Control Statements
   a) Find the prime numbers between 1 to 100
   b) Count the number of digits of a given integer using while loop
   c) Find the smallest and biggest number of given 'n' elements using for loop

2. Using String handling functions
   a) Find the sum of ASCII value of your name
   b) Count the total number of vowels, consonants, and words in given sentences

3. Using class and objects
   a) To find the perimeter of circle and rectangle
   b) To illustrate the method overloading

4. To demonstrate the following inheritance
   a) Single Inheritance
   b) Multilevel inheritance

5. To demonstrate the concepts
   a) Area of the shapes (interface)
    b) Abstract Class

6. a) Using package to prepare an EB bill / Telephone bill / Student mark sheet with suitable
       fields
    a) To demonstrate the multiple catch clauses

7. Using Thread concept to solve the following
   a) Display the System date and time with specific time interval using extends Thread
       class
   b) Display a set of numbers. If 25 even numbers have been displayed stop the thread
and initiate a new thread class for displaying 25 odd numbers

8. Using I/O Streams:
   a) Find the properties of a given directory name
   b) Copy of one file contents into another

9. Using awt package
   a) Draw a house using Graphics class
   b) Demonstrate the Layout Managers: FlowLayout, BorderLayout & GridLayout

10. Using AWT controls to create student bio-data form

		Course Outcomes	
		Course Outcomes	
Upon successful completion of this course, the student will be able to:			
CO No.	**CO Statement**		**Cognitive Level (K-Level)**
CO1	Apply the control statements to solve the simple problems		**K3**
CO2	Develop the day to day applications using Inheritance, Packages, and Interface		**K3**
CO3	Illustrate the exception handling and string class methods for simple applications		**K2**
CO4	Solve the errors in the computer laboratory using I/O and networking concepts.		**K3**
CO5	Create an application for automation of real time problems using database		**K5**

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	2	2	3	2	3	0	2	3	2.2
CO2	3	3	1	2	3	3	2	3	2	3	2.5
CO3	3	2	3	2	3	3	1	2	3	3	2.5
CO4	2	2	3	1	2	3	2	3	3	3	2.4
CO5	2	2	2	2	3	2	3	0	2	3	2.1
Mean Overall Score											2.34
Correlation											High

Mean Overall Score = Sum of Mean Score of Cos / Total Number of Cos

Mean Overall Score	Correlation
< 2	Low
≥ 2 and < 2	Medium
≥ 2	High

Course Coordinator: Mr. M. Kamal

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
II	23UCA2AC3	ALLIED – III	5	4	25	75	100

Course Title	Operations Research

SYLLABUS

Unit	Contents	Hours
I	Introduction to Operations Research – Mathematical Formulation of the problem –Graphical Solution Method –General Linear Programming (LPP)-* Canonical and Standard forms of LPP*- Basic Solutions - Solving LPP by Using Simplex Method (Problems only)	15
II	Transportation problem –North West corner rule – *Least Cost Method* – Vogel Approximation Method–Assignment Problem– Hungarian Method (Balanced and unbalanced). (Problems only)	15
III	Sequencing Problems: Introduction – Problem of sequencing – Basic term used in sequencing – Processing 'n' Jobs through '2' machines –* Processing 'n' Jobs through 'k' machines*. (Problems only)	15
IV	Games and Strategies: Introduction- Two Person Zero-Sum Games-*Some Basic Terms-The Maximin- Minimax Principle*-– Games Without Saddle Points – Mixed Strategies – Graphic Solution of 2 X n and m X 2 Games. (Problems only)	15
V	Network scheduling by CPM – Introduction – Network and Basic Components – Logical Sequencing - Rules of Network Construction– Concurrent Activities – *Critical Path Analysis*. (Problems only)	15
VI	**Current Trends (For CIA only)** – Contemporary developments related to the course during the semester concerned.	

………. Self Study

Text Book(s):

KantiSwarup, P.K. Gupta and Man Mohan, Operations Research, Sultan Chand and Sons publishers, New Delhi,Thirteenth Edition, Reprint 2008.

UNIT I:　　　　Chapter 2,3 & 4　　　Sections: 2.1 – 2.4, 3.1, 3.2,3.4,3.5 ,4.1, 4.3

UNIT II:　　　　Chapter 10 & 11　　　Sections: 10.1, 10.2, 10.5, 10.9, 11.1, 11.2, 11.3, 11.4

UNIT III:　　　Chapter 12　　　Sections 12.1 – 12.5

UNIT IV:　　　Chapter 17　　　Sections: 17.1 – 17.6

UNIT V:　　　Chapter 25　　　Sections: 25.1 – 25.6

Reference Book(s):

1. Sharma, S.D., "Operations Research", KedarNath Ram Nath& Co. (15th Edition), 2010.

2. Richard Bronson, Theory and Problems of Operations Research, Tata McGraw Hill Publishing Company Ltd., NewDelhi, 1982.

Web Resource(s):

1. **https://nptel.ac.in/courses/111/107/111107128/**
2. **https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=25**
3. https://onlinecourses.swayam2.ac.in/cec21_ma13/unit?unit=6&lesson=7

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Remember the system of linear equations and linear inequalities	**K₁**
CO2	Demonstrate and study of operations research and illustrate the examples of mathematical formulation	**K₂**
CO3	Classification and study of Transportation problems and Assignment problems.	**K₄**
CO4	Examine and Illustrate the Replacement Problems with suitable examples.	**K₄**
CO5	Assess forward and backward calculations of network problems to obtain CPM and PERT	**K₅**

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	2	3	1	3	3	3	3	3	2.7
CO2	3	3	3	3	1	3	3	3	3	3	2.8
CO3	3	3	3	3	2	2	3	2	3	3	2.7
CO4	3	3	3	2	1	3	3	3	3	3	2.7
CO5	3	3	3	3	2	2	3	3	3	3	2.8
Mean Overall Score											2.74
Correlation											**High**

Mean Overall Score = Sum of Mean Score of Cos / Total Number of Cos

Mean Overall Score	Correlation
< 2	Low
≥ 2 and < 2	Medium
≥ 2	High

Course Coordinator: Dr. T. Shiek Pareeth

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
II	23UCA2AC4	ALLIED – IV	3	2	25	75	100

Course Title	Game Theory and its Applications

SYLLABUS		
Unit	Contents	Hours
I	Introduction - What is game theory? Nash Equilibrium: Theory - Strategic games - Example: The Prisoner's Dilemma - Bach or Stravinsky? - Matching Pennies - The Stag Hunt - Nash equilibrium - Examples of Nash equilibrium - best response functions - Dominated actions - Cournot's model of Oligoploy - Bertrand's model of Oligopoly	9
II	Extensive Games with Perfect Information: Theory - Strategies and Outcomes - Nash equilibrium - Subgame perfect equilibrium - Finding subgame perfect equilibria of finite horizon games: backward induction - Ticktacktoe, Chess and related games – The ultimatum game and the holdup game - Stackelberg's model of duopoly	9
III	Extensive Games with Perfect Information: Extensions and Discussion - Allowing for Simultaneous moves - Illustration: Entry into a monopolized industry - Electoral competition with strategic voters - Committee decision-making - Exit from a declining industry	9
IV	Coalitional Games and the Core: Coalitional games - Illustration: Ownership and the distribution of wealth - Exchanging homogeneous horses. Bayesian Games - Introduction - General definitions - Illustration: Cournot's duopoly game with imperfect information - Providing a public good - Auctions - Juries.	9
V	Repeated games: The Prisoner's Dilemma - The main idea - Infinitely repeated games - Some Nash equilibria of the infinitely repeated Prisoner's Dilemma - Subgame perfect equilibria and the one-deviation property - Repeated games: General Results - Nash equilibria of general infinitely repeated games - Subgame perfect equilibria of general infinitely repeated games.	9
VI	**Current Trends (For CIA only)** – Nash equilibrium, The Prisoner's dilemma & The Tragedy of the Commons	

Text Book(s):
Martin J. Osborne, "An Introduction to Game Theory", Oxford University Press, 2003
UNIT I : Chapter 1 (Section 1.1), Chapter 2 (Section 2.1 - 2.9), Chapter 3 (Section 3.1, 3.2)
UNIT II : Chapter 5 (Section 5.1 - 5.6), Chapter 6 (Section 6.2, 6.3)
UNIT III : Chapter 7 (Section 7.1 - 7.5)
UNIT IV : Chapter 8 (Section 8.1 - 8.4), Chapter 9 (Section 9.1, 9.3, 9.5 - 9.8)
UNIT V : Chapter 14 (Section 14.1, 14.3, 14.5, 14.7), Chapter 15 (Section 15.1, 15.2)

Reference Book(s):
1. Prajit K. Dutta, "Strategies and Games: Theory and Practice", MIT Press.
2. Allan MacKenzie, "Game Theory for Wireless Engineers", Synthesis lectures on Communications, 2006

Web Resource(s):
1. https://online.stanford.edu/courses/soe-ycs0002-game-theory

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Remember the fundamental concept of game theory	K1
CO2	Demonstrate and study base concept of Nash equilibrium	K2
CO3	The ability to apply solution concepts to examples of games, and to state and explain them precisely	K2
CO4	The ability to solve unseen games that are variants of known examples.	K3
CO5	Create real time games using game theory concepts	K5

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	3	2	3	1	3	3	3	3	3	2.7
CO2	3	1	1	3	1	3	3	3	2	3	2.3
CO3	3	3	3	3	2	2	3	2	3	3	2.7
CO4	1	2	3	2	1	3	3	2	3	3	2.3
CO5	3	3	3	3	2	2	1	3	3	2	2.5
Mean Overall Score											2.5
Correlation											High

Mean Overall Score = Sum of Mean Score of Cos / Total Number of Cos

Mean Overall Score	Correlation
< 2	Low
≥ 2 and < 2	Medium
≥ 2	High

Course Coordinator: Lt. J. Hajiram Beevi

Semester	Course Code	Course Category	Hours/Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
III	23UCA3CC5	Core – V	4	4	25	75	100

Course Title	Data Structures

SYLLABUS		
Unit	**Contents**	**Hours**
I	INTRODUCTION TO DATA STRUCTURES: Overview – Definitions – ARRAYS: Overview – Introduction – Range of an Array – One- dimensional Array - Two-dimensional Array - Multidimensional Arrays. LINKED LISTS - Overview – Introduction – Memory Allocation – Benefits – Limitations – Types – Basic Operations – Singly Linked Lists – Circular Linked Lists - Doubly Linked Lists	12
II	STACKS, QUEUES AND RECURSION: Introduction – Stacks – Array Representations of Stacks - Linked Representations of Stacks – Arithmetic Expressions; Polish Notation – Recursion: Towers of Hanoi – Queues - Representation of Queues - Linked representation of Queues – Deques - Priority Queues	12
III	TREES: Introduction – Binary Trees– Representing Binary Tress in Memory – Traversing Binary Trees - Traversal Algorithms using Stacks – * Header Nodes * - Binary Search Trees – Searching and Inserting in Binary Search Trees – Deleting in a Binary Search Tree – Heap; Heap Sort	12
IV	GRAPHS AND THEIR APPLICATIONS: Sequential Representation of Graphs – Warshall's Algorithm – Linked Representation of a Graph – Operations on Graphs – Traversing a Graph – Posets; Topological Sorting	12
V	SORTING AND SEARCHING: Introduction – Insertion Sort – Selection Sort – Quick Sort - Merging – Merge Sort – Radix Sort – Searching and Data Modification – Hashing	12

…….. Self Study

Text Book(s):

1. A. Chitra and P.T. Rajan, Data Structures, Tata McGraw – Hill Publishing Company Limited, New Delhi
2. Seymour Lipschutz, *Data Structures*, Tata McGraw – Hill Publishing Company Limited, New Delhi, 2006

Reference Book(s):
1. Jean Paul Tremblay and Paul G. Sorenson, An Introduction to Data Structures with Applications, Tata McGraw-Hill, Second Edition

Web Resource(s):

1. https://www.geeksforgeeks.org/data-structures/
2. https://www.javatpoint.com/data-structure-tutorial

	Course Outcomes	
Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Acquire knowledge in the representation of arrays and linked lists	**K1**
CO2	Implement the application of arrays and linked lists in various structures	**K2, K3**
CO3	Evaluate the use of stack, queue, trees and graphs	**K3**
CO4	Describe the concept of graphs and their application	**K4**
CO5	Apply the appropriate structures in problem solving	**K5**

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	2	3	3	3	2	3	2	3	2	2.5
CO2	2	3	2	2	2	3	2	2	2	2	2.2
CO3	3	2	3	3	3	2	3	2	3	3	2.7
CO4	2	3	2	3	3	3	3	3	3	3	2.8
CO5	2	3	3	3	2	3	3	3	2	2	2.6
										Mean Overall Score	2.56
										Correlation	**High**

Mean Overall Score	**Correlation**
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Dr. O. S. Abdul Qadir

Semester	Course Code	Course Category	Hours/Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
III	23UCA3CC6P	Core – VI	3	3	20	80	100

Course Title	DATA STRUCTURES LAB - PRACTICAL

SYLLABUS
Contents
1. Singly Linked List Operations 2. Stack Operations using Arrays. 3. Queue Operations using Arrays 4. Bubble Sort. 5. Selection Sort. 6. Insertion Sort 7. Quick Sort. 8. Searching (Linear Search, Binary Search) 9. Multidimensional Arrays (Matrix Operations, Addition and Multiplication) 10. Fibonacci Series using Recursion

Course Coordinator: Dr. O. S. Abdul Qadir

Semester	Course Code	Course Category	Hours/Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
III	23UCA3AC5	Allied - V	4	4	25	75	100

Course Title	Principles of Accountancy

SYLLABUS		
Unit	Contents	Hours
I	Meaning of Accounting – Meaning and Objects of Book Keeping – Accounting Concepts and Conventions – Principles of Double Entry – Kinds of Account – Journal and Ledger accounts	12
II	Subsidiary Books – Purchase Book, Sales Book, Purchase Returns Book, Bills Receivable Book, Bills Payable Book, Cash Book, Analytical Petty Cash Book and Journal Proper –*Bank Reconciliation Statement*	12
III	Trail Balance – Preparation – Errors Disclosed and Errors Not Disclosed by its Suspense account – Rectification of Errors	12
IV	Preparation of Final Accounts – Trading Account, Profit and Loss Account, Balance Sheet – Adjusting and Closing Entries. Methods of Depreciation Fixed Percentage on Original Cost Method and Diminishing Balance Method Only	12
V	Bills of Exchange – Bill Transaction, Discounting Endorsement – Sending Bill for Collection, Noting of a Bill, Renewal of a Bill – Insolvency of Acceptor	12
VI	Current Trends (For CIA only) – Contemporary developments related to the course During the semester concerned.	

….. Self Study

Text Book(s):
1.N. Vinayakam, P.L. Mani, K.L. Nagarajan, Principles of Accountancy, EURASIA Publishing House PVT Ltd., New Delhi, Revised Edition, 2002 UNIT I : Chapter 1 & 2   UNIT II : Chapters 3 & 7   UNIT III : Chapter 4 UNIT IV : Chapter 6   UNIT V : Chapter 8
Reference Book(s): M.C. Shukla, T.S. Grewal, Advanced Accounts, Eleventh Edition, S. Chand& Company Pvt. Ltd,Reprinted, 1988
1.Jean Paul Tremblay and Paul G. Sorenson, An Introduction to Data Structures with Applications, Tata McGraw-Hill,Second Edition
Web Resource(s):
1. https://www.accountingcoach.com/accounting-principles/explanation

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	State/outline the nature of financial accounting	**K1**
CO2	Recognize the basics of financial accounting	**K2**
CO3	Analyze assigned questions, exercises and problems	**K3**
CO4	Participate in class, to complete written homework assignments and to interact with other classmates	**K3**
CO5	Participate in collaborative learning, problems and cases in financial accounting selected to foster cooperative learning	**K5**

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	2	1	3	3	1	2	3	2	1	**2.0**
CO2	3	3	3	1	2	2	2	2	3	3	**2.4**
CO3	2	2	1	2	3	2	1	2	3	2	**2.2**
CO4	2	2	3	1	2	3	1	2	3	3	**2.2**
CO5	2	3	2	3	2	3	2	1	2	1	**2.6**
										Mean Overall Score	**2.28**
										Correlation	**Medium**

Mean Overall Score	**Correlation**
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator   Dr. S. Mohamed Ashik

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
III	23UCA3AC6P	Allied – VI	3	2	20	80	100

Course Title	ACCOUNTING PACKAGE LAB - PRACTICAL

SYLLABUS
Contents

Solve the following problems using Tally ERP software
1. Architecture and customization of Tally
2. Configuration of Tally
3. Tally Screens and Menus
4. Creation of new company and groups
5. Preparation of voucher entries
    a. Payment voucher
    b. Receipt voucher
    c. Sales voucher
    d. Purchase voucher
    e. Contra voucher
    f. Journal voucher
6. Ledger Creation
 7. Preparation of Trail balance
8. Preparation of Profit and Loss statement.
9. Preparation of Balance Sheet
10. Preparation of Bank Reconciliation Statement
11. Creation of Inventory reports
    a. Stock groups
    b. Stock items
    c. Unit measurement
    d. Single and multiple Godown

Course Coordinator   Dr. S. Mohamed Ashik

Semester	Course Code	Course Category	Hours/Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
III	23UCA3GE1	GENERIC ELECTIVE - I	2	2	-	100	100

Course Title	Office Automation

SYLLABUS		
Unit	Contents	Hours
I	INTRODUCTION: Introduction to Computers-What is computer-History of Computers: Evolution – The first computer-Next Generations- Basic Anatomy of Computers: The Basic Components – Functioning of the Components-Introduction to MS-Office	6
II	MS-WORD: Word Basics-Starting Word - Creating document- Formatting Features –Menus.	6
III	MS-WORD: Toolbars and their Icons - Mail Merge – Macro - Creating and formatting tables	6
IV	MS-EXCEL: Excel Basics-Introduction-Menus-*Entering Formula*-Data Sort and Filter- Functions	6
V	MS-POWERPOINT: Navigating in PowerPoint-Working with PowerPoint-Formatting Features-Inserting picture-Inserting design templates- Inserting transitions and animations-Saving PowerPoint in different formats	6

..... Self Study

Text Book(s):
1. Sanjay Saxena, MS Office 2000 for Everyone, Vikas Publishing, 2001

Reference Book(s):
1. Archana Kumar, Computer Basics with Office Automation, First Edition, 2010

Web Resource(s):
1. http://www.bcpls.org/Docs/Computer_Handouts/Word101.pdf 2. http://www.itdesk.info/Microsoft%20Excel%202010%20notes.pdf

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Understand the basic knowledge of computer and components of computer in education.	K1
CO2	Perform common functional operations in Windows and apply the menus in MS-Word.	K2
CO3	Understand the menus and Toolbars in MS-Excel.	K2
CO4	Understand the components of MS-PowerPoint.	K2
CO5	Understand the Database Create and usage of MS-Access.	K3

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	2	2	3	1	2	2	3	1	2	1	1.9
CO2	3	2	3	1	3	1	2	3	3	2	2.3
CO3	1	2	3	2	2	2	2	3	2	1	2.0
CO4	2	3	1	2	2	2	2	2	1	2	1.9
CO5	3	2	2	2	2	2	1	2	2	2	1.9
Mean Overall Score											2.02
Correlation											Medium

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Mrs. S. Munavara Banu

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
IV	23UCA4CC7	Core – VII	6	6	25	75	100

Course Title	Database Management Systems

SYLLABUS		
Unit	**Contents**	**Hours**
I	**Database Concepts:** Database and DBMS, Comparison between traditional file V/s DBMS, Characteristics of data in database, Components of database system environment, Functions of DBMS, Advantages and disadvantages of the DBMS, DBMS users, Database administrator, Role of DBA. Database Design and Architecture, Essentials of Database Design, Three level Architecture of Database - External, Conceptual and Internal. **Data Models concept:** Relational, Operators, relations, domains and attributes, keys.	18
II	**Normalization:** Purpose of Normalization – How Normalization Support Database Design – Data Redundancy and Update Anomalies – Functional Dependencies – First Normal Form – Second Normal Form – Third Normal Form – Advanced Normalization – *BCNF*.	18
III	**Relational Algebra:** Algebraic Operation – Select – Project – Set Operations – Cartesian product - Rename – Join – Division. SQL – Advantages – Types of SQL Commands – Creating table – Modify Table – Views – INSERT, UPDATE, and DELETE Operations – Queries – Aggregate Functions with Grouping and Having Clause – Sub Queries.	18
IV	Introduction to PL/SQL – Variables – Data Types – Control Structure – Cursors – Iterative Control Statement – PL/SQL Exception – Triggers – Types of Triggers – Procedures and Packages	18
V	**Client/Server Technology and Client Server Database:** Introduction – Benefits of C/S Computing – Cost of C/S computing – Applications Architecture. **Database Security:** Database Security Risks – Dimension of Database Security – Data Security Requirements – Database Users – Protecting the Data within the Database – Roles – Granting and Revoking Privileges – System Availability Factors – Network Security.	18

……. Self Study

Text Book(s):
Alexis Leon and Mathews Leon, Database Management Systems, Vikas Publishing House Pvt. Ltd., New Delhi.
UNIT I : Chapters 5, 7, 8 & 9   UNIT III: Chapters 12, 14, 15 & 16   UNIT IV: Chapter 21, Glossary of Database Terms: D   UNIT V : Chapters 32 & 2
2. Thomas M. Connolly, Carolyn E. Begg, Database Systems A Practical Approach to Design, Implementation and Management, Pearson Education, Fifth impression 2012.
UNIT II: Chapter 13 (Sections 13.1 – 13.4 & 13.6 – 13.9) & Chapter 14 (14.2)
Web Resource(s)
https://www.tutorialspoint.com/
https://www.javatpoint.com/dbms

Course Outcomes		
Upon successful completion of this course the student will able to :		
CO No.	CO Statement	Cognitive Level (K – Level)
CO1	Understand the basic concepts and various data model and query language used in the database design	K1, K2
CO2	Understand the Normalization techniques.	K2
CO3	Master the basics of SQL and construct queries using SQL	K3
CO4	Apply PL/SQL for processing database	K4
CO5	Design and build the principles of Client – server computing and mandatory access control	K5

Relationship Matrix:

Course Outcomes (CO's	Programme Outcomes(PO's)					Programme Specific Outcomes(PO's)					Mean Score of CO'S
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	3	2	3	1	3	3	3	3	1	2.5
CO2	3	3	2	3	2	3	3	3	2	1	2.4
CO3	3	3	3	2	1	3	2	2	3	2	2.5
CO4	2	3	3	3	2	3	3	3	2	2	2.5
CO5	3	3	3	3	2	3	3	3	3	2	2.7
										3Mean Overall Score	2.54
										Correlation	High

Mean Overall score=Sum of Mean Score of Cos / Total Number of Cos

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Dr. R. Inbaraj

Semester	Course Code	Course Category	Hours/Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
III	23UCA4CC8P	Core – VIII	3	3	20	80	100

Course Title	RDBMS Lap - Practical

1. SQL: DATA DEFINITION LANGUAGE
　　　a) Table Creation: Primary Key.
　　　b) Table Alteration: Rename table and Column name, Add Column, Drop column,
Modify Column size
　　　　and Data type.
　　　c) Drop Table
　　　d) Truncate Table

2. SQL: DATA MANIPULATION LANGUAGE
　　　a) Select   b) Insertion   c) Update   c) Deletion d) String Operations e) Set
Operations
　　　f) Tuple Variables g) Aggregate Functions with Grouping and Having Clause
　　　h) Ordering Tuples i) Join Operations – Inner-Join, Outer- join, Right outer join, Left
Outer Join.
　　　j) Nested Sub-queries – Set Membership (IN, NOTIN), Set Comparison (SOME, ALL
Sub-queries in
　　　　the From Clause)

3. SQL: DATA CONTROL LANGUAGE
　　　a) Grant   b) Revoke

4. SQL: TRANSACTION CONTROL LANGUAGE
　　　a) Commit   b) Rollback   c) Savepoint

5. PL/SQL PROCEDURE
　　　a) Reverse the String
　　　b) Find Factorial number using Recursive Function
　　　c) Prepare Student Mark Sheet
　　　d) Employee Pay Roll
　　　 e) EB – Bill

Course Coordinator: Dr. R. INBARAJ

Semester	Course Code	Course Category	Hours/Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
IV	23UCA4AC7	Allied - VII	4	4	25	75	100

Course Title	SCRIPTING LANGUAGES

SYLLABUS		
Unit	Contents	Hours
I	HTML: Introduction – SGML – Outline of HTML Document – Head Section – Body Section – HTML Forms	12
II	DHTML: Introduction – Cascading Style Sheets – DHTML Document Object Model and Collections – Event Handling – Filters and Transitions – Data Binding	12
III	Introduction to JavaScript: Beginning with JavaScript. Placing JavaScript in an HTML: Using the HTML Script tags – Creating your first script – Using External JavaScript files – Using functions – *JavaScript operators*.	12
IV	Conditional Statements and Loops - Event Handlers – The Document Objects – Window Object – Math, Number and Data objects	12
V	Typescript: Overview – environment setup – basic syntax – types – variables – operators – decision making – loops – functions – strings – *classes*.	12
VI	**Current Trends (For CIA only) –** Contemporary developments related to the course during the semester concerned.	

….. Self Study

Text Book(s):

1. N.P. Gopalan, J. Akilandeswari, Web Technology, PHI Learning Private Limited, New Delhi, Fifth Printing, 2011
2. John Pollock, "JavaScript", TATA McGRAW - Hill, Third Edition, 2010
3. Tutorial.pdf, Tutorials Point (I) Pvt. Ltd., 2016

Reference Book(s):

1. Douglas Crockford, Java Script: The Good parts, O'Reilly Media, 2008

Web Resource(s):

1. https://riptutorial.com/Download/typescript.pdf
2. https://pdfcoffee.com/qdownload/typescript-tutorial-pdf-free.html

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Understand the basic concepts of HTML, CSS, and JavaScript	K2
CO2	Analyze a web page and identify its elements and attributes	K2
CO3	Demonstrate the important HTML tags for designing static pages and separate design from content using Cascading Style Sheet	K3
CO4	Implement interactive web pages using html and JavaScript	K4
CO5	Develop web application software tools and identify the environments currently available on the market to design web sites	K5

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	2	2	3	2	3	2	2	2	3	3	2.4
CO2	3	2	3	3	2	3	2	3	3	2	2.6
CO3	1	2	3	3	3	2	2	2	3	3	2.4
CO4	3	2	3	3	3	1	2	2	2	2	2.3
CO5	3	3	2	2	3	2	2	3	3	1	2.4
Mean Overall Score											**2.51**
Correlation											**High**

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator   Mr. M. KAMAL

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
IV	23UCA4AC8P	Allied - VIII	3	2	20	80	100

Course Title	Scripting Languages Lab - Practical

1. Develop a HTML document to basic alignments on headers and format the document using suitable tags.

2. Develop a HTML document which displays the arts and science department of your college and the courses offered by the department using list.

3. Develop a HTML document to create table with rows and columns and split them using rows span and column span.

4. Using CSS and HTML, make a webpage that has two columns. Each column should use half of the width of the page. The left half should have a light-gray background and the right half should have a light green background. The left half should have a list of the 5 best-selling books in Amazon's kindle store, and the right should have a list of your five favourite celebrities or athletes.

5. Develop a program to illustrate CSS border style properties

6. Develop a JavaScript program to compute the sum of an array of integers.

7. Develop a JavaScript program to generate ten random numbers within 1 to 100 and display the numbers in a table.

8. Develop a JavaScript to create an Arithmetic Calculator using user defined Function

9. Develop a JavaScript for loop that will iterate from 0 to 100. For each iteration, it will check if the current number is odd or even, and display a message to the screen.

10. Develop a JavaScript program to sum of sum digits of a given number.

11. Develop a JavaScript function to demonstrate the mathematical functions.

12. Develop a JavaScript program to demonstrate the various string functions.

13. Develop a Typescript program to demonstrate the control statements

14. Develop a Typescript program to demonstrate the string functions

Course Coordinator   **Mr. M. KAMAL**

Semester	Course Code	Course Category	Hours/Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
IV	23UCA4GE2	Generic Elective – II	2	2	-	100	100

Course Title	Image Editing Tools

SYLLABUS		
Unit	**Contents**	**Hours**
I	Photoshop Panels and Tools: Workspaces-The Tool Bar-The Options Bar-The Menu Bar. Basic Operations: Opening Files-Open As-Open As Smart Object-Saving Your Work-Popular and Useful File Formats-Creating a New Document.	6
II	Navigating and Zooming: The Navigator Panel-The Hand Tool-The Zoom Tool-Useful Keyboard Shortcuts. Simple Global Adjustments: Levels-Hue Saturation. Layers : Layers-Aligning and Moving Layers-Layer Interactions-Blend Modes-Naming Layers-Text Layers-Shape Layers.	6
III	Simple Selections: The Magic Wand Tool-The Marquee Tools-Marquee Selection Modifier Keys-The Lasso Tools-Copying a Selected Item to a New Layer. Choosing Colours : The Foreground and Background colours-Changing the Colours-The Swatches Panel-*The Color Panel*.	6
IV	Video and animation: - Creating frame animations- Creating timeline animations-Creating images for video- Saving and exporting video and animations- Editing video and animation layers	6
V	Filter and effects: Filter basics- Filter effects reference- Add Lighting Effects. Saving and exporting: Saving images- File formats	6
VI	**Current Trends (For CIA only) –** Contemporary developments related to the course during the semester concerned.	

 ….. Self Study

Text Book(s):
1. An Introduction to Adobe Photoshop- Steve Bark & Ventus   UNIT I : Chapters 1 & 2   UNIT II : Chapters 3,4 & 5   UNIT III : Chapters 6 & 7 2. ADOBE® PHOTOSHOP Help and tutorials by Adobe - February 2013   UNIT IV : Chapter 13   UNIT V : Chapters 14 & 15
Reference Book(s):
1. Barbara Obermeier, Ted Padova, Photoshop Elements 2020 for Dummies, Published by John Wiley & Sons, Inc., New Jersey, 2020
Web Resource(s):
https://help.adobe.com/archive/en/photoshop/cs6/photoshop reference.pdf

	Course Outcomes	
	Course Outcomes	
	Upon successful completion of this course, the student will be able to:	
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Acquire the knowledge on photo editing.	**K2**
CO2	Acquire the knowledge on photo editing.	**K2**
CO3	Learn the practical experience in editing video and animation	**K3**
CO4	Understand image cropping Operations	**K2**
CO5	Get idea on applying Filter and light effect	**K2**

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	2	3	2	3	2	2	2	3	3	2.4
CO2	3	2	3	3	2	3	2	3	3	2	2.6
CO3	1	2	3	3	3	2	2	2	3	3	2.4
CO4	3	2	3	3	3	1	2	2	2	2	2.3
CO5	3	3	2	2	3	2	2	3	3	1	2.4
Mean Overall Score											**2.02**
Correlation											**Medium**

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Mrs. S. Tamil Fathima

Semester	Course Code	Course Category	Hours/Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
V	23UCA5CC9	Core – IX	6	6	25	75	100

Course Title	Software Engineering

SYLLABUS		
Unit	Contents	Hours
I	Introduction – Evolution – Software Development projects – Emergence of Software Engineering. Software Life cycle models – Waterfall model – Rapid Application Development – Agile Model – Spiral Model	15
II	Requirement Analysis and Specification – Gathering and Analysis – SRS – Formal System Specification.	15
III	Software Design – Overview – Characteristics – Cohesion & Coupling – Layered design – Approaches. Function Oriented Design – Structured Analysis – DFD – Structured Design – Detailed design	15
IV	Object Modeling using UML – OO concepts – UML – Diagrams – Use case, Class, Interaction, Activity, State Chart – Postscript.	15
V	Coding & Testing – coding – Review – Documentation – Testing – Black-box, White-box, Integration, OO Testing, Smoke testing.	15
VI	**Current Trends** *(For CIA only)	

* For Theory Core Course, wherever possible

Text Book(s):
1. Rajib Mall, Fundamentals of Software Engineering, PHI 2018, 5th Edition.

Reference Book(s):
1. Roger S. Pressman, "Software Engineering - A Practitioner's Approach", McGraw Hill 2010, 7th Edition.   2. Ian Sommerville, Software Engineering, Pearson Education Asia, New Delhi, Ninth Edition, 2015.

Web Resource(s):
1. NPTEL online course – Software Engineering - https://nptel.ac.in/courses/106105182/   2. www.pubnub.com/blog/2015-05-27-internet-of-things-101-getting-started-w-raspberry-pi/

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Understand the different software process models	K1
CO2	Acquire the knowledge of system engineering process	K2
CO3	Realize the system design process and design quality	K3
CO4	Understand the various software testing methods	K3
CO5	Understand the software quality assurance and metrics.	K3

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2	3	2	3	3	2	3	3	1	2.5
CO2	3	2	2	3	3	2	2	2	3	3	2.5
CO3	2	3	3	3	3	3	2	3	2	3	2.7
CO4	3	2	3	2	3	2	3	3	3	2	2.6
CO5	3	2	3	2	3	2	3	3	3	3	2.7
Mean Overall Score											2.6
Correlation											High

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Dr. S. PEERBASHA

Semester	Course Code	Course Category	Hours/Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
V	23UCA5CC10	Core - X	5	5	25	75	100

Course Title	Operating Systems

SYLLABUS		
Unit	**Contents**	**Hours**
I	Operating System Overview – Basic Concepts and Terminologies – Operating System as Resource Manager – I/O Programming: Types of I/O Channels – I/O Processor Structure – Communication between the CPU and Channel - Interrupt Structure and Processing: Interrupt Types – Interrupt Mechanism – Interrupt Handler Processing.	15
II	Memory Management – Single Contiguous Allocation – Multiprogramming – Partitioned Allocation – Relocatable Partitioned Memory Management – Paged Memory Management – Demand Paged Memory Management. - Segmented Memory Management – Swapping.	15
III	Process Management –State Model – Job Scheduling: Job Scheduling in Non-multi-programmed Environment – Job Scheduling in Multi-programmed Environment – Multiprocessor Systems - Process Synchronization.	15
IV	Device Management – Techniques For Device Management – Device Characteristics – Channels and Control Units - I/O Traffic Controller – I/O Scheduler and Device Handlers.	15
V	Information Management: A Simple File System - General Model File System – Logical File System - Physical File System – Allocation Strategy Module.	15
VI	**Current Trends** *(For CIA only) –** Contemporary developments related to the course during the semester concerned.	

* For Theory Core Course, wherever possible

Text Book(s):

1. S.E. Madnick and J. J. Donovan, Operating Systems, McGraw Hill International Book Co, New Delhi, 2017.

Reference Book(s):

1. Darrell Hajek, Cesar Herrera, Principles of Operating Systems, Kindle Edition, 2020

Web Resource(s):

1. https://www.techtarget.com/whatis/definition/operating-system-OS
2. https://www.tutorialspoint.com/operating_system/os_overview.htm
3. https://archive.nptel.ac.in/courses/106/105/106105214/

Course Outcomes

Upon successful completion of this course, the student will be able to:

CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Define the key concepts and terminologies related to operating systems, including types of operating systems, resource management.	K1
CO2	Apply knowledge of memory management techniques to design memory allocation strategies for various operating environments, including contiguous allocation, partitioned allocation, and paging.	K2
CO3	Analyze different job scheduling algorithms in both multi-programmed and non-multi-programmed environments, identifying their strengths and weaknesses in process management.	K3
CO4	Evaluate the performance of various device management techniques, including I/O scheduling and spooling, assessing their impact on overall system efficiency.	K3
CO5	Integrate concepts of file systems, including symbolic and logical file systems, to propose an efficient file allocation strategy that ensures proper access control and verification.	K4

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2	3	2	3	3	2	3	3	1	2.5
CO2	3	2	2	3	3	2	2	2	3	3	2.5
CO3	2	3	3	3	3	3	2	3	2	3	2.7
CO4	3	2	3	2	3	2	3	3	3	2	2.6
CO5	3	2	3	2	3	2	3	3	3	3	2.7
										Mean Overall Score	2.6
										Correlation	High

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Mr. L. IMAMDHEEN

Semester	Course Code	Course Category	Hours/Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
V	23UCA5CC11	Core - XI	5	5	25	75	100

Course Title	Python Programming

SYLLABUS		
Unit	**Contents**	**Hours**
I	Python Programming: An Introduction - IDLE - Python Strings - Operators - Variables and Assignment - Keywords - Script Mode. Functions: Built-in Functions - Function Definition and Call - importing User-defined Module. Control Structures: if conditional statement - Iteration Statements.	15
II	Strings: Strings - Slicing - Membership - Built-in Functions of Strings - String Processing Examples. Mutable and immutable Objects: List - Sets.	15
III	Mutable and Immutable Objects: Tuples - Dictionary. Recursion: Recursive Solutions for Problems on Numeric Data - Problems on Strings - Problems on List. Files and Exceptions: File Handling - Writing Structures to a File - Errors and Exceptions - Handling Exceptions using try-except - File Processing Example.	15
IV	Classes and Object Oriented Programming: Classes - Class definitions - Storing Classes in Modules. GUI Programming: Graphical User Interfaces –Using the tkinter Module - Display Text with Label Widgets - Organizing Widgets with Frames - Button Widgets and Info Dialog Boxes - Getting Input with the Entry Widget - Using Labels as Output Fields - Radio Buttons and Check Buttons.	15
V	Applications of Python: Sharing Data Using Sockets: Client-Server Communication on the same machine – Accessing Web Data. Managing Databases using SQL: Database Concepts – Creating Database and Tables – Inserting Data into Table – Retrieving Data from Table – Updating Data in a Table – Deleting Data from Table/Deleting Table.	15
VI	**Current Trends** *(**For CIA only**)	

* For Theory Core Course, wherever possible

Text Book(s):
1. Sheetal Taneja, Naveen Kumar, Python Programming, Pearson, 12th Edition, 2021 2. Tony Gaddis, Starting out with Python, Second Edition, Pearson Pvt. Ltd., 4th Edition, 2019
Reference Book(s):
1. Mark Lutz, Programming Python, O'Reilly, 4th Edition, 2010 2. Charles Severance, Python for Everybody, Kindle Edition, 2016
Web Resource(s):
1. www.docs.python.org/3/tutorial/index.html 2. www.halvorsen.blog/documents/programming/python/resources/PythonProgramming.pdf 3. https://onlinecourses.swayam2.ac.in/cec22_cs20/preview

Course Outcomes

	Upon successful completion of this course, the student will be able to:	
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Show proficiency in Python basics like data types and control structures, and use built-in functions, string manipulation, and file handling.	**K1**
CO2	Identify and use Python data structures like lists and dictionaries, and understand the implications of mutable versus immutable objects.	**K2**
CO3	Analyze and optimize recursive solutions to ensure efficiency and effectiveness.	**K3**
CO4	Create and use Python classes to model real-world problems and develop user-defined modules to organize and reuse code effectively.	**K4, K5**
CO5	Develop interactive GUI applications with tkinter, and build robust Python applications by implementing client-server communication, databases with SQL, and accessing web data.	**K5**

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	3	3	2	3	3	3	2	3	2.8
CO2	3	3	3	3	3	3	2	3	3	2	2.8
CO3	3	2	3	3	2	3	2	2	3	3	2.6
CO4	3	3	3	3	3	2	2	2	3	3	2.7
CO5	3	3	2	3	2	3	3	3	2	3	2.7
										Mean Overall Score	2.72
										Correlation	High

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Dr. M. KAMAL

Semester	Course Code	Course Category	Hours/Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
IV	23UCA5CC12P	Core – XII	4	4	20	80	100

Course Title	Python Programming Lab - Practical

SYLLABUS

1. Write a Python program to demonstrate the use of various operators (arithmetic, relational, logical, bitwise) on variables.
2. Write a Python program to perform the string operations.
3. Write a Python program to input a number and check whether it is odd or even using an if-else conditional statement.
4. Define a user-defined module containing a function to calculate the factorial of a number. Import and call the function from another script.
5. Create a Python script that takes a sentence as input and counts the number of vowels and consonants.
6. Write a Python program to demonstrate list operations like insertion, deletion, slicing, and concatenation.
7. Implement a Python program to demonstrate set operations like union, intersection, and difference.
8. Write a Python program to create a tuple, access its elements, and perform tuple slicing. Demonstrate immutability of tuples.
9. Write a recursive Python function to find the greatest common divisor (GCD) of two numbers.
10. Write a Python program to read and write data to a text file. The program should take user input and store it in the file, then read it back and display it.
11. Write a program to implement a Python script that demonstrates the use of try-except to handle division by zero errors and other common exceptions.
12. Write a Python program to define a Student class with attributes name, age, and grade. Create objects of this class and display their details.
13. Tkinter Label and Button: Create a Python GUI using tkinter that displays a label and a button. When the button is clicked, change the label's text.
14. Develop a GUI application in Python using tkinter that takes a user's name as input in an entry widget and displays it using a label when a button is clicked.
15. Radio Buttons and Check Buttons: Create a Python GUI application using tkinter with a set of radio buttons to select a gender and check buttons to select hobbies. Display the selected options when a button is pressed.
16. Write a Python program that demonstrates client-server communication using sockets on the same machine. The client sends a message to the server, and the server responds with a confirmation message.
17. Database Operations - Insertion and Retrieval: Develop a Python script that creates a database and table using SQL. Insert data into the table and retrieve it using a SELECT statement.

Course Coordinator: Dr. M. KAMAL

Semester	Course Code	Course Category	Hours/Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
V	23UCA5DE1AT	Discipline Specific Elective - I (a)	4	4	10	40	50

Course Title	VB .Net

SYLLABUS		
Unit	**Contents**	**Hours**
I	.NET Framework Overview – Namespace – Languages in .NET – Visual Studio .NET – Why VB.NET? – Objects and Properties – Constructors and Destructors – Interfaces – Free Threading – Delegates – Winforms - Console Applications – ADO.NET	12
II	VB.NET Program: The Solution Explorer Window – The Class View Window – Toolbox – Output Window – The Task List Window. Literals – Variables – Data Types – Declaration of Variables – Constant – Statements – Operators.	12
III	Control Statements: IF Statement – Block-If – Nested If – Looping – Select-Case Statement – Goto Statement – Early Exit from Control Statements. Intrinsic Control List – Events – Label – Textbox – Group Box - Check Box – Radio Button – Scroll Bar – Timer – Picture Box – Working with Mouse Input – Date Time Picker – Month Calendar.	12
IV	One-Dimensional Array – Array Initialisation – Printing array elements using For Each..Next Loop – Redim Statement – Multi-dimensional array – Initialization of Two-dimensional array – Arrays of array – List Box Control – Checked List Box – Combo Box Control – Procedures and Structures: Subroutine Procedures – Function Procedure – Property Procedure – Functions – Sub Procedure – Structures – Message Box Function – Input Box Function.	12
V	Menu – MDI Forms – Context Menu – RichTextBox – Color Dialog Control – Font Dialog Control. Data Access with ADO.NET: Database – Relational Database – Table Creation – Record Insertion – Displaying Data – Deleting Data – Modifying – Drop Table – Special Features of ADO.NET. Connection – Commands – Data Reader – Data Set – Using Data Grid.	12
VI	**Current Trends** *(**For CIA only**)	

  * For Theory Core Course, wherever possible

Text Book(s):
1. P. Radhaganesan,VB.NET , 1st Edition, Scitech Publications(India) Pvt Ltd, 2014.
Reference Book(s):
1. JefreyR.Shapiro, The Complete Reference – Visual Basic .NET, Tata McGraw-Hill, 2002. 2. StevemHolzner, Visual Basic .Net Programming Black Book, Dreamtech Press, Reprint 2011.
Web Resource(s):
1. https://www.javatpoint.com/vb-net 2. https://www.tutorialspoint.com/vb.net/index.htm

Course Outcomes

Upon successful completion of this course, the student will be able to:

CO No.	CO Statement	Cognitive Level (K-Level)
CO1	State and understand the .Net framework features and to develop console applications in VB.Net	K1, K2
CO2	Describe the basic structure of a Visual Basic.NET project and use main features of the Integrated Development Environment (IDE)	K2, K3
CO3	Solve simple real world problems using looping, branching and arrays and test the results	K3, K5
CO4	Construct solutions by assembling multiple forms, modules, and working with menus	K4, K5
CO5	Examine the complexity of problems and develop data-related solutions using database concepts	K3, K5

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	1	1	1	2	2	1	1	2	2	2	1.5
CO2	1	2	2	2	2	2	2	2	2	3	2.0
CO3	2	2	2	3	3	3	2	3	3	3	2.6
CO4	2	2	3	3	3	3	3	3	3	3	2.8
CO5	3	3	3	3	3	3	3	3	3	3	3.0
Mean Overall Score											2.38
Correlation											Medium

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Dr. K. NAFEES AHMED

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
V	23UCA5DE1BT	Discipline Specific Elective - I (a)	4	4	10	40	50

Course Title	C# .Net Programming

SYLLABUS		
Unit	Contents	Hours
I	Introduction to C# - Evolution of C# - Characteristics of C# - Applications of C# - The Origin of .Net Technology – The .Net framework – The Common Language Runtime - .NET Languages – Literals, Variables and Data Types	12
II	Operators – Arithmetic Expressions – Evaluation of Expressions - Precedence of Arithmetic Operators – Type Conversions. Decision Making and Branching – Looping. Methods in C#: Declaring Methods – Main Method – Invoking Methods – Nesting of Methods – Pass by Value – Pass by Reference - Handling Arrays	12
III	Manipulating Strings: Creating Strings – String Methods – Inserting Strings – Comparing Strings. Classes and Objects: Defining a Class - Adding Variables – Adding Methods – Member Access Modifiers – Creating Objects – Accessing Class Members – Constructors – Overloaded Constructors – Destructor. Inheritance and Polymorphism: Containment Inheritance – Defining sub class - visibility control – multilevel inheritance. overriding methods – hiding methods – abstract classes - Interface: Multiple Inheritance: defining an interface – extending interface –implementing interface.	12
IV	Delegates and Events – Managing Console I/O operations - Managing Errors and Exceptions: Types of Errors – Syntax of Exception Handling code – Multiple catch statements – The Exception Hierarchy – General catch handler – using finally statement – Nested try blocks – Throwing our own exceptions - using Exception for debugging – Multithreading in C#	12
V	Windows Forms and Web based application Development on Net: creating windows forms – Customizing a form – Creating and running a sample win app windows application – overview of design patterns –web based application on .Net	12
VI	**Current Trends** * **(For CIA only)**	

* For Theory Core Course, wherever possible

Text Book(s):
1. E. Balagurusamy, C# - A Primer, Tata McGraw Hill, 4th Edition, 2014

Reference Book(s):
1. Herbert Schildt, C# 4.0 The Complete Reference, McGraw Hill Education, 2010 2. Ian Griffiths, Programming C# 8.0: Build Cloud, Web, and Desktop Applications, O'Reilly Media, 2019

Web Resource(s):
1. https://docs.microsoft.com/en-us/dotnet/csharp/ 2. https://www.c-sharpcorner.com/

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Understand the basics of C# and .NET	K1, K2
CO2	Apply basic syntax and operators in C# programming	K3, K4
CO3	Develop C# programming using basic object-oriented principles	K3, K4
CO4	Understand and identify exception handling techniques and implement the real time applications	K4, K5
CO5	Create desktop and web applications using components of C# and .NET	K5, K6

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	3	2	3	3	3	2	1	2	2.4
CO2	3	3	3	2	1	3	3	3	2	2	2.5
CO3	3	2	3	2	3	2	3	3	3	2	2.6
CO4	2	3	2	2	3	3	3	2	2	2	2.4
CO5	3	3	3	3	3	1	2	2	2	2	2.4
Mean Overall Score											2.46
Correlation											Medium

Mean Overall Score	**Correlation**
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Mr. K. MOHAMED ARIFKHAN

Semester	Course Code	Course Category	Hours/Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
V	23UCA5DE1AP	Discipline Specific Elective - I (b)	2	1	10	40	50

Course Title	VB .Net Lab - Practical

SYLLABUS

1. Demonstrate If and Select statements in VB.NET using a console application.

2. Demonstrate the looping statements in VB.NET using a console application.

3. Develop a windows application using Text Box, Check Box and Radio Button controls.

4. Develop a windows application using Timer control.

5. Demonstrate the use of Arrays using a console application.

6. Develop a windows application using List Box and Combo Box controls.

7. Develop a windows application using Functions.

8. Develop a windows application using Menus and Dialog Boxes.

9. Develop a database application for student information system using ADO.NET.

10. Develop a database application for library information system using ADO.NET.

Course Coordinator: Dr. K. NAFEES AHMED

Semester	Course Code	Course Category	Hours/Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
V	23UCA5DE1BP	Discipline Specific Elective - I (b)	2	1	10	40	50

Course Title	C# .Net Programming Lab - Practical

SYLLABUS

Develop Programs using C#

1. Write a Programs using
   a) if statement
   b) if..else statement
   c) nested if..else statement
2. Write a Program
   a) to find sum of series using foreach statement
   b) to find the odd or even numbers between 1 to 100 using for loop
3. Write a program to perform various arithmetic operations using switch statement
4. Write a program to print the multiplication table using do..while loop
5. Write a C# program that uses a method to sort an array of integers
6. Demonstrate ArrayList Class
7. Write a program to find the vowels, consonants and words from a given sentence using string handling functions
8. Write a program to demonstrate multilevel Inheritance
9. Write a program to implement a delegate and events
10. Write a program using try and catch for exception handling
11. Write a program to demonstrate Multithreading
12. Develop a windows application for simple calculator

Course Coordinator: Mr. K. MOHAMD ARIFKHAN

Semester	Course Code	Course Category	Hours/Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
V	23UCA5SE1	Skill Enhancement Course - I	2	1	--	100	100

Course Title	Digital Marketing

SYLLABUS		
Unit	**Contents**	**Hours**
I	**Introduction to Digital Marketing** - Definition and Evolution of Digital Marketing - Traditional vs Digital Marketing - Overview of Digital Marketing Channels: SEO, SEM, SMM, And Email Marketing - Setting Objectives and KPIs - The Buyer's Journey in Digital Marketing - #Self-study: Case study on the importance of digital marketing in modern business.	6
II	**Search Engine Optimization (SEO)** - Introduction to SEO: On-Page vs Off-Page SEO - Keyword Research and Strategy - Website Optimization Techniques - Importance of Backlinks - Technical SEO: Sitemaps, Robots.txt, and Site Speed - # Self-study: Trends in Mobile SEO and Voice Search	6
III	**Social Media Marketing (SMM)** - Introduction to Social Media Platforms (Facebook, Instagram, Twitter, LinkedIn) - Creating a Social Media Marketing Plan - Content Creation and Curation for Social Media - Organic vs Paid Social Media - Monitoring and Analytics for Social Media - # Self-study: Importance of Influencer Marketing.	6
IV	**Content Marketing** - Content Marketing Strategy and Planning - Types of Content: Blogs, Videos, Infographics - Content Creation: Best Practices - Distribution Channels: Email, Social Media, Websites - Content Marketing Metrics and Analytics - # Self-study: Case study on successful content marketing campaigns.	6
V	**Pay-Per-Click (PPC) and Analytics** - Introduction to PPC Advertising - Google Ads and Campaign Setup - Bid Management and Ad Auction - PPC Metrics: CTR, CPC, Conversion Rate - Conversion Tracking and Optimization - # Self-study: Exploring retargeting and remarketing strategies.	6
VI	**Current Trends** * **(For CIA only)**	

* For Theory Core Course, wherever possible

Text Book(s):
1. Dave Chaffey & Fiona Ellis-Chadwick, Digital Marketing: Strategy, Implementation, and Practice Pearson, 2019.

UNIT I: Chapters 1, 2 **UNIT II: Chapters 4, 5** **UNIT III: Chapters 7, 8**
UNIT IV: Chapters 9, 10 **UNIT V: Chapters 12, 13**

Reference Book(s):
1. Eric Enge, Stephan Spencer, and Jessie Stricchiola, The Art of SEO (O'Reilly, 2015.
2. Susan Gunelius, Content Marketing for Dummies (Wiley, 2020).
3. Howie Jacobson, Google AdWords for Dummies (Wiley, 2019).

Web Resource(s):
1. https://academy.hubspot.com/courses/digital-marketing
2. https://learndigital.withgoogle.com/digitalgarage/courses
3. https://onlinecourses.nptel.ac.in/noc22_mg109/preview

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Understand the fundamental concepts of digital marketing.	K1
CO2	Develop a working knowledge of various digital marketing tools and techniques.	K4
CO3	Gain practical experience with SEO, SEM, and content marketing strategies.	K3
CO4	Understand and apply social media marketing tactics.	K1, K4
CO5	Analyze the performance of digital marketing campaigns using metrics and analytics tools	K5

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	3	2	3	3	3	2	1	2	2.4
CO2	3	3	3	2	2	3	3	3	2	2	2.6
CO3	3	2	3	2	3	2	3	3	3	2	2.6
CO4	2	3	2	2	3	3	3	3	2	3	2.6
CO5	3	3	3	3	3	3	2	2	3	3	2.8
										Mean Overall Score	2.6
										Correlation	High

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Dr. O. S. ABDUL QADIR

Semester	Course Code	Course Category	Hours/Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
V	23UCA5SE2P	Skill Enhancement Course - II	2	1	--	100	100

Course Title	Digital Marketing Lab - Practical

SYLLABUS

1. Digital Marketing Implementation in Business Scenario
2. Create the Digital Marketing Webpage
3. Conducting the Search Engine Optimization and Search Engine Marketing
4. Using Google Analytics to analyze website performance
5. Creating Promotional banner through Canva
6. Facebook Promotion using banners
7. Creating YouTube Channel for Marketing
8. Twitter Marketing
9. Instagram Marketing
10. Email Marketing

Course Coordinator: Dr. M. KAMAL

Semester	Course Code	Course Category	Hours/Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
VI	23UCA6CC13	Core - XIII	5	5	25	78	100

Course Title	Data Communications and Networking

SYLLABUS		
Unit	Contents	Hours
I	Introduction: Computer Networks-Categories of Network- Open System and OSI model-Transmission Media-Transmission mode-Interfacing-Multiplexing-Types of Errors-Error Detection- Error Correction	15
II	LAN: Types of Network and Topology-LAN Transmission Equipment- Token Bus-Token Ring-FDDI Ethernet Technologies. WAN: WAN Transmission methods- WAN carrier types- WAN Transmission Equipment-WAN Protocols	15
III	Networking and Internetworking Devices: Repeaters – Bridges – Routers – Gateways. Routing Algorithms: Distance Vector Algorithm –Link State Algorithm - Dijkstra Algorithm. TCP/IP Protocol Suite: Part-I: Network Layer-Internetwork Protocol (IP), Transport layer: UDP-TCP.	15
IV	Point-to-Point Protocol PPP: Transition states – PPP Layers-Link Control Protocol LCP – Network Control Protocol - ISDN: Services - ISDN Layers- Future of ISDN	15
V	ATM: Design Goals: Packet Networks-Mixed Network packets - Cell Networks - Asynchronous TDM - ATM Architecture - ATM Layers. Network Security: Fundamental Concepts-Securing Network using Firewall	15
VI	**Current Trends * (For CIA only)**	

* For Theory Core Course, wherever possible

Text Book(s):

1. Brijendra Singh, Data communication and Computer Networks, Second edition
        UNIT I : Chapter 1.3,1.4,1.7,2.4,2.7,2.8,2.9,3.1,3.2,3.3
        UNIT II : Chapter 6.1,6.2,6.5,6.6,6.7,6.10,7.1,7.2,7.3,7.5.   UNIT V: Chapter 14.1, 14.7
2. Behrouz A.Forouzan, Data Communications and Networking, Tata McGraw Hill, Second Edition
        UNIT III : Chapter 21 and 24   UNIT IV : Chapter 16.1, 16.4, 16.6
        UNIT V : Chapter 19.1, 19.2, 19.5

Reference Book(s):

1. Wayne Tomasi, Introduction to Data Communication and Networking, First edition

Web Resource(s):

1. https://www.udemy.com/course/computer-networks
2. https://www.geeksforgeeks.org/computer-network-tutorials/
3. https://nptel.ac.in/courses/106105082

	Course Outcomes	
	Course Outcomes	
	Upon successful completion of this course, the student will be able to:	
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Define key concepts and terminologies related to computer networks, including categories of networks, OSI model, transmission media, and types of errors.	K1, K2
CO2	Apply knowledge of multiplexing, error detection, and correction techniques to design reliable communication systems.	K4
CO3	Design a network infrastructure incorporating various devices (repeaters, bridges, routers, gateways) and routing algorithms, ensuring optimal performance and reliability.	K3, K4
CO4	Assess the security of network architectures by analyzing potential vulnerabilities and proposing firewall solutions to enhance network security.	K4
CO5	Integrate knowledge of TCP/IP protocols, PPP, and ATM architecture to propose solutions for efficient data transmission and network management.	K5

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	3	3	2	3	3	3	1	3	2.7
CO2	3	3	3	2	3	3	3	3	3	2	2.8
CO3	3	3	3	2	3	3	3	2	3	3	2.8
CO4	3	3	2	3	2	3	2	3	3	3	2.7
CO5	3	3	2	3	3	2	3	3	3	3	2.8
Mean Overall Score											2.76
Correlation											High

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Dr. M. KAMAL

Semester	Course Code	Course Category	Hours/Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
VI	23UCA6CC14T	Core - XIV (a)	4	4	10	40	50

Course Title	Web Framework

SYLLABUS		
Unit	**Contents**	**Hours**
I	Introduction to Node.js- Features of Node.js – Environment Setup – REPL – Command Line Options - NPM - Callback Concepts - Upload Files – Events – Event Loop – Event Emitter – Console – Process – Packaging – RESTFul API – Buffers – Streams – File System.	12
II	What is Express.js? – The Interface – Configuration – Settings – Environments – Applying middleware – Types of middleware – Different Template Engines – Extracting Parameters – Routing – Request Handlers – Request – Response – Error Handling	12
III	Manage Cookies - Work with HTTP Headers - Redirects – CORS - Templating - Middleware - Serving static files - Send files - Sessions - Validating input - Sanitizing input - Handling forms - File uploads in forms	12
IV	React.js: Setup - Hello React World - React.createElement() - JSX - Custom Function Component- Custom Class Component - Textarea Component - Setting Up for App Development - Create React App - package.json and node_modules - Building the App's Components – Setup - CSS - Local Storage – Components – Logo and a Body - <Button> Component - Forms - <Actions> - Dialogs - Header - App Config - Context – Consuming Context – Routing.	12
V	MongoDB Basics - Mastering Selectors - Update: Replace Versus $set - Update Operators - Upserts - Multiple Updates - Mastering Find: Field Selection - Ordering - Paging - Count - Data Modeling: No Joins - Arrays and Embedded Documents - Denormalization - Aggregation Pipeline.	12
VI	**Current Trends** * **(For CIA only)**	

  * For Theory Core Course,wherever possible

Text Book(s):

1. Azat Mardan, Express.js Guide, The Comprehensive Book on Express.js, Leanpub, 2014
2. Flavio Copes, The Express Handbook
3. Stoyan Stefanov, React Up & Running, Building Web Applications, O'Reilly, Second Edition, 2021.
4. Karl Seguin and Perry Neal, The Little MongoDB Book

Reference Book(s):

1. Sandro Pasquali, Mastering Node.js, PACKT Publishing, First Edition, 2013

Web Resource(s):

1. https://www.tutorialspoint.com/nodejs/nodejs_introduction.htm
2. https://learndigital.withgoogle.com/digitalgarage/courses
3. https://nptel.ac.in/courses/106106156

Course Outcomes

Upon successful completion of this course, the student will be able to:

CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Define key concepts and terminologies related to Node.js, Express.js, and React.js, including features, middleware, and components.	K1, K2
CO2	Explain the architecture and workflow of Node.js applications, including the event loop, process management, and RESTful APIs.	K3, K4
CO3	Analyze different middleware types in Express.js and their role in the request-response cycle, including error handling and CORS.	K3, K4
CO4	Design and implement a full-stack application using Node.js, Express.js, and React.js, integrating components, routing, and state management.	K4, K5
CO5	Solve practical challenges related to file handling, session management, and dynamic content rendering in a web application context.	K5

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	3	3	3	2	3	3	3	3	1	2.7
CO2	3	3	3	2	3	2	3	3	3	2	2.7
CO3	3	3	3	2	3	3	3	2	3	3	2.8
CO4	3	3	2	3	2	3	2	3	3	3	2.7
CO5	3	3	2	3	3	2	3	3	3	3	2.8
									Mean Overall Score		2.74
									Correlation		High

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Lt. J. HAJIAM BEEVI

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
VI	23UCA6CC14P	Core - XIV (b)	2	2	10	40	50

Course Title	Web Framework Lab - Practical

SYLLABUS

1. Develop a basic server using Express.js that handles simple GET request.

2. Develop a BMI (Body Mass Index) calculator as a basic Express.js web application and learn how to handle user input and return calculated results via an API.

3. Develop a basic arithmetic calculator as an Express.js web application that can perform addition, subtraction, multiplication, and division based on user input.

4. Develop a simple file downloader using Express.js that allows users to download files from the server.

5. Develop an Express.js application that renders JSON data on an EJS (Embedded JavaScript) template.

6. Develop a countdown timer using React.js that counts down from a specified number of seconds and displays the remaining time.

7. Develop a simple React.js application that counts the number of words and letters in a user-provided text input.

8. Develop a React.js application that validates a password based on specific criteria.

9. Develop a simple React.js application where a button can be enabled or disabled based on a user's input.

10. Develop a React.js component that accepts a number as input and returns a list of all prime numbers that are less than or equal to the input number.

11. Implement CRUD operations using MongoDB Atlas.

12. Design and implement a simple application that allows users to manage a list of users using MongoDB and React.js

Course Coordinator: Lt. J. HAJIAM BEEVI

Semester	Course Code	Course Category	Hours/Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
VI	23UCA6CC15	Core - XV	5	5	25	75	100

Course Title	Cyber Security

SYLLABUS		
Unit	Contents	Hours
I	**Introduction to Security :** Data Encryption Standard-Block cipher principles-block cipher modes of operation-Advanced Encryption Standard (AES)-Triple DES-Blowfish-RC5 algorithm.	12
II	**Public Key Cryptography and Hash Algorithms:** Principles of public key cryptosystems-The RSA algorithm-Key management - Diffie Hellman Key exchange- Hash functions-Hash Algorithms (MD5, Secure Hash Algorithm	12
III	**Fundamentals of Cyber Security:** How Hackers Cover Their Tracks- Fraud Techniques- Threat Infrastructure- Techniques to Gain a Foothold (Shellcode, SQL Injection, Malicious PDF Files)- Misdirection, Reconnaissance, and Disruption Methods.	12
IV	**Planning for Cyber Security:** Privacy Concepts -Privacy Principles and Policies -Authentication and Privacy - Data Mining - Privacy on the Web - Email Security - Privacy Impacts of Emerging Technologies.	12
V	**Cyber Security Management:** Security Planning - Business Continuity Planning - Handling Incidents - Risk Analysis - Dealing with Disaster – Legal Issues – Protecting programs and Data – Information and the law – Rights of Employees and Employers - Emerging Technologies - The Internet of Things - Cyber Warfare.	12
VI	**Current Trends * (For CIA only)**	

* For Theory Core Course, wherever possible

Text Book(s):
1. William Stallings, "Cryptography and Network Security", Pearson Education, 6th Edition, 2013.   2. Charles P. Pfleeger Shari Lawrence Pfleeger Jonathan Margulies, Security in Computing, 5th Edition , Pearson Education , 2015.

Reference Book(s):
1. Graham, J. Howard, R., Olson, R., Cyber Security Essentials, CRC Press, 2011.   2. George K.Kostopoulous, Cyber Space and Cyber Security, CRC Press, 2013.

Web Resource(s):
1. Web resources from NDL Library, E-content from open-source libraries   2. https://onlinecourses.nptel.ac.in/noc23_cs127/previeew

Course Outcomes

Upon successful completion of this course, the student will be able to:

CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Implement basic security algorithms required by any computing system	K1
CO2	Analyze the vulnerabilities in any computing system and hence be able to design a security solution	K5
CO3	Analyze the possible security attacks in complex real time systems and their effective countermeasures	K5
CO4	Differentiate various governing bodies of cyber laws	K4
CO5	Impart various privacy policies for an organization	K4

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	3	3	3	2	3	3	3	3	1	2.7
CO2	3	3	3	2	3	2	3	3	3	2	2.7
CO3	3	3	3	2	3	3	3	2	3	3	2.8
CO4	3	3	2	3	2	3	2	3	3	3	2.7
CO5	3	3	2	3	3	2	3	3	3	3	2.8
										Mean Overall Score	2.74
										Correlation	High

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Dr. M. KAMAL

Semester	Course Code	Course Category	Hours/Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
VI	23UCA6PW	Project Work	5	4	--	100	100

Course Title	Project Work

Students will do the project work using Java, .Net, Python, and PHP as front-end technologies and MySQL, SQL Server, and Oracle as back-end databases.

Semester	Course Code	Course Category	Hours/Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
VI	23UCA6PW	Project Work	5	4	--	100	100

Course Title	Project Work

Semester	Course Code	Course Category	Hours/Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
VI	23UCA6DE2A	Discipline Specific Elective - II	4	4	25	75	100

Course Title	PHP Programming

SYLLABUS		
Unit	**Contents**	**Hours**
I	Introduction and Overview: Lexical Structure – Data types – Expressions, Operators, Control Statements and Functions: Operator Precedence –Arithmetic, String Concatenation, Comparison, Bitwise, Logical and Assignment Operators – Flow Control Statements – Functions.	12
II	Strings: Quoting String Constants – Printing Strings – Cleansing Strings – Comparing Strings – Manipulating and Searching Strings – Arrays: Types of Arrays – Important functions in array – Functions on Complete Arrays – Sorting- Graphics - Creating and Drawing Images - Basic Drawing functions.	12
III	Objects: Object Oriented Concepts - Classes and Objects in PHP - Declaring Methods - Declaring Properties - Declaring Constants - Inheritance - Abstract Classes - Constructors - Destructors - Files and Directories – Opening and creating files in PHP – Closing files in PHP – File uploading in PHP – File Downloading in PHP – Reading the contents of a Directory – Deleting the contents of a Directory – Creating the new Directories.	12
IV	Cookies: Need for Cookies – Uses of Cookies– Anatomy of a Cookie – Creating and Accessing Cookies in PHP – Deleting Cookies – PHP Sessions – Starting a PHP Session – Storing a Session variable – Destroying a Session – Forms: Form Handling – Processing Forms – Form Validation	12
V	MySQL: Connecting to and disconnecting from the Server – MySQL data types – SHOW and CREATE databases – Creating a table – DESCRIBE, INSERT and SELECT command – DROP tables and databases – Update, Alter and Delete Operations – MySQL access with PHP: Open a connection to the MySQL server – Disconnect a connection from MySQL server – Creating a database using PHP – Selecting MySQL database using PHP – Creating a table using PHP -Insert data into MySQL using PHP	12
VI	**Current Trends** [*] **(For CIA only)**	

* For Theory Core Course, wherever possible

Text Book(s):
1. J. Hajiram Beevi, Khairunnisa and S. Munawara Banu, Primer on PHP, Yazhini Publication, 1st Edition, 2016

Reference Book(s):
1. Julie Meloni and Matt Telles, PHP 6, Course Technology, CENGAGE Learning, India Edition, 2008

Web Resource(s):
1. https://www.w3schools.com/php/   2. https://www.php.net/manual/en/

Course Outcomes

Upon successful completion of this course, the student will be able to:

CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Understand the basic constructs of PHP programming	**K1**
CO2	Apply the object-oriented concepts	**K2**
CO3	Apply MySQL with PHP	**K3**
CO4	Apply suitable logic in solving problems	**K3**
CO5	Develop applications to solve real world problems	**K5**

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	2	3	2	3	3	3	2	3	0	2	2.3
CO2	2	2	2	2	2	2	2	2	2	2	2.0
CO3	3	3	3	2	2	3	3	2	2	2	2.5
CO4	3	2	3	3	2	2	3	3	2	3	2.6
CO5	2	2	1	3	3	2	1	3	3	3	2.3
									Mean Overall Score		2.34
									Correlation		Medium

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Ms. S. Munawara Banu

Semester	Course Code	Course Category	Hours/Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
VI	23UCA6DE2B	Discipline Specific Elective - II	4	4	25	75	100

Course Title	Data Science using R

SYLLABUS		
Unit	**Contents**	**Hours**
I	Introduction to Data Science and Data Visualization: Data Science Introduction: Concepts, lifecycle, applications. - Role of Data Visualization in Analysis and Decision Making. - Basics of R Programming: Variables, data types, operators. - Data Visualization Fundamentals: Principles, visualization types.	12
II	Data Preprocessing and EDA with R: Data Collection and Sources: Structured, unstructured, web scraping. - Data Cleaning: Handling missing data, outliers. - Data Transformation Techniques: Normalization, standardization, encoding. - Exploratory Data Analysis (EDA): Univariate, bivariate, multivariate analysis. - Advanced EDA Plotting: ggplot2 for customized visualizations, faceting, distributions.	12
III	Advanced Data Analysis and Visualization with R: - Statistical Analysis: Descriptive stats, hypothesis testing. - Data Visualization Libraries in R: ggplot2. - Machine Learning Concepts: Introduction to ML, basic models in R. - R Shiny: Building interactive web applications.	12
IV	Power BI for Data Visualization and Dashboard Creation: Introduction to Power BI: Interface, data connection, roles. - Creating Basic Visualizations: Bar charts, line charts, scatter plots. - Building Interactive Dashboards: Design principles, combining visualizations. - Effective Data Storytelling using Power BI.	12
V	Advanced Data Visualization and Integration: Advanced Visualization Techniques in R. - Integrating R with Power BI: Using R scripts and calculations. - Data Visualization Ethics and Best Practices. - Capstone Project: Applying skills using R and Power BI.	12
VI	**Current Trends * (For CIA only)**	

    * For Theory Core Course,wherever possible

Text Book(s):
1. R for Data Science by Hadley Wickham and Garrett Grolemund, 2017, O'Reilly Media.   2. Hands-On Data Visualization with R by Claus O. Wilke, 2019, O'Reilly Media.   3. Power BI for Data Science by Ryan Sleeper, 2023, Springer

Reference Book(s):
1. Data Visualization with Power BI by Daniel Murray   2. Data Storytelling with Power BI by Anupam Jain   3. The Visual Display of Quantitative Information by Edward Tufte

Web Resource(s):
1. https://www.r-project.org/about.html   2. https://onlinecourses.nptel.ac.in/noc19_ma33/preview

	Course Outcomes	
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Define data science and explain its lifecycle, including problem definition, data collection, preprocessing, analysis, modeling, and interpretation.	K1
CO2	Evaluate the role of visualizations in understanding trends, relationships, and outliers within data.	K2
CO3	Apply data transformation techniques like normalization, standardization, and encoding to prepare data for analysis.	K3
CO4	Navigate the Power BI interface and connect to various data sources to create impactful visualizations.	K4
CO5	Implement advanced visualization techniques in R to represent complex data more intuitively and informatively.	K5

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	3	3	2	3	3	3	3	1	2.7
CO2	3	3	3	2	3	2	3	3	3	2	2.7
CO3	3	3	3	2	3	3	3	2	3	3	2.8
CO4	3	3	2	3	2	3	2	3	3	3	2.7
CO5	3	3	2	3	3	2	3	3	3	3	2.8
Mean Overall Score											2.74
Correlation											High

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Dr. S.PEERBASHA

Semester	Course Code	Course Category	Hours/Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
VI	23UCA6DE3AP	DSE – III	4	3	20	80	100

Course Title	PHP Programming Lab - Practical

SYLLABUS

Write a Program in PHP

1. Using different types of operators

2. Using Switch Statement

3. Using While, Do-While & For Loop

4. Count the number of words in a string

5. To merge and sort the array values

6. Using graphics draw the hut house

7. Illustrate the use of constructors and destructors

8. To upload a file & to download a file

9. To store the current date and time in a COOKIE and display the 'Last Visited' date and time on the web page

10. To store the page views, count in SESSION, to increment the count on each refresh and to show the count on web page

11. Develop a Webpage to generate Prime number series from 1 to 1000.

12. Design a simple calculator

13. To create a Database and Table in MySQL

14. To insert, update and delete data in MySQL

15. To create a Registration form in MySQL

Course Coordinator: Ms. S. MUNAWARA BANU

Semester	Course Code	Course Category	Hours/Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
VI	23UCA6DE3BP	DSE – III	4	3	20	80	100

Course Title	R Programming Lab - Practical

SYLLABUS

1. Data Manipulation and Cleaning with R

Given a dataset customer_orders.csv, write an R program to:

a. Load the data using read.csv()
b. Perform data cleaning by removing rows with missing values
c. Rename specific columns for better readability
d. Filter the dataset to include only orders placed in 2023
e. Display the first 5 rows of the cleaned dataset

2. Exploratory Data Analysis (EDA)

Use the mtcars dataset to perform exploratory data analysis

a. Plot a histogram of mpg (Miles per Gallon) with appropriate bin sizes and labels
b. Create a box plot to visualize the distribution of hp (Horsepower) based on the number of cylinders (cyl)

3. Statistical Analysis and Hypothesis Testing

Perform a t-test to compare the means of two groups from the mtcars dataset

a. Test if there is a significant difference in mpg between cars with 4 cylinders and 6 cylinders
b. Write a hypothesis for the tes

4. Building Predictive Models using Linear and Logistic Regression

Use the mtcars dataset to build a predictive model:

a. Create a linear regression model to predict mpg using hp and wt as independent variables
b. Summarize the model output and interpret the coefficients
c. Evaluate the model performance using R-squared value

5. Time Series Analysis and Forecasting

Perform time series analysis on the AirPassengers dataset

a. Fit an ARIMA model using the auto.arima() function
b. Forecast the number of airline passengers for the next 12 months
c. Plot the forecast and compare it with the actual data

2. Data Visualization and Dashboard Creation

Create an interactive web application using Shiny that visualizes the mtcars dataset

a. Create a slider input to control the number of bins in a histogram of mpg
b. Display both a histogram of mpg and a scatter plot of wt (weight) vs. mpg

3. Working with Databases in R (SQL Integration)

Write a program to connect to a MySQL database and query data:

a. Establish a connection to a MySQL database with credentials
b. Write an SQL query to extract employees with salaries greater than 50,000 from the employee table
c. Display the retrieved data in R
d. Disconnect from the database

4. Machine Learning with R (Classification and Clustering)

Perform k-means clustering on the iris dataset:

a. Implement k-means clustering on the first four columns of the iris dataset
b. Visualize the clusters using a scatter plot of Petal. Length vs Petal. Width
c. Evaluate the performance of the clustering by comparing it with the actual species classification

5. Text Mining and Sentiment Analysis

Perform basic text mining using the following text corpus:

a. Create a corpus of text containing phrases like "I love programming" and "I dislike bugs".
b. Clean the text data by converting it to lowercase, removing punctuation, and eliminating stop words.
c. Create a term-document matrix and display the most frequent terms.
d. Discuss how text cleaning improves sentiment analysis.

6. Web Scraping with R

  Write a program to scrape data from a website:

a. Use the rvest package to read the HTML content from a website (e.g., "https://jmc.edu").
b. Extract specific elements like h1 or p (paragraph) tags and print their content.
c. Store the extracted text in a data frame and discuss the possible applications of web scraping in real-world scenarios.

Course Coordinator: Dr. S.PEERBASHA