

DEPARTMENT OF COMPUTER SCIENCE

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

Programme : B.Sc. Computer Science



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.SC. COMPUTER SCIENCE

Sem	Course Code	Part	Course Category	Course Title	Ins. Hrs/ Week	Credit	Marks		Total
							CIA	ESE	
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
	23UCS1CC1	III	Core - I	Programming in C and C++	5	5	25	75	100
	23UCS1CC2P		Core - II	Programming in C and C++ Lab - Practical	3	3	20	80	100
	23UMA1AC1		Allied - I	Linear Algebra and Differential Equations	4	3	25	75	100
	23UMA1AC2		Allied - II	Numerical Methods with Octave	4	3	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
	23UCS2CC3T	III	Core - III (a)	Java Programming	4	4	10	40	50
	23UCS2CC3P		Core - III (b)	Java Programming Lab - Practical	2	2	10	40	50
	23UCS2CC4		Core - IV	Web Programming	3	3	25	75	100
	23UMA2AC3		Allied - III	Operations Research	4	3	25	75	100
	23UMA2AC4	IV	Allied - IV	Statistics	3	3	25	75	100
	23UCN2SS		Soft Skills Development	Soft Skills Development	2	2	-	100	100
	23UCN2CO	V	Community Outreach	JAMCROP	-	@	-	-	@
	23U2BT1 / 23U2AT1		Basic Tamil - I / Advanced Tamil - I	எழுத்தும் இலக்கியமும் அறிமுகம் - I / தமிழ் இலக்கியமும் வரலாறும் - I /	-	-	-	100 #	-
*Only grades will be given				Total	30	23			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
	23UCS3CC5	III	Core - V	Computer Organization and Architecture	4	4	25	75	100
	23UCS3CC6P		Core - VI	Web Programming Lab - Practical	3	3	20	80	100
	23UPH3AC5		Allied - V	Electronic Circuits and Devices	4	4	25	75	100
	23UPH3AC6P		Allied - VI	Electronics - Practical	3	2	20	80	100
	23UCS3GE1	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
	23UCS4CC7	III	Core - VII	Database Management Systems	5	5	25	75	100
	23UCS4CC8P		Core - VIII	RDBMS Lab - Practical	3	3	20	80	100
	23UPH4AC7		Allied - VII	Digital Electronics and Microprocessor	5	4	25	75	100
	23UPH4AC8P		Allied - VIII	Digital and Microprocessor - Practical	3	2	20	80	100
	23UCS4GE2	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	25			800
V	23UCS5CC9T	III	Core - IX (a)	Data Structures and Algorithms	4	4	10	40	50
	23UCS5CC9P		Core - IX (b)	Data Structures Lab - Practical	2	2	10	40	50
	23UCS5CC10		Core - X	Software Engineering	5	5	25	75	100
	23UCS5CC11		Core - XI	Cyber Security	5	5	25	75	100
	23UCS5CC12		Core - XII	Operating Systems	5	5	25	75	100
	23UCS5DE1AT/BT		Discipline Specific Elective - I (a)		3	2	10	40	50
	23UCS5DE1AP/BP	IV	Discipline Specific Elective - I (b)		2	2	10	40	50
	23UCS5SE1		Skill Enhancement Course - I	Open Source Technology	2	1	-	100	100
	23UCS5SE2P		Skill Enhancement Course - II	Open Source Technology Lab - Practical	2	1	-	100	100
	23UCS5EC1		Extra Credit Course - I*	Online Course	-	*	-	-	-
	Total				30	27			700
VI	23UCS6CC13	III	Core - XIII	Computer Graphics with Immersive Technologies	5	5	25	75	100
	23UCS6CC14		Core - XIV	Computer Networks	5	5	25	75	100
	23UCS6CC15		Core - XV	Internet of Things	5	5	25	75	100
	23UCS6PW		Project Work	Project Work	5	4	-	100	100
	23UCS6DE2A/B		Discipline Specific Elective - II		5	4	25	75	100
	23UCS6DE3AP/BP		Discipline Specific Elective - III		4	4	20	80	100
	23UCN6AE3	IV	AECC - III	Gender Studies	1	1	-	100	100
	23UCS6EC1		Extra Credit Course - II*	Online Course	-	*	-	-	-
	23UCSECA		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	23UCS3GE1	Business Process Outsourcing
IV	23UCS4GE2	Web Design

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	23UCS5DE1AT	Data Science with Python
	23UCS5DE1BT	Digital Marketing
	23UCS5DE1AP	Data Science with Python Lab - Practical
	23UCS5DE1BP	Digital Marketing Lab - Practical
VI	23UCS6DE2A	Introduction to Cloud Computing
	23UCS6DE2B	Artificial Intelligence
	23UCS6DE3AP	Internet of Things Lab - Practical
	23UCS6DE3BP	Computer Graphics Lab - Practical

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
I	23UCS1CC1	CORE – I	5	5	25	75	100
Course Title		PROGRAMMING IN C AND C++					

SYLLABUS		
Unit	Contents	Hours
I	Overview of C – Importance of C – Basic Structure of C Programs – Constants – Variables – Data Types in C – Operators in C – Expressions – Managing Input and Output Operations – Decision Making and Branching – Various Forms of IF Statements – The Switch Statement – The ?: Operator – *The GO TO Statement*.	15
II	Decision Making and Looping – The WHILE Statement– The DO Statement – The FOR Statement – Arrays – Types of Arrays – Need for User-Defined Functions – The Form of C Functions – Category of Functions – Call by Value – *Call by Reference*.	15
III	Basic concepts of OOP – Structure of C++ Program – Operators and Data Types in C++ – Manipulators – Inline Functions – Default Arguments – *Recursion* – Function Overloading – Classes and Objects – Arrays of Objects – Objects as Function Arguments – Friendly Functions – Returning Objects.	15
IV	Constructors and Destructors – Constructors - Parameterized Constructors – Multiple Constructors in a Class – Copy Constructors – Destructors – Operator Overloading – Defining Operator Overloading – Overloading Unary Operators – Overloading Binary Operators – Overloading Binary Operators using Friends – Rules for Overloading Operators–Inheritance: Extending Classes – Defining Derived Classes – Single Inheritance – *Multilevel Inheritance* – Multiple Inheritance.	15
V	Pointers, Virtual Functions and Polymorphism – Pointers –Pointers to Objects –this Pointer – *Pointers to Derived Classes* – Virtual Functions – Pure Virtual Functions – Managing Console I/O Operations – C++ Streams – C++ Stream Classes – Unformatted I/O Operations – Formatted Console I/O Operations – Working with Files.	15
VI	Current Trends (For CIA only): Developing C/C++ coding for simple real world application problems	

..... Self Study

Text Book(s):
1. E. Balagurusamy, <i>Programming in ANSI C</i> , Tata McGraw Hill Education Private Ltd., New Delhi, Fifth Edition, 2011. 2. E. Balagurusamy, <i>Object Oriented Programming with C++</i> , Tata McGraw Hill Education Private Ltd., New Delhi, Fifth Edition, 2011.
Reference Book(s):
1. Yashavant Kanetkar, <i>Let Us C</i> , BPB Publications, New Delhi, Thirteenth Edition, 2013. 2. Bjarne Stroustrup, <i>The C++ Programming Language</i> , Addison-Wesley, New York, Third Edition, Eighth Impression, 2012.
Web Resource(s):
1. https://www.programiz.com/c-programming 2. https://www.geeksforgeeks.org/object-oriented-programming-in-cpp/ 3. https://onlinecourses.nptel.ac.in/noc22_cs40/preview 4. https://archive.nptel.ac.in/courses/106/105/106105151/ 5. https://nptel.ac.in/courses/106105151

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Recall the basic concept of procedure and object-oriented programming	K1
CO2	Illustrate the fundamental definitions and concepts of C and C++ Programming	K2
CO3	Apply the concept of decision-making, looping, arrays, functions and OOP concepts	K3
CO4	Analyze various programming constructs of C and C++	K4
CO5	Evaluate and explain the suitable logic and principles of C and C++ Programming for solving real-time application 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	3	3	2	3	2	3	2	2	1	2	2.3
CO2	3	3	3	3	2	3	2	2	2	2	2.5
CO3	3	3	2	3	2	3	2	2	2	2	2.4
CO4	3	3	3	2	2	3	2	3	3	2	2.6
CO5	3	3	3	3	2	3	2	3	3	3	2.8
Mean Overall Score											2.52
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. O.A. Mohamed Jafar

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
I	23UCS1CC2P	CORE – II	3	3	20	80	100
Course Title		Programming in C and C++ Lab - Practical					

Develop a C and C++ Program to illustrate the use of

1. Arithmetic Statements
2. Different forms of if statements (*if, if-else and nested if-elses*)
3. Various Loop Control Structures (*while, do-while and for loop*)
4. Case Control Structure (*switch*)
5. Arrays
6. Call by Value and Call by Reference
7. Class and Object
8.
 - a) Inline Function
 - b) Friend Function
9. Function Overloading
10. Arrays of Objects
11. Constructors
12. Operator Overloading
13. Inheritance
14. Pointers
15. File

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Demonstrate the evaluation of expressions and compare the various decision-making and looping statements	K2
CO2	Construct Object-Oriented Programs using class, objects and functions	K3
CO3	Analyze and examine the result of the function overloading, operator overloading and constructors	K4
CO4	Compare the result of different Inheritance Programs	K5
CO5	Make use of Object-Oriented Concepts to solve real-life application problems and Interpret the results	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	3	3	2	3	2	3	2	2	2	2	2.4
CO2	3	3	3	3	2	3	2	2	2	2	2.5
CO3	3	3	2	3	2	3	2	2	2	2	2.4
CO4	3	3	3	2	2	3	2	3	3	2	2.6
CO5	3	3	3	3	2	3	3	3	3	3	2.9
Mean Overall Score											2.56
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. O.A. Mohamed Jafar

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
I	23UMA1AC1	Allied - I	4	3	25	75	100
Course Title Linear Algebra and Differential Equations							

SYLLABUS		
Unit	Contents	Hours
I	Matrices- *Special types of matrices*- Scalar multiplication of a matrix- Equality of matrices, Addition of matrices- Subtraction- Symmetric matrix-Skew symmetric matrix-Hermitian and skew Hermitian matrices- Multiplication of matrices- Inverse matrix- Orthogonal matrices (Problems only).	12
II	Solution of simultaneous equations-Rank of a matrix- Eigen values and Eigen vectors-*Cayley Hamilton theorem*. (Problems only)	12
III	Differential equations of the first order with higher degree – Equations solvable for p- Equations Solvable for y – *Equations Solvable for x* - Clairaut's form. (Problems only)	12
IV	*Linear Differential Equations with constant coefficients * - Particular integral – Special method of finding P.I. – Derivation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Different integrals of First Order P.D.E. (Problems only)	12
V	Standard type of first order partial differential equations I, II, III and IV (Clairaut's form) - *Lagrange's equations*. (Problems only).	12

..... Self Study

Text Books:		
1. T.K. Manicavachagom Pillay, T. Natarajan and K.S. Ganapathy, Algebra Volume-II, Ananda Book Depot, Chennai (2019) 2. S. Narayanan, T.K. Manicavachagom Pillay, Calculus Volume-III, S. Viswanathan Publishers Pvt. Ltd. (2012).		
UNIT I	Chapter 2 Sections 1-9	T.B-1
UNIT II	Chapter 2 Sections 10-13, 16	T.B-1
UNIT III	Chapter 1 Sections 5.1–5.4, 6.1, 6.2	T.B-2
UNIT IV	Chapter 2 Sections 1–4 Chapter 3 Sections 1–3	T.B-2
UNIT V	Chapter 4 Sections 5.1-5.4, 6	T.B- 2
Reference Books:		
1. P. Kandasamy and K. Thilagavathy, Allied Mathematics, S. Chand & Company Ltd, New Delhi (2010). 2. A. Abdul Rasheed, Allied Mathematics, Vijay Nicole Imprints private limited, Chennai (2008). 3. S. Arumugam and A. Thangapandi Isaac, Ancillary Mathematics, New Gamma Publishing house (2002).		
Web Resources:		
1.	https://nptel.ac.in/courses/111/107/111107111/	
2.	https://nptel.ac.in/courses/111/102/111102133/	

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO1	recognize and recall the basic concept of matrices and first order differential equations with examples.	K1
CO2	compute the operations on matrices and solving differential equations related problems.	K2
CO3	apply the concepts of matrices for solving system of equations, Eigen values and Eigen vectors.	K3
CO4	analyse the impact of an applications of mathematical concepts in computer science using matrices and differential equations.	K4
CO5	evaluate the general solution of ordinary and partial differential equations	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	3	1	3	3	2	3	2	2.5
CO2	3	3	2	2	1	2	3	2	3	2	2.3
CO3	3	3	2	2	1	3	2	3	3	2	2.4
CO4	3	2	3	3	2	3	3	3	2	2	2.6
CO5	2	2	2	3	1	2	2	2	3	2	2.1
Mean Overall Score											2.38
Correlation											Medium

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

Course Coordinators:

Dr. M.A. Rifayathali
Mrs. A. Fathima Begam

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 common numerical methods and how they are used to obtain approximate solutions to otherwise intractable mathematical problems.	K1
CO2	Demonstrate understanding numerical methods for various mathematical problems	K2
CO3	Apply numerical methods to obtain approximate solutions to mathematical problems.	K3
CO4	Analyse mathematical problems to determine the suitable numerical techniques.	K4
CO5	Evaluate the numerical solution of ordinary differential equations.	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	2	1	3	3	3	1	3	2.5
CO2	2	2	3	2	1	3	3	3	1	3	2.3
CO3	2	3	3	1	1	3	3	2	1	2	2.1
CO4	3	2	2	1	1	3	3	3	1	2	2.1
CO5	3	2	2	2	1	3	3	2	1	2	2.1
Mean Overall Score											2.22
Correlation											Medium

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

Course Coordinators: Dr. V. Krishnan & Mrs. A. Fathima Begam

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
II	23UCS2CC3T	Core – III (a)	4	4	10	40	50
Course Title		Java Programming					

SYLLABUS		
Unit	Contents	Hours
I	Java Evolution : History – Features – Differences between C++ and Java – Java Environment – Java Development Kit – Application Programming Interface – Overview of Java Language – Introduction – Java Program Structure – Java tokens- Java Statements – Implementing a Java Program – Java Virtual Machine – Command line arguments – Constants, Variables and Data types – Basic Input/ Output – Simple Java Program – Operators and Expressions – *Branching and Looping Statements*.	12
II	Classes, Objects and Methods : Defining a Class – Creating Objects – Accessing class members – Constructors – Method Overloading – Static Members – Inheritance – Extending a Class – Overriding Methods – Final variables and methods – Final Classes – Finalizer methods – Abstract Methods and Classes – Methods with Varargs – Visibility Control – Arrays, Strings and Vectors – One-dimensional Array – Creating an Array – Two-dimensional Arrays – Strings – Vectors – Wrapper Classes – *Enumerated Types*.	12
III	Interfaces – Multiple Inheritance: Defining Interfaces – Extending Interfaces – Implementing Interfaces – Accessing Interface Variables – Packages - Java API Package – Java API Packages- Using System Packages – Naming conventions – Creating Packages, Accessing a Package, using a Package – adding a class to a package – Hiding Classes – Static import- Multithreaded Programming - Creating Threads – Extending the Thread Class – Implementing the ‘Runnable’ Interface – Stopping and Blocking a Thread – Life Cycle of a Thread – Using Thread Methods – *Thread Exceptions – Thread Priority*.	12
IV	Managing Errors and Exceptions: Types of Errors – Exceptions – Syntax of Exception Handling Code – Multiple Catch Statements – Using Finally Statement – Throwing our own Exceptions – Managing Input/output Files in Java – Stream Classes – Byte Stream and Character Stream classes – Using Streams – Using the File Classes – Input / Output Exceptions – Creation of Files – Reading / Writing Characters – Reading / Writing Bytes – Handling Primitive Data Types – *Random Access Files*.	12
V	Event Handling: The Delegation Event Model-Events-Event Sources-Event Listeners-Event Classes-Sources of Events-Event Listener Interfaces-Using the Delegation Event Model-Adapter Classes-Inner Classes- Introducing the AWT: AWT Classes-Component-Container-Working with Frame Windows-Introducing Graphics-Working with Color-Working with Fonts- Using AWT Controls, Layout Managers-FlowLayout-BorderLayout-GridLayout-CardLayout-GridBagLayout- *Menu Bars and Menus-Dialog Boxes*.	12
VI	Current Trends (For CIA only): Network Programming, JDBC and Swing Controls	

..... Self Study

Text Book(s):

1. E. Balagurusamy, Programming with JAVA, McGraw Hill India, Sixth Edition, 2019.
2. Herbert Schildt, Java The Complete Reference, Eleventh Edition, McGraw-Hill Education Pvt. Ltd., 2019.

Reference Book(s):

1. Sachin Malhotra and Saurabh Choudhary, Programming in Java, 2nd Edition, Oxford University Press, 2018.
2. C. Muthu, Programming with Java, Vijay Nicole imprints private Limited, 2004.

Web Resource(s):
1. https://www.programiz.com/java-programming
2. https://www.javatpoint.com/java-tutorial
3. https://onlinecourses.nptel.ac.in/noc22_cs102/preview

Course Outcomes		
Upon successful completion of this course, the students will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Understand the runtime environment, programming features and statements of Java Programming	K1, K2
CO2	Apply the concept of class, inheritance, interfaces and packages into real-world entities	K3
CO3	Analyze the stream classes for manipulating files.	K4
CO4	Explain the importance of Multithreading and Exception handling techniques	K5
CO5	Develop the small window-based real-life applications using Java	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	3	3	1	3	3	1	2.6
CO2	3	3	1	1	3	3	3	3	3	2	2.5
CO3	3	3	2	2	2	3	3	3	2	2	2.5
CO4	3	3	3	3	3	3	2	3	3	3	2.9
CO5	3	2	2	2	3	3	3	3	3	3	2.7
Mean Overall Score											2.64
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. M. Mohamed Surputheen

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
II	23UCS2CC3P	Core – III (b)	2	2	10	40	50
Course Title		Java Programming Lab - Practical					

Develop a Java Program to:

- Demonstrate
 - Keyboard input and screen output
 - Control statements
- Define a class, describe its constructor, and instantiate its object
- Demonstrate method overloading
- Demonstrate single and two-dimensional arrays
- Demonstrate various methods in the String and StringBuffer class
- Demonstrate methods in the vector class
- Implement the single inheritance and method overriding
- Implement the multiple inheritance
- Implement the concept of packages
- Implement the concept of threads by using Thread class and Runnable interface
- Implement the concept of Exception Handling
- Demonstrate the use of File streams
- Demonstrate the concept of Event handling
- Design a Simple Calculator

Course Outcomes		
Upon successful completion of this course, the students will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Demonstrate the I/O statements and various control statements	K2
CO2	Compare and contrast the three types of looping statements	K2
CO3	Apply the concept of class, inheritance, interfaces and packages in a problem domain	K3
CO4	Distinguish between method overloading and method overriding	K4
CO5	Prove the power of Multithreading, Exception handling and Event handling techniques	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	3	3	1	3	3	1	2.6
CO2	3	3	1	1	3	3	3	3	3	2	2.5
CO3	3	3	2	2	2	3	3	3	2	2	2.5
CO4	3	3	3	3	3	3	2	3	3	3	2.9
CO5	3	2	2	2	3	3	3	3	3	3	2.7
Mean Overall Score											2.64
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. M. Mohamed Surputheen

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
II	23UCS2CC4	CORE – IV	3	3	25	75	100
Course Title		Web Programming					

SYLLABUS		
Unit	Contents	Hours
I	Introduction To HTML and XHTML: Hyper Text Markup Language – Origin and Evolution – HTML Basics – Headings – Paragraphs – Tables – Forms – CSS – *Levels of Style Sheets* – Different forms of Selectors.	9
II	Overview of JavaScript – JavaScript Constituents – Java v/s JavaScript –Event Driven Computation – Syntactic Characteristics – Variables – Operators – Mathematical Functions – *Control Structures* – Arrays – Functions, Data and Objects	9
III	Introduction to AngularJS: What is AngularJS? – Benefits of AngularJS – First AngularJS Script – DIRECTIVES: App – Model – Bind – Init – Repeat – Valid – *Check Email Address*.	9
IV	Filters: What is Filter? – Uppercase – Lowercase – OrderBy – Currency – Array – EVENTS: Event – Click – Double Click – *Mouse Move* – Mouse Over – Key Up – Key Down	9
V	Expression: {{Expression}} – String – Number – Object – Array – Using – Controller & Scope: Controller – Defining Controller – Scope – MVC & Scope Module & API: Basics – AngularJS Module – *AngularJS API*.	9
VI	Current Trends (For CIA only) – AJAX and its uses, Set up a Server	

..... Self Study

Text Book(s):
1. Shivanand S Gornale, Basavanna M, Web Programming for Beginners, Shroff Publishers & Distributors Pvt.Ltd, New Delhi, First Edition, 2016
2. Ray Yao, AngularJS Programming Include Tests & Answers, 2015
Reference Book(s):
1. Chris Bates, Web Programming Building Internet Applications, Wiley India Pvt. Ltd, New Delhi, Third Edition, 2017.
2. Shyam Seshadri & Brad Green, AngularJS Up & Running, O'Reilly, First Edition, 2014
Web Resource(s):
1. https://spoken-tutorial.org/tutorial-search/?search_foss=HTML&search_language=English
2. https://spoken-tutorial.org/tutorial-search/?search_foss=JavaScript&search_language=English
3. https://intellipaat.com/blog/tutorial/angularjs-tutorial/

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Compare and Contrast HTML and XHTML concepts and techniques.	K2 & K4
CO2	Develop the ability to logically plan and creating web pages using CSS.	K3
CO3	Evaluate the basic concept of AngularJS and its Directives.	K5
CO4	Examine the AngularJS filters and events.	K4
CO5	Select the appropriate design of single-page applications	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	1	2	3	3	3	0	0	1	1.9
CO2	3	3	3	2	1	3	3	3	2	0	2.3
CO3	3	2	3	2	3	2	3	3	3	0	2.4
CO4	2	3	2	2	3	3	3	2	2	2	2.4
CO5	3	3	3	3	3	3	2	3	3	3	2.9
Mean Overall Score											2.38
Correlation											Medium

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. S. Mohamed Iliyas

Semester	Course Code	Course Category	Hours/Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
II	23UMA2AC3	Allied - III	4	3	25	75	100
Course Title		Operations Research					

SYLLABUS		
Unit	Contents	Hours
I	Linear Programming Problem- Mathematical Formulation of the Problem – Solving a LPP by Graphical method – General Linear Programming (LPP)- Standard form and Canonical form-* Basic Solution *- Solving LPP by Using Simplex Method (Problem only)	12
II	Transportation Problem: Finding IBFS by NWCR, LCM, VAM for given Transportation Problem (Balance and unbalanced). (Problem only)	12
III	Assignment Problem (Balanced and unbalanced) – Hungarian Method – Problem of Sequencing Problem - Processing n-jobs through 2-machine – *processing 2-jobs through k-machine*. (Problem only)	12
IV	Games and Strategy : Introduction – Two-person zero –sum games – *Some Basic terms – The maxmin –minmax principle* – Games without saddle points – mixed strategies – Graphic solution of 2 X n and m X 2 games. (Problem only)	12
V	Network scheduling by CPM – Networks basic components – Logical sequencing – *Rules of Network constructions* – Critical Path Analysis. (Problem only)	12

..... Self Study

Text Book:
KantiSwarup, P.K.Gupta and Man Mohan, Operations Research, Sultan Chand &son Pvt. Ltd, 2009 UNIT I: Chapter 2, 3&4 Sections: 2.3,2.4,3.2 - 3.5, 4.1- 4.3. UNIT II: Chapter 10 Section:,10.9. UNIT III: Chapter 11&12 Sections: 11.1 – 11.3, 12.4,12.6. UNIT IV: Chapter 17 Sections: 17.1 – 17.6. UNIT V: Chapter 25 Sections: 25.1 – 25.4, 25.6.
Reference Books:
1. P.Prem kumar Gupta and D.S. Hira , Operations Research,S.Chand,2000. 2.J.K.Sharma , Operations Research Theory and Applications ,Macmillan India Ltd.(2000) 3.V.Sunderesan,K.S.Ganapathy Subramaniam,K.Ganesan, Operations Research, A.R.Publications,3 rd Edition,2005
Web Resources: MOOC learning: 1. https://nptel.ac.in/courses/111/107/111107128/ (Lectures by Prof. Kusum Deep, Dept. of Mathematics ,IIT Roorkee) 2. https://nptel.ac.in/courses/112/102/112106134/ (Lectures by Prof.G.Srinivasan, Dept. of . Management Studies IIT Madras) 3. https://www.youtube.com/watch?v=-1jpfY0zA7s (Standard and Canonical Form) 4.. https://www.youtube.com/watch?v=fSuqTgnCVRg (Game theory) 5. https://www.youtubr.com/watch?v=KG5b0xZ_Ba8 (Networking theory).

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 features of operations research with applications and limitations with practical examples.	K1
CO2	illustrate LPP by Graphical and Simplex methods.	K2
CO3	construct the Basic feasible solution of Transportation problem by different methods.	K3
CO4	analyse the optimum solution for Assignment problems with illustrations.	K4
CO5	determine Network scheduling and demonstrate critical path analysis 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	3	3	3	3	3	3	2	2	3	2.8
CO2	3	3	3	3	3	3	3	3	3	2	2.9
CO3	3	3	3	3	3	3	2	3	2	3	2.8
CO4	3	3	3	3	3	3	2	3	2	2	2.7
CO5	3	3	3	3	3	3	3	2	2	3	2.8
Mean Overall Score											2.8
Correlation											High

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

Course Coordinators:

Dr. M. Mohamed Althaf

Mrs. Z. Sirajunisha

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
II	23UMA2AC4	Allied - IV	3	3	25	75	100
Course Title		Statistics					

SYLLABUS		
Unit	Contents	Hours
I	Arithmetic Mean-Properties of Arithmetic Mean-Weighted Mean-Median. Merits and Demerits of Mean, *Median*.	9
II	Mode- Geometric Mean- Harmonic Mean. Graphical Location of the Partition values. Merits and Demerits of Mode, Geometric Mean and * Harmonic Mean*.	9
III	Dispersion-Characteristics for Ideal Measure of Dispersion-Measures of Dispersion -Range- Q.D- M.D- S.D, Coefficient of Dispersion -*Coefficient of Variation*-	9
IV	Correlation-Types of Correlation-Scatter Diagram-Karl-Pearson's Coefficient of *Correlation Spearman's Rank Correlation*.	9
V	Regression- Linear -Properties of correlation and regression coefficients. (Numerical Problems only)	9

..... Self Study

Text Book:		
S.C. Gupta & V.K. Kapoor, Elements of Mathematical Statistics, Sultan Chand and Sons, Third Edition, Reprint2010.		
UNIT I	Chapter 2	Sections 2.3–2.6
UNIT II	Chapter 2	Sections 2.7 –2.9.1 & 2.11.1
UNIT III	Chapter 3	Sections 3.1–3.7, 3.7.3, 3.8
UNIT IV	Chapter 10	Section 10.1 to 10.3, 10.6
UNIT V	Chapter 10	Section 10.7
Reference Books:		
1. S.C.Gupta and V.K.Kapoor , Fundamental of Mathematical Statistics , Sultan Chand and Sons Publication, 11 th Edition, 2013.		
2. Murray R. Speigal , John Jschiller , R. Alu Srinivasan , Probability and statistics , 3 rd Edition , shaum's Outline series , 2010.		
3. P.R. Vittal, Business Mathematics and Statistics, Margham Publications, 2021		
Web Resources:		
MOOC learning:		
1. https://nptel.ac.in/courses/110107114 (Introduction – Objectives- Diagrams and Graphs) (Lectures by Prof. Mukesh Kumar Barua, Dept. of Management Studies , IIT Roorkee)		
2. https://www.syncfusion.com/ebooks/statistics/descriptive-statistics (Measures of central tendency and dispersion)		
3. https://www.youtube.com/watch?v=cOuUsZ9yNyk (Diagrammatic and graphical)		
4. https://www.youtube.be/XrGM00ANzaE (Measures of central tendency)		
5. https://www.youtu.be/O48XefedSWs (S.D)		
6. https://www.youtu.be/5TJ52gAjzOI (M.D)		
7. https://www.youtu.be/C1gidiCxQ2s (Q.D)		
8. https://www.youtu.be/iJcO1ZzX-Qo (correlation)		
9. https://www.youtu.be/pT8M17HUh8c (Regression)		

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO1	demonstrate the basic concepts about collection and representation of data with practical examples.	K1
CO2	identify the methods for different type of Mean and discuss its merits and demerits.	K2
CO3	examine and understanding of the concepts of Median and Mode with examples.	K3
CO4	determine the measures of dispersions and their coefficients.	K4
CO5	evaluate the direction of linear relationship between two variables, correlation and Regression.	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	1	3	3	3	3	3	2.6
CO2	3	3	3	3	1	3	2	3	3	3	2.7
CO3	3	3	3	2	0	3	3	3	3	2	2.5
CO4	3	3	3	2	0	3	3	3	3	2	2.5
CO5	3	3	3	2	0	3	3	2	2	2	2.3
Mean Overall Score											2.52
Correlation											High

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

Course Coordinators: Dr. T. Shiek Pareeth & Mrs. Z. Sirajunisha

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
III	23UCS3CC5	Core – V	4	4	25	75	100
Course Title		Computer Organization and Architecture					

SYLLABUS		
Unit	Contents	Hours
I	Digital Logic Circuits: Digital Computers – Logic Gates – Combinational Circuits – Flip flops (SR, D JK) – Decoder – Encoder – Multiplexer – *Register*	12
II	Data Representation: Data Types – Complements – Fixed-Point Representation – Floating-Point Representation – Register Transfer and Microoperations: Register Transfer – Bus and Memory Transfer – Arithmetic Microoperations – Logic Microoperations – Shift Microoperations – *Arithmetic Logic Shift Unit*	12
III	Central Processing Unit: General Register Organization – Stack Organization – Instruction Formats – Addressing Modes – Data Transfer and Manipulation – *CISC and RISC characteristics*	12
IV	Input-Output Organization: Peripheral Devices – Input-Output Interface – Asynchronous Data Transfer – Modes of Transfer – Direct Memory Access – CPU-*IOP Communication*	12
V	Memory Organization: Memory Hierarchy – Main Memory – Auxiliary Memory – Associative Memory – Cache Memory – Virtual Memory	12
VI	Current Trends (For CIA only): Types of Computer Architecture, Microprocessors	

..... Self Study

Text Book(s):
3. Morris Mano M, Computer System Architecture, Prentice Hall of India, Third Edition, 2009
Reference Book(s):
3. Thomas C. Bartee, Digital Computer Fundamentals, Tata McGraw-Hill, Sixth Edition, 2006
4. Morris Mano M, Digital Logic and Computer Design, Prentice Hall of India, 2008
Web Resource(s):
1. https://www.tutorialspoint.com/Computer-System-Architecture
2. https://www.javatpoint.com/computer-organization-and-architecture-tutorial
3. https://nptel.ac.in/courses/106105163

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 various data types and their representation	K1
CO2	Classify the different logic gates and input-output devices	K2
CO3	Examine the organization of memories	K3
CO4	Analyse the logic circuits and microoperations	K4
CO5	Explain the architecture and functionality of central processing unit	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	2	3	3	2	2	2	3	2.5
CO2	3	3	2	3	2	3	2	3	2	2	2.5
CO3	3	2	3	3	3	2	3	2	3	2	2.6
CO4	2	3	2	3	3	3	3	3	2	2	2.6
CO5	3	2	2	3	2	3	2	2	3	3	2.5
Mean 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. T. Abdul Razak

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
III	23UCS3CC6P	CORE – VI	3	3	20	80	100
Course Title		Web Programming Lab – Practical					

1. Write an HTML document to display a simple calculator.
2. Write an HTML document to create college application form.
3. Write a CSS program to link external style sheet.
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. Write a program to illustrate CSS border style properties.
6. Write a JavaScript code to illustrate the use of arithmetic operators.
7. Write a JavaScript code to guess a random number.
8. Write a JavaScript code to check if an array contains a specified value.
9. Write an AngularJS program using directives.
10. Write an AngularJS program to add filters to directives.
11. Write an AngularJS program to add modules and controllers in file.
12. Write an AngularJS program to create a notepad application.
13. Write an AngularJS program to create a login application.

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Demonstrate the HTML concepts and techniques	K2
CO2	Construct and create web pages using CSS and JavaScript	K3
CO3	Analyze the basic syntax of AngularJS	K4
CO4	Examine the results of AngularJS filters and directives	K4
CO5	Evaluate the use of AngularJS concepts to solve real-life application 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	3	3	2	3	2	3	2	2	2	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	0	2.4
CO4	2	3	2	2	3	3	3	2	2	2	2.4
CO5	3	3	3	3	3	3	2	3	3	3	2.9
Mean 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. S. Mohamed Iliyas

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
III	23UPH3AC5	ALLIED - V	4	4	25	75	100
Course Title		ELECTRONIC CIRCUITS AND DEVICES					

SYLLABUS		
Unit	Contents	Hours
I	Semiconductor Physics Intrinsic & Extrinsic Semiconductors – n-Type and p-Type semiconductors- Formation of PN Junction Diode -V-I characteristics –*Zener diode* –V-I characteristics – Zener diode voltage regulator -Rectifiers – Half wave & Full wave bridge rectifier	12
II	Transistors Transistor action: npn & pnp–Transistor characteristics CE and CB configuration – α and β relationship-Amplifier – Single Stage RC Coupled Amplifier –Principle of feedback –Types of feedback –Barkhausen criterion – Oscillator – Hartley oscillator.	12
III	Special Devices FET – Construction – n channel and p channel – FET Characteristics – FET parameters – FET amplifier (CS configuration) –Photo diode –Construction- Characteristics - LED – Construction- Characteristics- *LCD*- Construction - Seven segment display.	12
IV	Optical Fiber & Optoelectronic devices Types of fibers- Semiconductor laser source for optical communication-Block diagram of fiber optic communication system -Construction and Characteristics of Optoelectronic devices: Photoconductive Sensors – Photoconductive Cell, Applications, Photodiode, Phototransistor –Solar Cell	12
V	Operational Amplifier: Ideal Op-amp – Parameters – Inverting and Non-Inverting Operational Amplifiers – Adder – Subtractor – Sign changer – Scale changer – Op-amp Differentiator -Op- amp Integrator.	12
Text Book(s):		
1. V.K. Mehta & Rohit Metha, Principle of Electronics, PH Printers & Publishers Private Ltd, Reprint 2008. 2. P.K.Palanisamy, Semiconductor Physics And Opto-Electronics , Scitech Publications (India).Pvt.Ltd, 2011 3. S Salivahanan, N Suresh Kumar, Electronic Devices and Circuits, McGraw Hill Education Pvt Limited, Chennai, Fourth Edition, 2019.		
Reference Book(s):		
1. Murugesan, Kiruththiga SivaPrasath ,Modern Physics,S. Chand & Co Thirteenth Edition, 2016 2. Applied Physics – Dr. M. Arumugam – Anuradha Agencies, 2011 3. D. Roy Choudhury and Shail B. Jain, Linear Integrated Circuits, New Age International Publishers, Fourth Edition, 2015		
Web Resource(s):		
1. https://swayam.gov.in/nd1_noc19_ee36/preview		

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Remembering some basic semiconductor devices, means of identifying them from their coding schemes and finding out their terminals	K1
CO2	understanding a knowledge of the principles and functioning of these semiconductor devices and their individual or standalone characteristic features using mathematical and graphical analysis so that they may be helpful in predicting their behavior and functioning when incorporated in circuitry	K2
CO3	Applying the essential techniques of circuit design employing these devices, the analysis of the circuits so constructed and the means of evaluating their parameters and performance using mathematical and graphical tools	K3
CO4	Analyzing a sound knowledge of the essential theoretical features and concepts such as modulation and demodulation, regulated power supplies, amplification, switching operations so that they may be useful not only for higher studies but also in providing theoretical framework for possible applications beneficial to the society	K4
CO5	Evaluating technical skills to wire the circuits and to trouble shoot them as well as to construct of new circuits for specific tasks thereby helping them to become entrepreneurs	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	3	2	2	3	2	3	2	3	2.5
CO2	3	3	2	2	2	3	2	3	2	2	2.4
CO3	3	2	3	2	3	3	2	3	2	3	2.6
CO4	2	3	2	3	2	3	2	3	3	3	2.6
CO5	2	3	2	2	2	2	3	3	3	3	2.5
Mean Overall Score											2.52
Correlation											High

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

Course Coordinators:

Dr. A. Mohamed Saleem
Dr. S. Abbas Manthiri

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
III	23UPH3AC6P	ALLIED - VI	3	2	20	80	100
Course Title		ELECTRONICS – PRACTICAL					

S.No.	List of Experiments
1	Junction diode characteristics
2	Wave shaping Circuits (Positive & Negative Clippers & Clampers)
3	Op-Amp – Adder and Subtractor
4	Basic Logic gates – Discrete Components
5	Zener controlled rectifier
6	Zener diode characteristics
7	Op-Amp – Differentiator and Integrator
8	NAND as universal gates

Text Book(s):
1. M.N. Srinivasan, S. Balasubramaniyan, R. Ranganathan, A text book of Practical Physics, S. Chand & Sons, Reprint 2010.
Reference Book(s):
1. C.C. Ouseph, U.J. Rao & V. Vijayendran, Practical physics and electronics, S. Viswanathan, Pvt, Ltd, First edition, 2007.
Web Resource(s):
1. www.physicstutorials.org 2. www.sciencelearn.org.nz

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 principles of Electricity and Magnetism	K1
CO2	Acquire the experimental skills.	K1
CO3	Understand the characteristics of the semiconductor diodes and operational amplifiers.	K2
CO4	Analyzing the practical applications of Electricity, Magnetism and Electronics in their day to day life.	K4
CO5	Evaluating the basic requirements for their higher studies.	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	1	2	3	2	2	2	3	1	2.1
CO2	3	2	3	2	2	2	2	2	3	2	2.3
CO3	3	2	2	2	2	2	2	2	3	2	2.2
CO4	3	2	3	2	1	2	2	2	3	3	2.3
CO5	3	2	3	3	2	2	2	2	3	2	2.4
Mean Overall Score											2.26
Correlation											Medium

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

Course Coordinators:

Dr. S. Abbas Manthiri

Dr. C. Hariharan

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
III	23UCS3GE1	Generic Elective – I	2	2	-	100	100
Course Title		Business Process Outsourcing					

SYLLABUS		
Unit	Contents	Hours
I	Introduction to BPO: Basics of Business Process Outsourcing – History of BPO – Evolution of BPO – Global trends of BPO – *Future of BPO*	6
II	BPO Industry: Employment opportunities in BPO industry – Employee structure – Skill set required for BPO – Compensation levels – Future of BPO employee.	6
III	Models of BPO: BPO Model and Types of Vendors – Transaction Processing BPO – Elements of back-office services – Contact Centre BPO – Types of Call Centres – Components and working of a call centre – * Offshoring – Offshore BPO* – BPO Companies in India.	6
IV	Processes in BPO: Financial Services – Insurance – Human Resource BPO – Activities involved in HR BPO – *Career in HR BPO*	6
V	BPO Domains: Media and Entertainment BPO – Publishing BPO – social media and BPO – *Changing dynamics in Indian BPO Industry*.	6

..... Self Study

Text Book(s):
Business Process Outsourcing Handbook
Reference Book(s):
Sarika Kulkarni, Business Process Outsourcing, Jaico Publishing House, 2005
Web Resource(s):
https://www.techtarget.com/searchcio/definition/business-process-outsourcing
https://unity-connect.com/our-resources/bpo-learning-center/what-is-business-process-outsourcing/

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Recall the basics of business process outsourcing	K1
CO2	Illustrate the fundamentals of BPO industry	K2
CO3	Examine the models of BPO and its vendor	K3
CO4	Analyze the importance of various processes of BPO	K4
CO5	Explain the appropriate domains of BPO	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	1	2	3	3	3	2	2	2	2.4
CO2	3	3	3	2	1	3	3	3	2	0	2.3
CO3	3	2	3	2	3	2	3	3	3	0	2.4
CO4	2	3	2	2	3	3	3	2	2	2	2.4
CO5	3	3	3	3	3	3	2	3	3	3	2.9
Mean Overall Score											2.48
Correlation											Medium

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. S. Mohamed Iliyas

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
IV	23UCS4CC7	Core - VII	5	5	25	75	100
Course Title		Database Management Systems					

SYLLABUS		
Unit	Contents	Hours
I	Introduction to DBMS – Advantages – DBMS Services – Relational Model - RDBMS Terminology – The Relational Data Structure – Relational Data Integrity – Codd’s Rules – Database Architecture and Data Modelling: Conceptual, Physical and Logical Models. E-R Model – *Components of E-R Model* – E-R Model Symbols	15
II	Database Design: Functional Dependencies – Introduction – Basic Definition – Trivial and Non-Trivial Dependencies – Closure of a Set of Dependencies – Non-loss Decomposition – First, Second and Third Normal Forms – Dependency Preservation – Boyce/Codd Normal Form.	15
III	Relational Algebra: Algebraic Operations – 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*	15
IV	Joins Operations - Introduction to PL/SQL – Variables – Data Types – Control Structure – Cursors – Iterative Control Statement – PL/SQL Exception – Triggers – Types of Triggers – *Procedures and Packages*	15
V	Client/Server Technology and Client Server Database: Introduction – Benefits 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	15
VI	Current Trends (For CIA only): Distributed Database Systems, Cloud Database	

..... Self Study

Text Book(s):
1. Alexis Leon and Mathews Leon, Database Management Systems, Vikas Publishing House Pvt. Ltd., New Delhi. 2. C.J Date, A Kannan and S. Swamynathan, An Introduction to Database Systems, 8 th Edition, Pearson Education Asia.
Reference Book(s):
1 Thomas M. Connolly, Carolyn E. Begg, Database Systems A Practical Approach to Design, Implementation, and Management, Pearson Education, Fifth impression 2012. 2. Ramez Elmasri, Shamkant B. Navathe, Fundamentals of Database Systems, 5 th Edition, Pearson Education LTD.
Web Resource(s):
1. http://www.db-book.com 2. https://lc.fie.umich.mx/~rodrigo/BD/An%20Introduction%20to%20Database%20Systems%20e%20By%20C%20J%20Date.pdf 3. https://nptel.ac.in/courses/106106095

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Recall the basic concepts and various data models in the database	K1
CO2	Explain ER diagrams for real-time applications, populate and query a database by SQL	K2
CO3	Develop the knowledge of the processes of Database Development using SQL and PL/SQL	K3
CO4	Examine the database effectively by using normalization techniques	K4
CO5	Determine and implement access control rules to assign privileges and protect data in 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	3	2	2	1	3	1	2	2	1	2.0
CO2	3	3	2	3	1	3	2	3	3	2	2.5
CO3	3	3	0	2	3	2	3	2	3	1	2.2
CO4	2	3	3	1	3	3	3	3	0	2	2.3
CO5	3	2	3	3	1	3	2	0	3	3	2.3
Mean Overall Score											2.28
Correlation											Medium

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: S. Syed Ibrahim

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
IV	23UCS4CC8P	Core – VIII	3	3	20	80	100
Course Title		RDBMS LAB – Practical					

I SQL: Data Definition Languages:

1. Table Creation

Constraints: Primary Key, Candidate key, Foreign key, **Unique key**

2. Table Alteration - Rename table and Column name,

Add Column, Drop column,

Modify Column size and Data type.

3. Drop Table

II SQL: Data Manipulation Languages:

1. Insertion

2. Update with Case statement

3. String Operations – LIKE, NOT LIKE with Wildcards

4. Set Operations

5. Tuple Variables – Join a table to itself with two different names

6. Aggregate Functions (avg, min, max, sum, count) Grouping and Having Clause

7. Ordering Tuples

8. Nested Subqueries – using IN, NOT IN, SOME, ALL Clauses

9. Deletion – Using Subqueries, Aggregate Functions

10. Join Operations – Inner-join,

Outer-join – Left join, Right join, Full join

11. Views – View involving a single table

View involving multiple tables.

III PL/SQL Procedure:

1. Reverse the String

2. Find Factorial number Using Function

3. **Write a Program using Procedure with parameters IN and OUT**

4. Prepare Student Mark Sheet

5. Prepare Employee Pay Roll

6. **Write a program using Exception Handling.**

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Design and Implement database Schema	K1
CO2	Ability to formulate queries using SQL DML	K3
CO3	Analyze the programs using the Views and Join	K4
CO4	Develop applications programs using PL/SQL with exception handling	K5
CO5	Declare and enforce integrity constraints on a database	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	3	3	2	2	1	3	1	2	2	1	2.0
CO2	3	3	2	2	1	3	1	3	3	2	2.3
CO3	3	3	0	2	3	2	3	2	3	1	2.2
CO4	3	3	3	1	2	3	3	3	0	2	2.3
CO5	3	2	3	2	1	3	2	0	3	2	2.1
Mean Overall Score											2.18
Correlation											Medium

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: S. Syed Ibrahim

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
IV	23UPH4AC7	ALLIED - VII	5	4	25	75	100
Course Title		DIGITAL ELECTRONICS AND MICROPROCESSOR					

SYLLABUS		
Unit	Contents	Hours
I	Number Systems: Introduction to decimal, binary, octal & hexadecimal number systems – Interconversions –binary arithmetic operations – Addition, Subtraction, Multiplication and Division – 1's & 2's complements - signed binary numbers - BCD code - *Gray code – ASCII code*	15
II	Logic gates and Boolean expressions: *Logic gates* –AND, OR, NOT, NAND, NOR, EX-OR, and EX-NOR – Universality of NAND and NOR gates- Sum of Products (SOP) - Product of Sum (POS) Laws of Boolean algebra – simplification of Boolean expressions using Boolean laws - De-Morgan's theorems-Karnaugh map:Minterms – 2, 3 & 4 variables – Don't care conditions.	15
III	Arithmetic, Combinational and Sequential circuits: *Half adder and full adder* – half subtractor and full subtractor–multiplexer – demultiplexer- Flip flops – RS, Clocked RS, J-K, J-K master slave and D flip flop	15
IV	Microprocessor Architecture: Intel 8085 architecture – Pin configuration – *Opcode – Operands – Instruction Word size* – Instruction Cycle – Fetch Operation – Execution Operation – Machine Cycle and State – Timing diagram – opcode fetch cycle–memory read – I/O read – memory write –I/O write	15
V	Intel 8085 Assembly language: Addressing modes – Intel 8085 instructions – data transfer, arithmetic, branch, stack, I/O and machine control group – stack – addition, subtraction, multiplication and division of 8-bit numbers – sum of the series of 8-bit numbers – sorting of numbers in ascending and descending order – block data transfer	15

..... Self Study

Text Book(s): 1. V.Vijayendran, S.Viswanathan, Introduction to Integrated electronics(Digital & Analog) PH Printers & Publishers Private Ltd, Reprint 2008. Unit-I : 1.1 – 4.20. Unit-II : 5.1 – 6.23. Unit-III: 7.1 – 8.18, 9.1 – 10.19, 16.1 – 16.13. 2. P.S.Manoharan, Microprocessors & Microcontrollers –P.S.Manoharan, Charulatha Publications, 2011 Unit-IV : 1.68 – 1.82. 3. B.Ram,Fundamentals of Microprocessors and Microcontrollers, B.Ram, Dhanpat Rai Publications,Reprint 2011. Unit-V : 1.6-1.86 ,6.22 – 6.38.
Reference Book(s): 1. V.Vijayendran,Fundamentals of Microprocessor – 8085, S.Viswanathan, Printers & Publishers Private Ltd. 2. P.S.Manoharan, Microprocessors & Microcontrollers –P.S.Manoharan, Charulatha Publications, 2011
Web Resource(s): 1. https://pages.uoregon.edu/rayfrey/DigitalNotes.pdf 2. 2. https://www.tutorialspoint.com/microprocessor/microprocessor_tutorial.pdf 3. http://ce.sharif.edu/courses/86-87/1/ce126/resources/root/8085%20Microprocessor.pdf

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 principles and operations of analog and digital instruments	K1
CO2	understand the digital principles and its applications	K2
CO3	Apply the principle of combinational and Flip-flops	K3
CO4	Analyze about the architecture of Intel 8085 Microprocessor	K4
CO5	Evaluate the assembly language programs of 8085 microprocessor using trainer kit	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	3	2	2	3	2	3	2	3	2.5
CO2	3	3	2	2	2	3	2	3	2	2	2.4
CO3	3	2	3	2	3	3	2	3	2	3	2.6
CO4	2	3	2	3	2	3	2	3	2	3	2.5
CO5	2	3	2	2	2	2	3	3	2	2	2.3
Mean Overall Score											2.46
Correlation											Medium

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

Course Coordinators:

Dr. A. Mohamed Saleem

Dr. S. Abbas Manthiri

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
IV	23UPH4AC8P	ALLIED - VIII	3	2	20	80	100
Course Title		DIGITAL AND MICROPROCESSOR – PRACTICAL					

S.No.	List of Experiments
1	Logic Gates AND, OR, NOT, NAND, NOR EX-OR and EX-NOR using ICs
2	Half adder and Full adder using AND,OR and EXOR gates
3	Half subtractor and Full subtractor using AND,OR, NOT and EX-OR gates
4	RS and J-K flip flops
5	8-bit addition, Subtraction, Multiplication and Division
6	Sum of the series of 8-bit numbers
7	Sorting of numbers in ascending and descending order
8	Block data transfer using microprocessor 8085.

Text Book(s):
1. M.N. Srinivasan,S.Balasubramaniyan, R. Ranganathan, A text book of Practical Physics, S.Chand&Sons , Reprint 2010.
Reference Book(s):
1. C.C. Ouseph, U.J. Rao& V. Vijayendran, Practical physics and electronics, S. Viswanathan, Pvt,Ltd, First edition,2007.
Web Resource(s):
1. www.physicstutorials.org 2. www.sciencelearn.org.nz

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 basic principles of Electricity, Heat and Electronics.	K1
CO2	Understand the experimental skills.	K2
CO3	Understand the characteristics of the semiconductor diodes, transistors and operational amplifiers.	K2
CO4	Analyze the Electricity and Electronics circuit construction.	K4
CO5	Evaluate the basic requirements for their higher studies.	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	1	2	3	2	2	2	3	2	2.2
CO2	3	2	3	2	2	2	2	2	3	2	2.3
CO3	3	3	2	2	2	2	2	2	3	2	2.4
CO4	3	2	3	2	1	2	2	2	2	3	2.2
CO5	3	2	3	3	2	2	2	2	3	2	2.4
Mean Overall Score											2.3
Correlation											Medium

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

Course Coordinators:

Dr. A. Mohamed Saleem

Dr. S. Abbas Manthiri

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
IV	23UCS4GE2	Generic Elective – II	2	2	-	100	100
Course Title		Web Design					

SYLLABUS		
Unit	Contents	Hours
I	Introduction to the Internet – Computers in Business – Networking – Internet – E-Mail – Resource Sharing – Gopher – World Wide Web – Usenet – Telnet – Bulletin Board Service – *Wide Area Information Service*	6
II	Internet Technologies – Modem – Internet Addressing – Physical Connections – Telephone Lines – Internet Browsers – Internet Explorer – *Netscape Navigator*	6
III	Introduction to HTML – History of HTML – HTML Documents – Anchor Tag – Hyperlinks – Head and Body Sections – Header Section – Title – Prologue – Links – Colorful Web Page – *Comment Lines*.	6
IV	Designing the Body Section – Heading Printing – Aligning the Headings – Horizontal Rule – Paragraph – *Tab Settings* – Ordered and Unordered Lists – Lists – Unordered Lists – Ordered Lists.	6
V	Table Handling – Tables – Table Creation in HTML – HTML Forms – Attributes – Elements – HTML Input types – Attributes – *Forms*	6

..... Self Study

Text Book:
C. Xavier, World Wide Web Design with HTML, Tata McGraw Hill Company Limited, New Delhi, 19th Reprint 2008.
Reference Book(s):
1. Thomas A. Powell, HTML & XHTML, TMH, Fourth Edition, Thirteenth Reprint, 2007 2. N.P. Gopalan and J. Akilandeswari, Web Technology A Developer's Perspective, PHI, Second Printing, 2008
Web Resource(s):
1. https://www.geeksforgeeks.org/the-internet-and-the-web/ 2. https://www.w3schools.com/html/default.asp

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Recall the basics of the Internet	K1
CO2	Summarize the different Internet devices and their functions	K2
CO3	Identify the functions of HTML	K3
CO4	List the concepts of HTML for developing web page	K4
CO5	Choose Web Pages for 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	3	3	3	2	3	3	3	2	2	2	2.6
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	3	2	3	3	3	2.9
Mean Overall Score											2.60
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. S. Mohamed Iliyas

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
IV	23UCN4EL	EXPERIENTIAL LEARNING	-	2	-	100	100
Course Title		Internship					

1.	At the end of Semester IV, during the summer vacation, the students should undergo an Internship in a reputed IT Company or in the IT Division of a reputed company after getting permission from the Department.
2.	The minimum number of days for an Internship will be 30 days.
3.	A Project Report and a Certificate of Attendance are to be submitted after completing the Internship for External Evaluation to the Department on the first day of Semester V.

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
V	23UCS5CC9T	Core - IX (a)	4	4	10	40	50
Course Title		Data Structures and Algorithms					

SYLLABUS		
Unit	Contents	Hours
I	Introduction and Overview: Basic Terminology – Data Structures – Data Structure Operations –Mathematical Notations and Functions – Control Structures – Algorithms: Time-space Trade-off –Complexity of Algorithms – Asymptotic Notations – Arrays – Introduction – Linear Array, Representation of Linear Array in Memory, Traversing Linear Arrays, Inserting and Deleting, Two Dimensional Arrays – *Representation of Two-Dimensional Array in Memory*.	12
II	Stacks- Array Representation of Stacks – Operations on Stack – Arithmetic Expressions: Polish Notation– Reverse Polish Notation – Evaluation of a postfix expression – Transforming Infix Expression into Postfix – Recursion – Queues – Representation of Queues – Operations on Queues – Deques – *Priority Queues*.	12
III	Linked List – Representation of Linked Lists in Memory – Traversing a Linked List – Searching a Linked List - Insertion into a Linked List – Deletion from a Linked List – Two-way Linked Lists – *Operations on Two-way Lists*.	12
IV	Trees - Binary Trees – Representing Binary Trees in Memory – Traversing Binary Tree – Threads –Binary Search Tree – Graph Theory – Terminology – Sequential Representation of Graph: Adjacency Matrix, Path Matrix – Warshall's Algorithm – Linked Representation - Traversing a Graph, Breadth First Search, Depth First Search.	12
V	Sorting and Searching: Sorting – Bubble Sort – Insertion Sort – Selection Sort – Merge Sort – Radix Sort - Quick Sort – Heap Sort – Searching – Linear Search – Binary Search.	12
VI	Current Trends * (For CIA only)	

..... Self Study Portion

Text Book(s):
Seymour Lipschutz (Schaum's Series), “Data Structures”, McGraw Hill Education (India) Private Limited Ltd., New Delhi, Revised First Edition, 2013.
Reference Book(s):
Reema Thareja, Data Structures Using C, Oxford University Press, New Delhi, Second Edition, 2014
Web Resource(s):
https://gascveerapandi.in/wp-content/uploads/2020/12/Data-Structures-With-C-by-schaum-lipschutz.pdf https://nptel.ac.in/courses/106102064 https://onlinecourses.swayam2.ac.in/cec19_cs04/preview

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO1	To analyse and implement fundamental data structures (array).	K2
CO2	To implement, manage and apply stacks, queues.	K3
CO3	Acquire knowledge in the representation of linked lists.	K3
CO4	Evaluate the use of trees and graphs.	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	3	3	0	0	3	3	0	2	0	3	1.7
CO2	3	3	2	2	3	2	3	2	3	0	2.3
CO3	3	2	3	2	3	2	3	2	3	2	2.5
CO4	2	3	2	3	2	2	3	0	2	2	2.1
CO5	3	2	1	3	3	1	2	1	2	3	2.1
Mean Overall Score											2.14
Correlation											Medium

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

Prepared by: Dr. O.S. Abdul Qadir

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
V	23UCS5CC9P	Core - IX (b)	2	2	10	40	50
Course Title		Data Structures Lab - Practical					

Develop a C program to

- Find mean and standard deviation of n numbers.
- Find
 - Row Sum
 - Column Sum
 - Trace Sum (Sum of Diagonal Elements)
 - Sum of all the elements for a given matrix.
- Perform Matrix addition and multiplication operations
- Search for an element using sequential and binary search.
- Perform the following types of sorting:
 - Bubble sort
 - Insertion sort
 - Selection sort
- Merge two arrays into a single array.
- Find using recursion.
- PUSH and POP the factorial of a number element from a STACK.
- Insert and delete an element from a QUEUE.
- Insert and delete a node in a linked list.

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO1	To analyse and implement fundamental data structures (array).	K2
CO2	To implement, manage and apply stacks, queues.	K3
CO3	Acquire knowledge in the representation of linked lists.	K3
CO4	Evaluate the use of trees and graphs.	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	3	3	0	0	3	3	0	2	0	3	1.7
CO2	3	3	2	2	3	2	3	2	3	0	2.3
CO3	3	2	3	2	3	2	3	2	3	2	2.5
CO4	2	3	2	3	2	2	3	0	2	2	2.1
CO5	3	2	1	3	3	1	2	1	2	3	2.1
Mean Overall Score											2.14
Correlation											Medium

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

Prepared by: Dr. O.S. Abdul Qadir

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
V	23UCS5CC10	Core – X	5	5	25	75	100
Course Title Software Engineering							

SYLLABUS		
Unit	Contents	Hours
I	Software and Engineering: The Nature of Software – The Unique Nature of WebApps – Software Engineering – The Software Process – Software Myths – A Generic Process Model – Prescriptive Process Models: The Waterfall Model – Incremental Process Model – Evolutionary Process Models – Concurrent Models – Specialized Process Models: Component-Based Development – The Formal Methods Model – *Aspect-Oriented Software Development*.	15
II	Understanding Requirements: Requirements Engineering – Establishing the Groundwork – Eliciting Requirements – Developing Use Cases – Building the Requirements Model – Negotiating Requirements – Validating Requirements – Requirements Analysis – Patterns for Requirements Modeling – *Data Modeling Concepts* – Requirements Modeling for WebApps .	15
III	Design Concepts: The Design Process -- Design Concepts – The Design Model – Architectural Design: Software Architecture – Architectural Genres – Architectural Styles – Architectural Design – Component-Level Design – *Architectural Mapping Using Data Flow*.	15
IV	Software Testing Strategies: A Strategic Approach to Software Testing – Test Strategies for Conventional Software – Unit Testing – Integration Testing – Validation Testing – System Testing – The Art of Debugging – Testing Conventional Applications: Software Testing Fundamentals – WhiteBox Testing – Basis Path Testing – Control Structure Testing – Black-Box Testing – *Object-Oriented Testing Methods*.	15
V	Quality Concepts: Software Quality – Achieving Software Quality -- Formal Technical Reviews – Software Quality Assurance: Elements of SQA – SQA Tasks, Goals and Metrics – Statistical SQA – Software Reliability – Process and Project Metrics: Metrics in the Process and Project Domains -- Software Measurement – Metrics for Software Quality – Metrics for small Organizations – *Establishing a Software Metrics Program*.	15
VI	Current Trends * (For CIA only)	

..... Self Study Portion

Text Book(s):
Roger S. Pressman, “Software Engineering - A Practitioner’s Approach”, McGraw Hill International Edition, Seventh Edition, 2010.
Reference Book(s):
<ol style="list-style-type: none"> 1. Shari Lawrence Fleeger and Joanne M. Atlee, Software Engineering: Theory and Practice, Pearson Education South Asia, New Delhi, Fourth Edition, Third Impression 2013. 2. Ian Sommerville, Software Engineering, Pearson Education Asia, New Delhi, Ninth Edition, 2015.
Web Resource(s):
<ol style="list-style-type: none"> 1. https://www.slideshare.net/slideshow/prescriptive-process-modelsoftware-engineering/241118828 2. https://www.geeksforgeeks.org/introduction-of-software-design-process-set-2/ 3. https://www.geeksforgeeks.org/software-testing-strategies/ 4. https://onlinecourses.nptel.ac.in/noc20_cs68/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 different software process models.	K1,K2
CO2	Acquire the knowledge of system engineering process.	K3
CO3	Realize the system design process and design quality.	K4
CO4	Evaluating the various software testing methods	K5
CO5	Building the software quality assurance and metrics.	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	3	0	0	3	3	0	2	0	3	1.7
CO2	3	3	2	2	3	2	3	2	3	0	2.3
CO3	3	2	3	2	3	2	3	2	3	2	2.5
CO4	2	3	2	3	2	2	3	0	2	2	2.1
CO5	3	2	1	3	3	1	2	1	2	3	2.1
Mean Overall Score											2.14
Correlation											Medium

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: M. Abdullah

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
V	23UCS5CC11	Core-XI	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*.	15
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)	15
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.	15
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*.	15
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*.	15
VI	Current Trends * (For CIA only)	

..... Self Study Portion

Text Book(s):
<ol style="list-style-type: none"> 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 Books
<ol style="list-style-type: none"> 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):
https://onlinecourses.swayam2.ac.in/nou19_cs08/preview https://onlinecourses.nptel.ac.in/noc23_cs127/preview

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	2	1	2	1	3	2	1	2	1	1.8
CO2	2	3	2	2	2	2	3	2	2	1	2.1
CO3	3	2	3	2	3	3	2	3	2	3	2.6
CO4	2	3	3	2	3	2	3	3	2	2	2.5
CO5	3	2	3	3	2	3	3	2	3	2	2.6
Mean Overall Score											2.32
Correlation											Medium

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. M.A Jamal Mohamed Yaseen Zubeir

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
V	23UCS5CC12	Core - XII	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 – Process Viewpoint – Hierarchical and Extended Machine View – I/O Programming and Interrupt Programming – I/O Programming – *Interrupt Structure and Processing*	15
II	Memory Management – Single Contiguous Allocation – Multiprogramming – Partitioned Allocation – Relocatable Partitioned Memory Management – Paged Memory Management – Page Removal Algorithms – Thrashing – Segmented Memory Management – Segmented and Demand Paged Memory Management	15
III	Process Management – Process State Model – Job Scheduling – Process Scheduling – Multiprocessor Systems – Process Synchronization – *Resolving Deadlocks*	15
IV	Device Management – Techniques – Device Characteristics – I/O Traffic Controller – I/O Scheduler and Device Handlers – Virtual Devices – *Spooling*	15
V	Information Management: File System Model – Symbolic, Basic File System – Access Control Verification – Logical, Physical File System – Allocation Strategy, *Device Strategy Modules*	15
VI	Current Trends * (For CIA only)	

..... Self Study Portion

Text Book(s):
S.E. Madnick and J. J. Donovan, “Operating Systems”, McGraw Hill International Book Co, New Delhi, 2017.
Reference Book(s):
1. Harvey M. Deitel, An Introduction to Operating Systems, Addison-Wesley Publishing Co., New York, 1984.
2. James L. Peterson and Abraham Silberschatz, An Introduction to Operating Systems, Addison-Wesley Publishing Co., New York, 1987.
Web Resource(s):
1. https://archive.nptel.ac.in/courses/106/105/106105214/
2. https://www.javatpoint.com/operating-system
3. https://www.tutorialspoint.com/operating_system/index.htm
4. https://www.geeksforgeeks.org/operating-systems/

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 basic concepts and terminologies of operating systems and explain the operating system as a resource manager.	K1, K2
CO2	Demonstrate the memory management techniques such as paging, segmentation, and thrashing in multiprogramming environments.	K2, K3
CO3	Analyze process management techniques, including job scheduling, process scheduling, and deadlock resolution strategies.	K4
CO4	Evaluate device management strategies, including I/O traffic control, scheduling, and virtual devices.	K5
CO5	Develop efficient file system management strategies including access control, file allocation, and device strategy modules.	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	3	2	3	3	3	3	2	3	1	2.6
CO2	2	3	3	3	1	1	3	3	3	3	2.5
CO3	3	3	2	3	3	3	1	3	3	3	2.7
CO4	3	1	3	3	2	1	2	2	3	3	2.3
CO5	1	3	3	3	3	1	3	1	2	2	2.2
Mean Overall Score											2.52
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. A.R. Mohamed Shanavas

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
V	23UCS5DE1AT	DSE – I (a)	3	2	10	40	50
Course Title		Data Science with Python					

SYLLABUS		
Unit	Contents	Hours
I	Data Science in a big data world: Benefits and uses of data science and big data – Facets of Data – The data science process – The big data ecosystem and data science – An introductory working example of Hadoop	9
II	The Data Science Process: Overview of the data science process – Defining research goals and creating a project charter – Retrieving data – Cleansing, integrating and transforming data – Exploratory data analysis – Build the models – Presenting findings and building applications on top of them	9
III	Python Programming an Introduction: An interpreter for Python – Python Strings – Relational operators – Logical operators – Bitwise operators – Variables and Assignment statement – Keywords – Script Mode – Built-in Functions – Function Definition and Call – Importing User-defined module – Command line arguments	9
IV	Control Structures: if Conditional Statement – Iteration (for and while Statements) – Debugging – Strings – String processing examples – Pattern Matching	9
V	Lists: Summary of List Operations – Function list, append, extend, count, remove, index, pop and insert, reverse – list functions – Sets: Set functions add, update, remove, pop and clear – Union and Intersection Operation on Lists – Tuples: Summary of Tuple operations – Functions tuple, zip, count and index - Dictionary	9
VI	Current Trends (For CIA only):	

Text Book(s):

1. Davy Cielen, Arno DB Meysman, Mohamed Ali, “Introducing Data Science”, DreamTech Press Publications, 2023
2. Sheetal Taneja, Naveen Kumar, “Python Programming A Modular Approach”, Pearson India Education Services Pvt Ltd, 2021

Reference Book(s):

1. AlbertLukaszewski,MySQLforPython,[PACKT]Publishing,1stEdition,2010
2. Samuel Burns, Fundamentals of DataScience, Independently Published, 2019
3. Usman Qamar, Muhammad Summair Raza, Data Science concepts and Techniques with Applications, second edition, Springer 2020

Web Resource(s):

<https://www.geeksforgeeks.org/data-science-tutorial/>
<https://www.w3schools.com/datascience/>
https://onlinecourses.nptel.ac.in/noc23_cs21/preview
<https://www.youtube.com/watch?v=LHBE6Q9XlZI>

Course Outcomes		
Upon successful completion of this course, the students will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Learn and understand the key concepts of data science and its applications	K1, K2
CO2	Apply skills in Python programming for data manipulation and analysis	K3
CO3	Plan to visualize data and perform statistical analysis.	K3
CO4	Analyze machine learning algorithms and their implementation	K4
CO5	Explain data science methods 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	3	3	3	3	1	3	3	3	3	1	2.6
CO2	3	3	1	3	3	3	3	3	2	3	2.7
CO3	3	1	3	1	3	1	3	1	3	3	2.2
CO4	3	3	2	3	3	3	3	3	3	3	2.9
CO5	3	3	3	3	2	3	3	3	3	2	2.8
Mean Overall Score											2.64
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. S. Abdul Saleem

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
V	23UCS5DE1BT	DSE – I (a)	3	2	10	40	50
Course Title		Digital Marketing					

SYLLABUS		
Unit	Contents	Hours
I	Introduction to Digital Marketing: Introduction – Origin and Development – Digital Marketing Strategy – Digital Marketing Plan – Ethical and Legal Framework of Digital Marketing – *Skills required and Careers in Digital Marketing*	9
II	Display Advertising: Concept – Digital Metrics – Types of Display Ads – Targeting in Digital Marketing – Programmatic Digital Advertising – Ad Exchange	9
III	Social Media Marketing: Introduction – Listen – Strategy – Implementation – Measure – Different Forms of Social Entertainment – Gamification – Facebook Marketing: Organic Marketing – Paid Marketing – Facebook insights – *How premier brands are using Facebook Ads Library* – Other Essentials	9
IV	LinkedIn: Introduction – LinkedIn Strategy – Content Strategy – LinkedIn Analytics – Ad Campaign. Twitter Marketing: Introduction – Building a content strategy – Twitter usage – Twitter ADS – *Twitter Analytics*	9
V	Search Engine Optimization: Introduction – Search Engine – SEO Phases – Content – On-Page Optimization – Off-Page Optimization – SEO Visual Search – *SEO UX and UI*. Technological Advancements in Digital Marketing: Artificial Intelligence Tools such as Jasper AI, Writer.com, FullStory, Albert.ai	9
VI	Current Trends * (For CIA only)	

..... Self Study Portion

Text Book(s):
Seema Gupta, “Digital Marketing”, McGraw Hill Education (India) Pvt Ltd, Third reprint 2022
Reference Book(s):
1. Ian Dodson, The Art of Digital Marketing: The Definitive Guide to Creating Strategic, Targeted, and Measurable Online Campaigns. Wiley Publication, 2016 2. Ahuja Vandana, Digital marketing. Oxford University Press, 2016
Web Resource(s):
1. https://digitalfireflymarketing.com/wp-content/uploads/2017/02/Big-Book-of-Digital-Marketing.pdf 2. https://www.7boats.com/academy/wp-content/uploads/2016/10/50-shades-of-digital-marketing.pdf 3. https://webmarketingacademy.in/wp-content/uploads/2015/09/A-Step-By-Step-Guide-to-Modern-Digital-Marketing.pdf 4. https://onlinecourses.swayam2.ac.in/ugc19_hs26/preview

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Recognize the importance of digital marketing and search engine optimization	K1
CO2	Identify the various digital platform used to achieve marketing goals	K2
CO3	Apply different stages of digital display advertising to implement marketing strategies using digital platform.	K3
CO4	Examine the digital marketing platform suitable for performing marketing strategies and plan in real-time scenario.	K4
CO5	Evaluate the digital platform that provides secured and effective method to accomplish the strategy of digital marketing	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	2	3	3	3	3	3	3	2.8
CO2	3	3	3	2	1	3	3	3	2	1	2.4
CO3	3	2	3	2	3	2	3	3	3	1	2.5
CO4	2	3	2	2	3	3	3	2	2	2	2.4
CO5	3	3	3	3	3	3	2	3	3	3	2.9
Mean Overall Score											2.60
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. S. Mohamed Iliyas

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
V	23UCS5DE1AP	DSE – I (b)	2	2	10	40	50
Course Title	Data Science with Python Lab–Practical						

Develop the Python program to

1. Demonstrate different numeric data types and perform all the arithmetic operations.
2. Demonstrate working with lists and tuples.
3. Demonstrate working with Dictionaries.
4. Demonstrate array and array indexing (such as slicing, integer & Boolean array indexing) along with their basic operations in NumPy.
5. Compute summary statistics such as mean, median, mode, standard deviation and variance of the given different types of data.
6. Visualizing geographical data with basemap.
7. Apply various plotting functions on UCI data sets to visualize a) Normal curve b) Density & contour plots
8. Implement the Python Modules using import statement.
9. Demonstrate File reading and writing in Python.
10. Implement various Control Structures in Python.

Course Outcomes		
Upon successful completion of this course, the students will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Understand Python Data Types and Arithmetic Operations	K1
CO2	Demonstrate the Data Structures in Python	K2
CO3	Apply NumPy for Array Operations and Indexing	K3
CO4	Analyze Data Using Statistical Measures	K4
CO5	Evaluate Machine Learning Models and Visualization Techniques	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	1	3	3	3	3	1	2.6
CO2	3	3	1	3	3	3	3	3	2	3	2.7
CO3	3	1	3	1	3	1	3	1	3	3	2.2
CO4	3	3	2	3	3	3	3	3	3	3	2.9
CO5	3	3	3	3	2	3	3	3	3	2	2.8
Mean Overall Score											2.64
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. S. Abdul Saleem

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
V	23UCS5DE1BP	DSE – I (b)	2	2	10	40	50
Course Title		Digital Marketing Lab – Practical					

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 Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Learn digital marketing tools like search engine optimization and associated analytics.	K2
CO2	Apply digital marketing tools to a) improve websites' rankings and optimize it in the process. b) Improve the brand's visibility c) improve brands reach which physically is relatively difficult and less effective.	K3
CO3	Analyze relative importance of digital marketing strategies to optimize digital marketing campaign	K4
CO4	Evaluate the performance of different social media in conjunction with overall digital marketing plan.	K5
CO5	Design search engine optimization and search engine marketing campaigns	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	2	3	2	2	2	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	0	2.4
CO4	2	3	2	2	3	3	3	2	2	2	2.4
CO5	3	3	3	3	3	3	2	3	3	3	2.9
Mean 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. S. Mohamed Iliyas

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
V	23UCS5SE1	SEC – I	2	1	-	100	100
Course Title		Open Source Technology					

SYLLABUS		
Unit	Contents	Hours
I	Essential PHP: Getting PHP – Creating Your Development Environment – Creating a First PHP Page – Running PHP Page – Mixing HTML and PHP – Adding Comments – Working with Variables – Storing Data in Variables – Creating Constants – Understanding Data Types.	6
II	Operators and Flow Control: String Operators – Ternary Operator – if Statement – else Statement – elseif Statement – switch Statement – for Loops – while Loops – foreach Loop - String Functions – Converting Strings – *Formatting Strings*.	6
III	Arrays: Building Arrays – Modifying Arrays – Deleting Arrays – PHP Array Functions – Extracting Data from Arrays – Sorting Arrays – Splitting and Merging Arrays – Creating Functions: Function Creation – Passing Some Data – Passing by Reference – Returning Data – *Returning References*.	6
IV	Sessions, Cookies, and FTP: Setting Cookie – Reading Cookie – Setting Cookie's Expiration – Deleting Cookies – Working with FTP – Downloading Files – *Uploading Files*.	6
V	Introduction to NoSQL: NoSQL – Types of NoSQL Database – NoSQL vs SQL Comparison – ACID & BASE property – Benefits of NoSQL – MongoDB Data Types – Inserting, Update, Deleting the documents – Querying the documents – Bulk insert operation – Updating multiple document – *Filtering documents*.	6
VI	Current Trends * (For CIA only)	

..... Self Study Portion

Text Book(s):
Steven Holzner, “The Complete Reference PHP”, McGraw-Hill Education (India) Edition 2008, 31 st Reprint 2022
Reference Book(s):
1. Kevin Tatroe, Peter MacIntyre & Rasmus Lerdorf, Programming PHP, O'Reilly, Third Edition Reprint 2013 2. Julie Meloni, Matt Telles, PHP 6, Cengage Learning 2009
Web Resource(s):
1. https://onlinecourses.swayam2.ac.in/aic20_sp32/preview 2. https://script.spoken-tutorial.org/index.php/PHP_and_MySQL 3. https://www.mongodb.com/docs/manual/crud/ 4. https://www.phptpoint.com/php-tutorial/

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 knowledge of PHP.	K1
CO2	Identify the various concepts like operators, control statement and strings.	K2
CO3	Apply arrays and functions in applications.	K3
CO4	Examine the sessions, cookies and FTP with case study	K4
CO5	Evaluate the working of database with 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	3	3	2	2	3	3	3	1	1	1	2.2
CO2	3	3	3	2	1	3	3	3	2	2	2.5
CO3	3	2	3	2	3	2	3	3	3	1	2.5
CO4	2	3	2	2	3	3	3	3	2	2	2.5
CO5	3	3	3	3	3	3	2	3	3	3	2.9
Mean Overall Score											2.52
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. S. Mohamed Iliyas

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
V	23UCS5SE2P	SEC – II	2	1	--	100	100
Course Title		Open Source Technology Lab – Practical					

Develop a PHP program to illustrate the use of

1. Different forms of if statements (if, else and elseif).
2. Various loop control structures (for, foreach and while).
3. Case control structure (switch).
4. String functions (chr, ord, str_shuffle, str_replace, strcmp and substr).
5. Arrays (sorting of names).
6. Arrays (splitting and merging).
7. Function (finding salary).
8. Text Fields, Check Boxes, List Boxes, Buttons and Radio Buttons (Registration Form).
9. Data Validation (Checking Age).
10. JavaScript for client-side data validation (Checking Date).
11. Cookies.
12. FTP.

MongoDB

13. Perform DDL and DML commands.
14. Develop a Database application using CRUD operation for Employee Details.

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Demonstrate the basic concepts and techniques of PHP	K2
CO2	Construct and create web pages using PHP	K3
CO3	Analyze the Data Validation	K4
CO4	Examine the results of cookies and FTP	K4
CO5	Evaluate the use of PHP with MySQL to solve real-life applications	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	2	3	2	2	2	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	0	2.4
CO4	2	3	2	2	3	3	3	2	2	2	2.4
CO5	3	3	3	3	3	3	2	3	3	3	2.9
Mean 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. S. Mohamed Iliyas

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
VI	23UCS6CC13	Core - XIII	5	5	25	75	100
Course Title		Computer Graphics with Immersive Technologies					

SYLLABUS		
Unit	Contents	Hours
I	Introduction: The Origin of Computer Graphics – Interactive Graphics Display Point Plotting Techniques: Incremental Methods-Line Drawing Algorithms – Symmetrical DDA – Simple DDA – Bransenham’s Algorithm – Circle Generators. Line Drawing Displays: The CRT- Beam Penetration CRT – The Shadow Mask CRT – *Inherent Memory Devices*.	15
II	Two-Dimensional Transformations: Translation – Scaling – Rotation – Matrix Representations – Concatenation. Clipping and Windowing: Line Clipping Algorithm – Cohen – Sutherland Line Clipping Algorithm – Midpoint Subdivision – Polygon Clipping – Graphical Input Device: Mouse –Tablets – Light Pen.	15
III	Graphical Input Techniques: Positioning Techniques – Pointing and Selection – Three-Dimensional Graphics Rotation: Translation – Scaling – Rotation – Hidden Surface Elimination: The Depth – Buffer Algorithm – Scan Line Coherence Algorithms – Span Coherence Algorithm – *Area Coherence Algorithms – Warnock’s Algorithm*.	15
IV	Defining Virtual Reality, History of VR, Human Physiology and Perception, Key Elements of Virtual Reality Experience, Virtual Reality System, Interface to the Virtual World-Input & output- Visual, Aural & Haptic Displays, *Applications of Virtual Reality*.	15
V	History of AR - Augmented reality characteristics – Difference between Augmented Reality and Virtual Reality – AR technological components – Technologies used in AR – Hardware components – AR devices – Importance of AR - Real-world uses of AR – AR types – *Software tools available for AR*.	15
VI	Current Trends *(For CIA only)	

..... Self Study Portion

Textbook(s):
1. William M. Newman and Robert F. Sproull, “Principles of Interactive Computer Graphics”, Tata McGraw – Hill Publishing Company Ltd., Second Edition, 1997. 2. Steven M. LaValle, “Virtual Reality”, Cambridge University Press, 2016 3. Kaliraj, P., Devi, T. (2021), “Innovating with Augmented Reality: Applications in Education and Industry” (P. Kaliraj, Ed.) (1st ed.). CRC Press, Taylor & Francis Group, Boca Raton, ebook ISBN 9781003175896 Auerbach Publications. https://doi.org/10.1201/9781003175896
Reference Book(s):
1. Donald Hearn and M. Pauline Baker, Computer Graphics, Prentice Hall of India, Second Edition, Reprint, 2007 2. Coiffet, P., Burdea, G. C., (2003), “Virtual Reality Technology,” Wiley-IEEE Press, 3. Schmalstieg, D., Höllerer, T., (2016), “Augmented Reality: Principles & Practice,” Pearson,
Web Resource(s):
https://onlinecourses.nptel.ac.in/noc20_cs90/preview https://nptel.ac.in/courses/121106013 https://www.javatpoint.com/computer-graphics-tutorial https://www.geeksforgeeks.org/computer-graphics-2/ https://www.geeksforgeeks.org/basics-augmented-reality/

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 Computer Graphics, Different Graphics Systems, and Applications of Computer Graphics.	K1
CO2	Learn Algorithms for Scan Conversion and filling of Basic Objects and their Comparative Analysis	K2
CO3	Use of Geometric Transformations on Graphical Objects and their Application in Composite form	K3
CO4	Describe how VR systems work and list the applications of VR.	K4
CO5	To Know Augmented Reality, the tool of Industry 4.0	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	0	0	3	3	0	0	0	3	1.5
CO2	3	3	2	3	3	3	2	3	2	0	2.4
CO3	3	2	3	2	3	2	3	2	3	2	2.5
CO4	2	3	2	2	3	3	3	0	2	2	2.2
CO5	3	2	3	2	3	2	3	2	3	2	2.5
Mean Overall Score											2.22
Correlation											Medium

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: P. Shaik Abdullah

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
VI	23UCS6CC14	Core – X1V	5	5	25	75	100
Course Title Computer Networks							

SYLLABUS		
Unit	Contents	Hours
I	Introduction - Data Communications – Components – Data Flows – Networks – Physical Structures – Network Types – *LAN* – WAN – Switching – The Internet – Network Models – Principles of Protocol Layering - TCP/IP Protocol Suite – Description of TCP/IP Layers – The OSI Model	15
II	Physical Layer: Transmission Impairment - Transmission Modes – Multiplexing – *FDM* – WDM – TDM – Circuit Switched Networks – Packet Switching – Datagram Networks – Virtual Circuit Networks – Structure of Circuit Switches – Structure of Packet Switches	15
III	Data Link Layer: Introduction - Error Detection and Correction – Block Coding – Cycle Codes - Checksum – Forward Error Correction – DLC Services – Data Link Layer Protocols - HDLC – *CSMA/CD/CA* - Controlled Access – Connecting Devices	15
IV	Network Layer: Network Layer Services – Network Layer Performance – IPv4 Addresses – Internet Protocol (IP) – Routing Algorithms – *Least Cost Routing* - Distance Vector Routing – Link State Routing – Path-Vector Routing	15
V	Transport Layer: Introduction – Transport Layer Protocols – User Datagram Protocol – Transmission Control Protocol – Application Layer: - World Wide Web and HTTP – File Transfer Protocol – *E-Mail* – TELNET – Domain Name System.	15
VI	Current Trends (For CIA only):	

..... Self-study portions

Text Book(s):
Behrouz A. Forouzan, “Data Communications and Networking”, McGraw-Hill, 5th edition, 2013
Reference Book(s):
5. Andrew S Tanenbaum, Computer Networks, Pearson Education India, Sixth Edition, 2021. 6. William Stallings, Data and Computer Communication, Pearson Education India, Eighth Edition, 2007
Web Resource(s):
4. https://elcom-hu.com/Subjects/Computer/Compulsory/Communication/Data-Communications-and-Network-5e.pdf 5. https://nptel.ac.in/courses/106105183 6. https://onlinecourses.swayam2.ac.in/cec19_cs07/preview

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Familiarize with fundamental underlying principles of computer networks	K1, K2
CO2	Apply various block codes for error detection and correction	K3
CO3	Analyse and apply various routing algorithms to find the shortest path	K6
CO4	Classify IP protocols schemes	K4
CO5	Understand transport services and principles of various protocols in application layer	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	0	3	3	1	2	1	3	2.1
CO2	3	3	0	3	2	3	2	3	2	1	2.2
CO3	3	2	3	1	3	2	3	2	3	2	2.4
CO4	2	3	0	2	3	3	3	3	1	2	2.2
CO5	3	2	1	3	1	3	2	3	3	3	2.1
Mean Overall Score											2.2
Correlation											Medium

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: S. Syed Ibrahim

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
VI	23UCS6CC15	Core -XV	5	5	25	75	100
Course Title		Internet of Things					

SYLLABUS		
Unit	Contents	Hours
I	Introduction to Internet of Things: Introduction-Definition & characteristics of IoT- Physical design of IoT: Things in IoT, IoT protocols– IoT Enabling Technologies: Wireless Sensor Networks, Cloud Computing, Big Data Analytics, *Communication Protocols and Embedded Systems*.	15
II	Domain Specific IoTs: Introduction- Home Automation-Smart Lighting-Smart Appliances-Intrusion Detection, Cities- smart parking – smart lighting- smart roads Retail-Inventory Management- Smart Payments- Smart Vending Machines, Logistics-Route Generation and scheduling-shipment monitoring Agriculture-Smart Irrigation-*Green house control*	15
III	IOT and M2M- M2M- Difference between IoT and M2M- SDN and NFV for IoT- Software Defined Networking- Network Function Virtualization, IoT System Management with Netconf-Yang- Need for IoT Systems Management- Simple Network Management Protocol(SNMP)-Limitations of SNMP- *Network Operator Requirements*	15
IV	IOT Design Methodology: Introduction, Purpose And Require Specification, Process Specification, Domain Model Specification, Information Model Specification, Service Specification, IOT Level Specification, Functional View Specification, Operational View Specification, Device And Component Integration And Application Development, *Case study on IOT system for whether monitoring*.	15
V	Case studies illustrating IoT design: Introduction -Home Automation: Smart lighting, Home Intrusion Detection- Cities: Smart Parking, Environment: Whether Monitoring System, Whether reporting Bot, Air Pollution Monitoring, Forest Fire Detection. Agriculture- *Smart Irrigation*	15
VI	Current Trends (For CIA only):	

..... Self study portions

Text Book(s):
Vijay Madiseti and ArshdeepBahga, — “Internet of Things (A Hands-on-Approach)”, First Edition, VPT, 2014.
Reference Book(s):
1. Daniel Minoli, — “Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications”, ISBN: 978-1-118-47347-4, Willy Publications 2. Pethuru Raj and Anupama C. Raman, "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", CRC Press
Web Resource(s):
https://onlinecourses.nptel.ac.in/noc22_cs53/preview https://simulation.iitbx.in/arduino/#/dashboard/gallery

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 various concepts, terminologies and architecture of IoT systems.	K1
CO2	Apply the Use sensors and actuators for design of IoT.	K2
CO3	Analyze and implement the various protocols for design of IoT systems	K4
CO4	Design and develop the various techniques of data storage and analytics in IoT	K3
CO5	Evaluate and optimize the various applications of IoT and API	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	0	3	3	1	2	1	3	2.1
CO2	3	3	0	3	2	3	2	3	2	1	2.2
CO3	3	2	3	1	3	2	3	2	3	2	2.4
CO4	2	3	0	2	3	3	3	3	1	2	2.2
CO5	3	2	1	3	1	3	2	3	3	3	2.1
Mean Overall Score											2.2
Correlation											Medium

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. Mozibur Raheman Khan

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
VI	23UCS6PW	Project Work	5	4	-	100	100
Course Title		Project Work					

The students have to carry out an in-house project work within the department during the class hours in any one of the following domains, not limited to

- PHP with MySQL
- Python'
- Java
- .NET Technologies

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
VI	23UCS5DE2A	DSE - II	5	4	25	75	100
Course Title		Introduction to Cloud Computing					

SYLLABUS		
Unit	Contents	Hours
I	Introduction: Limitations of Traditional Computing Approaches – Three Layers of Computing – Three Layers in Traditional Computing – The End of Traditional Computing. Evolution and Enabling Technologies: Evolution of Cloud Computing – *Comparison between Cluster, Grid and Cloud Computing*.	15
II	Benefits and Challenges: Origin of the term Cloud Computing – Utility Computing – Metering and Billing in Cloud – Separation of Data Center Operation – Benefits of Cloud Computing – Challenges of Cloud Computing – Ethical Issues in Cloud Computing – Ubiquitous Cloud – *Confusion between Cloud and Internet*.	15
III	Cloud Computing Model: Standard Cloud Model – Cloud Deployment Models. Cloud Computing Services: Service Delivery Models – Service Abstraction – SPI Model – Traditional System vs Cloud System Model – Other category of Cloud Services – *Open Cloud Services*.	15
IV	Resource Virtualization: What is Virtualization – Virtualizing Physical Computing Resources – Understanding Abstraction – Business Benefits of Virtualization – Machine or Server Level Virtualization – Operating System Level Virtualization – Virtualization Products and Vendors – Advantages of Virtualization – Downsides of Virtualization – *Virtualization and Cloud Computing*.	15
V	File System and Storage: Cloud Native File System – Storage Deployment Models – Storage Types – Popular General Purpose Cloud Storages. Popular Cloud Services: Amazon Web Services – Microsoft Azure – *Google Cloud*.	15
VI	Current Trends * (For CIA only)	

..... Self Study Portion

Text Book(s):
Sandeep Bhowmik, “Cloud Computing”, Cambridge University Press, UK, 2017.
Reference Book(s):
Rajkumar Buyya, James Broberg and Andrzej Goscinski, Cloud Computing: Principles and Paradigms, Wiley Publications, 2011.
Web Resource(s):
1. https://www.tutorialspoint.com/cloud_computing/index.htm 2. https://www.javatpoint.com/cloud-computing 3. https://onlinecourses.nptel.ac.in/noc21_cs14/preview 4. https://www.youtube.com/watch?v=bRiatZMnkmA

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Obtain fundamental knowledge of cloud computing	K1,K2
CO2	Understand the concept of computing models and services	K1,K2
CO3	Acquire knowledge about security models and resource virtualization	K1,K2
CO4	Examine the principles of file system and storage	K2,K3
CO5	Analyse real world cloud services	K3,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	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 = 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. K. Nafees Ahmed

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
VI	23UCS5DE2B	DSE - II	5	4	25	75	100
Course Title		Artificial Intelligence					

SYLLABUS		
Unit	Contents	Hours
I	Artificial Intelligence: AI Problems – Underlying Assumption – AI Technique – Level of the Model – Criteria of Success – Some General References. Problems, Problem Spaces, and Search: Defining the Problem as a State Space Search – Production Systems – Problem Characteristics – Production System Characteristics – *Issues in the Design of Search Programs*.	15
II	Heuristic Search Techniques: Generate and Test – Hill Climbing – Best-First Search – Problem Reduction – Constraint Satisfaction – Means-ends Analysis. Knowledge Representation Issues: Representations and Mappings – Approaches to Knowledge Representation – *Issues in Knowledge Representation* – The Frame Problem.	15
III	Using Predicate Logic: Representing Simple Facts in Logic – Representing Instance and ISA Relationships – Computable Functions and Predicates – Resolution – Natural Deduction - Representing Knowledge Using Rules: Procedural Versus Declarative Knowledge – Logic Programming – Forward Versus Backward Reasoning – Matching – *Control Knowledge*.	15
IV	Symbolic Reasoning Under Uncertainty: Introduction to Non-monotonic Reasoning – Logics for Non-monotonic Reasoning – Implementation Issues – Augmenting a Problem-solver – Implementation Depth First Search – Implementation Breadth First Search. Statistical Reasoning: Probability and Baye's Theorem – Certainty Factors and Rule- based Systems – Bayesian Networks – *Dempster-Shafer Theory* – Fuzzy Logic	15
V	Semantic Nets- Frames- Conceptual Dependency – Scripts – CYC. - Syntactic-Semantic Spectrum of Representation – Logic and Slot-and-Filler Structures – *Other Representational Techniques*.	15
VI	Current Trends *(For CIA only)	

..... Self Study Portion

Text Book(s):
Elaine Rich, Kevin Knight, Shivashankar B Nair, “Artificial Intelligence”, Third Edition, Tata McGraw Hill, 2019.
Reference Book(s):
1. Stuart Jonathan Russell, Peter Norvig, Artificial Intelligence: A Modern Approach, Pearson, 2021. 2. Müller, Vincent C. (2020), Ethics of artificial intelligence and robotics, in Edward N. Zalta (ed.), Stanford Encyclopedia of Philosophy (Summer 2020; Palo Alto:CSLI, Stanford University), 1-70. https://plato.stanford.edu/entries/ethics-ai/ 3. Numa Dhamani and Maggie Engler, Introduction to Generative AI, Manning Publications Co, 2024
Web Resource(s):
https://www.geeksforgeeks.org/What-is-ai-artificial-intelligence/ https://plato.stanford.edu/entries/ethics-ai/ https://nptel.ac.in/courses/106102220

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Define and explain the concepts of problem spaces and state space search.	K1
CO2	Analyze the characteristics of production systems and identify issues in the design of search programs.	K4
CO3	Evaluate various heuristic search techniques, including generate-and-test, hill climbing, and best-first search.	K5
CO4	Represent simple facts and relationships using predicate logic, including instance and isa relationships.	K2
CO5	Differentiate between procedural and declarative knowledge in logic programming.	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	3	2	3	2	3	2	2	1	2	2.4
CO2	3	3	3	3	2	3	2	2	2	2	2.5
CO3	3	3	2	3	2	3	2	2	2	2	2.4
CO4	3	3	3	2	2	3	2	3	3	2	2.6
CO5	3	3	3	3	2	3	2	3	3	3	2.8
Mean 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. S. A. Jameel

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
VI	23UCSDE3AP	DSE-III	4	4	20	80	100
Course Title		Internet of Things Lab -Practical					

1. LED Blinking: Write a simple program to blink an LED on and off using an Arduino.

2. Reading Sensor Data: Read temperature and humidity data from a DHT11 sensor and print the values to the serial monitor.

3. Controlling an LED with a Web Server: Create a web server using ESP8266/ESP32 to control an LED remotely.

4. Sending Sensor Data to a Cloud Platform: Use an ESP8266/ESP32 to send temperature data from a sensor to a cloud platform like ThingSpeak.

5. MQTT Communication: Publish and subscribe to a topic using an MQTT broker to send and receive data between two devices. The devices will connect to Blynk or ThingsBoard.

6. Basic Home Automation: Control a relay module connected to a home appliance (like a light bulb) using a smartphone app.

7. Sending Notifications: Send an email or push notification when a sensor value exceeds a threshold (e.g., high temperature alert).

8. Controlling Devices with Voice Commands: Use an ESP32 with Google Assistant or Amazon Alexa to control an LED or other devices.

9. Smart Agriculture Monitoring: Monitor soil moisture levels and automatically control a water pump based on the sensor readings.

10. Displaying Sensor Data on an LCD or OLED Display: Read data from a temperature sensor and display it on a connected OLED screen

11. Environmental Monitoring System: Collect data from multiple sensors (e.g., temperature, humidity, and air quality) and display it on a web interface.

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Demonstrate the ability to write and execute basic programs for IoT devices such as controlling LEDs and reading sensor data.	K1
CO2	Apply knowledge of web server and cloud platforms to send and receive data from IoT sensors	K2
CO3	Analyze and implement communication protocols like MQTT for device-to-device communication in IoT systems.	K4
CO4	Design and build basic home automation systems using IoT devices controlled through mobile applications or voice commands.	K3
CO5	Evaluate and optimize IoT systems for environmental monitoring, smart agriculture, or notification-based applications by integrating multiple sensors.	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	2	3	2	2	1	2	2.4
CO2	3	3	3	3	2	3	2	2	2	2	2.5
CO3	3	3	2	3	2	3	2	2	2	2	2.4
CO4	3	3	3	2	2	3	2	3	3	2	2.6
CO5	3	3	3	3	2	3	2	3	3	3	2.8
Mean 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. Mozibur Raheman khan

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
VI	23UCS6DE3BP	DSE-III	4	4	20	80	100
Course Title		Computer Graphics Lab – Practical					

1. Write a Program to draw a line using the DDA algorithm.
2. Write a program to draw a line using Bresenham's Algorithm.
3. Write a program to draw a circle using Bresenham's Circle algorithm.
4. Write a program for the Boundary fill Algorithm.
5. Write a program for the Flood fill Algorithm.
6. Write a program to draw a circle using the Midpoint Algorithm.
7. Write a program showing the Translation of a triangle.
8. Write a program showing the Scaling of a triangle.
9. Write a program showing the Translation of a circle.
10. Write a program showing the Scaling of a circle.
11. Write a program showing the Rotation of a line.
12. Write a program showing the Rotation of a triangle.
13. Write a program to make a Hut, a Kite, and a Fish.
14. Write a program to animate a fish.
15. Write a program for creating various types of texts and fonts.

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 DDA and Bresenham algorithms to generate lines, and Bresenham's and Midpoint algorithms to generate circles.	K3
CO2	Implement filling algorithms (Boundary Fill and Flood Fill) to fill regions and shapes in graphics.	K3
CO3	Demonstrate 2D transformations including translation, scaling, and rotation on geometric shapes like triangles and circles.	K4
CO4	Analyze the differences and performance of various line and circle drawing algorithms based on their efficiency and accuracy.	K5
CO5	Create composite shapes like huts, kites, and fishes using basic graphics primitives and animate them using transformations.	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	3	2	3	2	3	2	2	2	2	2.4
CO2	3	3	3	3	2	3	2	2	2	2	2.5
CO3	3	2	3	2	3	2	3	2	3	2	2.5
CO4	3	3	3	2	2	3	2	3	3	2	2.6
CO5	3	3	3	2	3	3	3	3	3	3	2.9
Mean Overall Score											2.56
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: P. Shaik Abdullah