DEPARTMENT OF COMPUTER SCIENCE

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

Programme: B.Sc. IT with Cyber Security

Since 1951

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

B.Sc. INFORMATION TECHNOLOGY WITH CYBER SECURITY

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
	23UIC1CC1	III	Core - I	C and C++ Programming	5	5	25	75	100
	23UIC1CC2P		Core - II	C and C++ Programming Lab - Practical	3	3	20	80	100
	23UIC1AC1		Allied - I	Mathematical Foundations	4	3	25	75	100
	23UIC1AC2		Allied - II	Probability and Statistics	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
	23UIC2CC3	III	Core - III	Fundamentals of Cyber Security and Network Security	5	5	25	75	100
	23UIC2CC4		Core - IV	Linux and Windows Fundamentals	4	4	25	75	100
	23UIC2AC3		Allied - III	Java Programming	4	3	25	75	100
	23UIC2AC4P		Allied - IV	Java Programming Lab - Practical	3	3	20	80	100
	23UCN2SS	IV	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
	23UIC3CC5T	III	Core - V (a)	Ethical Hacking Essentials	3	3	10	40	50
	23UIC3CC5P		Core - V (b)	Ethical Hacking Essentials Lab - Practical	2	2	10	40	50
	23UIC3CC6		Core - VI	Advanced Linux and Windows Active Directory	3	3	25	75	100
	23UIC3AC5		Allied - V	Web Technology	2	2	25	75	100
	23UIC3AC6T		Allied - VI (a)	Python Programming	2	2	10	40	50
	23UIC3AC6P		Allied - VI (b)	Python Programming Lab - Practical	2	2	10	40	50
	23UIC3GE1	IV	Generic Elective - I		2	2	-	100	100
	23UCN3AE2		AECC - II	Environmental Studies	2	2	-	100	100
				Total	**30**	**24**			**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
	23UIC4CC7	III	Core - VII	Network Defense Essentials	5	5	25	75	100
	23UIC4CC8P		Core - VIII	Network Defense Essentials Lab - Practical	4	3	20	80	100
	23UIC4AC7		Allied - VII	Numerical Methods	4	3	25	75	100
	23UIC4AC8		Allied - VIII	Number Theory	3	2	25	75	100
	23UIC4GE2	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**	**24**			**800**
V	23UIC5CC9T	III	Core - IX (a)	Digital Forensics Essentials	4	4	10	40	50
	23UIC5CC9P		Core - IX (b)	Digital Forensics Essentials Lab - Practical	3	3	10	40	50
	23UIC5CC10T		Core - X (a)	Data Structures	4	4	10	40	50
	23UIC5CC10P		Core - X (b)	Data Structures Lab - Practical	3	3	10	40	50
	23UIC5CC11		Core - XI	Pentesting	4	4	25	75	100
	23UIC5CC12P		Core - XII	Pentesting Lab - Practical	3	3	20	80	100
	23UIC5DE1AT/BT		Discipline Specific Electives - I (a)		3	2	10	40	50
	23UIC5DE1AP/BP		Discipline Specific Electives - I (b)		2	2	10	40	50
	23UIC5SE1	IV	Skill Enhancement Course - I	Cyber Laws and Ethics	2	1	-	100	100
	23UIC5SE2		Skill Enhancement Course - II	Fundamentals of SOC	2	1	-	100	100
	23UIC5EC1		Extra Credit Course - I*	Online Course	-	*	-	-	-
				Total	**30**	**27**			**700**
VI	23UIC6CC13	III	Core - XIII	Artificial Intelligence	3	3	25	75	100
	23UIC6CC14		Core - XIV	Cyber Defense	6	6	25	75	100
	23UIC6CC15		Core - XV	Network Security Expert	6	6	25	75	100
	23UIC6CCPW		Project Work	Project Work	5	4	-	100	100
	23UIC6DE2A/B		Discipline Specific Electives - II		5	4	25	75	100
	23UIC6DE3AP/BP		Discipline Specific Electives - III		4	4	20	80	100
	23UCN6AE3	IV	AECC - III	Gender Studies	1	1	-	100	100
	23UIC6EC2		Extra Credit Course - II*	Online Course	-	*	-	-	-
	23UICECA		Extra Credit Course for all**	Online Course	-	**	-	-	-
	*** Programme Specific Online Course for Advanced Learners** **** Any Online Course for Enhancing Additional Skills**			**Total**	**30**	**28**			**700**
				Grand Total		**148**			**4400**

GENERIC ELECTIVES COURSES

Semester	Course Code	Course Title
III	23UIC3GE1	Social Networks
IV	23UIC4GE2	Digital Commerce

 # 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	23UIC5DE1AT	Cloud Computing and its Security
	23UIC5DE1BT	Blockchain Technology
	23UIC5DE1AP	Cloud Computing Lab - Practical
	23UIC5DE1BP	Blockchain Technology Lab - Practical
VI	23UIC6DE2A	Mobile Communication
	23UIC6DE2B	Web Application Security
	23UIC6DE3AP	Mobile Communication Lab - Practical
	23UIC6DE3BP	Web Application Security Lab - Practical

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
I	23UIC1CC1	CORE - I	5	5	25	75	100

Course Title	C and C++ Programming

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, *Programming in ANSI C*, Tata McGraw Hill Education Private Ltd., New Delhi, Fifth Edition, 2011.
2. E. Balagurusamy, *Object Oriented Programming with C++*, Tata McGraw Hill Education Private Ltd., New Delhi, Fifth Edition, 2011.

Reference Book(s):

1. Yashavant Kanetkar, *Let Us C*, BPB Publications, New Delhi, Thirteenth Edition, 2013.
2. Bjarne Stroustrup, *The C++ Programming Language*, 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	23UIC1CC2P	CORE - II	3	3	20	80	100

Course Title	C and C++ Programming 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	23UIC1AC1R	ALLIED - I	4	3	25	75	100

Course Title	MATHEMATICAL FOUNDATIONS

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	Mathematical Logic: Introduction – Statements and Notation – Connectives – (AND, OR, NOT), Negation, Conjunction, Disjunction, Conditional and Biconditional – Tautologies, Contradiction, Equivalence of formulas - Related Problems – *Tautological Implication*	12
IV	Introduction- Application of Graphs-Finite and Infinite Graphs – Incidence and Degree- Isolated Vertex, Pendent Vertex and Null Graph – Paths and Circuits – Isomorphism – Subgraph – Walks, Paths and Circuits – Operations on Graphs	12
V	Matrix representation of Graphs – Incidence matrix – Circuit matrix – Fundamental circuit matrix – Path matrix – Adjacency matrix	12

…… Self Study

Text Book(s):

1. T.K. Manicavachagom Pillay, T. Natarajan and K.S. Ganapathy, Algebra Volume-II, Ananda Book Depot, Chennai (2019)
2. J.P. Tremblay and R. Manohar, Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw-Hill Education Private Limited, 38th reprint 2010.
3. Narsingh Deo, Graph Theory with applications to engineering and computer science, PHI Learning Private Ltd., New Delhi, Reprint, 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 1.1 – 1.2.3, 1.2.6, 1.2.8, 1.2.9, 1.2.11	TB - 2
UNIT IV	Chapter 1	Sections 1.1 – 1.5, 2.1-2.2, 2.4, 2.7	TB - 3
UNIT V	Chapter 7	Sections 7.1, 7.3, 7.4, 7.8, 7.9	TB - 3

Reference Book(s):

G. Shankar Rao, Mathematical Foundations of Computer Science, I. K. International Pvt Ltd, 2006

Web Resource(s):

https://www.pdfdrive.com/mathematical-foundation-of-computer-science-e18828981.html

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Remember methods for recurrence relation	**K1**
CO2	Demonstrate and discuss Eigen values and Eigen Vectors	**K2**
CO3	Apply domain knowledge on mathematical logics	**K3**
CO4	Examine and illustrate the basic terminology of graphs and planar graphs	**K4**
CO5	Classification the basic structures of graphs	**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	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Dr. T. Shiek Pareeth

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
I	23UIC1AC2R	ALLIED - II	4	3	25	75	100

Course Title	PROBABILITY AND STATISTICS

SYLLABUS		
Unit	**Contents**	**Hours**
I	Concept of Random experiment – Basic Terminology – Mathematical Probability – Related problems – *Axiomatic Probability* - Theorem on probability – Addition Theorem of probability – Related problems	12
II	Conditional probability - *Multiplication theorem* – Independent events - Multiplication theorem of Probability for independent events – Related Problems - Baye's theorem – simple problems.	12
III	Measure of Central Tendency - Arithmetic Mean - Weighted mean – Median - Mode - Geometric mean - Harmonic mean – *Merits and Demerits*	12
IV	Random variables and Distribution functions – Distribution function - Discrete and continuous random variables - probability mass function- Probability density function –simple problems	12
V	Correlation – Introduction - Meaning - *Scatter diagram* – Karl- Pearson's coefficient of correlation – Rank Correlation - Spearman's Rank correlation – Simple Problems only	12

…… Self Study

Text Book(s):

S. C. Gupta and V. K. Kapoor, "Fundamentals of Mathematical Statistics", Sultan Chand and Sons Publications, New Delhi, Reprint 2009

UNIT I	Chapter 3	Sections 3.3, 3.4, 3.8.5, 3.9, 3.9.1
UNIT II	Chapter 3	Sections 3.10, 3.11, 3.12, 3.13
UNIT III	Chapter 2	Sections 2.4 - 2.9
UNIT IV	Chapter 5	Sections 5.2 - 5.4
UNIT V	Chapter 10	Sections 10.1 – 10.4, 10.7

Reference Book(s):

1. J. N. Kapur and H. C. Saxena (1989) "Mathematical Statistics", S. Chand And Company Ltd., New Delhi.
2. Murray R. Speigel, John Jschiller, R. Alu Srinivasan, Probability and Statistics, Third Edition, Shaum's Outline Series (2010).

Web Resource(s):

https://www.tutorialspoint.com/statistics/probability.html

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Remember methods for random and exhaustive events	**K1**
CO2	Demonstrate and discuss theorems of probability with examples	**K2**
CO3	Apply domain knowledge on discrete and continuous random variables	**K3**
CO4	Examine and illustrate the basic terminology of mean, median and mode	**K4**
CO5	Classification the correlation and its types 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**	**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	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Dr. T. Shiek Pareeth

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
I	23UCN1AE1	AECC - I	2	2	-	100	100

Course Title	Value Education for Men

SYLLABUS		
Unit	**Contents**	**Hours**
I	**VALUES IN LIFE:** Purpose and philosophy of life – Need for values –five fold moral culture. Values: truth, loyalty, integrity, humility, trustworthy, considerate, not being greedy, clean habits, punctuality, kindness, gratitude, patience, respect and character building.	6
II	**PERSONAL WELLBEING**: Social responsibility - taming a healthy mind and body – personal hygiene - Balanced diet – meditation – yoga - positive thinking – introspection - a passion for Nature- Win-win strategy.	6
III	**ROLE OF MEN IN FAMILY**: As a responsible student – committed employee - loyal husband - dedicated father – fatherhood- sacrificing human – considerate true friend.	6
IV	**MAN A SOCIAL BEING**: A friendly neighbour - living a life with definite motives – emotions and moral desire- uncompromising will power- puberty- secondary sexual characters- marriage: Purpose – marital life- Harmony with spouse- fidelity towards spouse.	6
V	**PROFESSIONAL VALUES**: More of a giver than a taker - being compassionate – patriotism - respecting culture - dependence on God – avoiding worry- professional ethics.	6

Hours of Teaching: 5 Hours and Hours of Activity: 25 Hours

Textbook(s):

1. Value Education for health, Happiness and harmony, the world community service centre, Vethathri Publications
2. N. Venkataiah, Value Education, APH Publishing Corporation, New Delhi, 1998
3. K.R. Lakshminarayanan and M. Umamageshwari, Value Education, Nalnilam Publication, Chennai.

Web References:

1. https://www.slideshare.net/humandakakayilongranger/values-education-35866000
2. https://www.ananda.org/blog/5-secrets-to-a-harmonious-marriage/
3. https://www.un.org/esa/socdev/family/docs/men-in-families

Activity:

- Assignment on Values (not less than 20 Pages)
- Multiple Choice Questions and Quiz
- Elocution - (Manners and good Habits for 3 to 5 minutes)
- Field Visit
- Debating - Current issues
- Essay writing: Proper use of e-gadgets, Ethics, Cyber ethics, Social media, etc.,
- Case Study / Album Making / Poster Presentation / Documentary- Celebrating National Days, Drug abuse & illicit trafficking, Independence Day, Secularism, Teachers Day, National Youth Awakening Day, Father's Day / Mother's Day and etc.,

EVALUATION COMPONENT: TOTAL: 100 MARKS

Component I:

Documentary (or) Poster Presentation (or) Elocution - 25 marks

Component II:

Quiz (or) Multiple choice questions Test - 25 marks

Component III:

Album Making (or) Case Study on a topic (or) Field visit - 25 marks

Component IV:

Assignment (or) Essay Writing (or) Debating - 25 marks

Course Coordinator: Dr. M. Purushothaman

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
II	23UIC2CC3	Core - III	5	5	25	75	100

Course Title	Fundamentals of Cyber Security and Network Security

SYLLABUS

Unit	Contents	Hours
I	Cybersecurity Landscape - Modern Computing Trends - New Application Threat Vectors - Tactics, Techniques, and Procedures - New Application Threat Vectors - SaaS Application Risks - Standards and Regulations - Attacker Profiles Cyberattack Lifecycle - High-Profile Attacks - *****MITRE Attack Framework*****	**15**
II	Cyberattack Types - Malware and Ransomware - Malware Types - Advanced or Modern Malware - Ransomware Types - Vulnerabilities and Exploits - Cyber attack Techniques - Business Email Compromise - Phishing Attacks - *****Bots and Botnets*****.	**15**
III	Advanced Persistent Threats - Wi-Fi Challenges - Wireless Security - Evil Twin - Jasager - SSLstrip - Security Models - Perimeter-Based Security Model - Zero Trust Security Model - Zero Trust Architecture - *****Security Operating Platform***** - Prevention-First Architecture.	**15**
IV	Common Network Devices - Routed and Routing Protocols - Area Networks and Topologies - Domain Name System (DNS) - Internet of Things (IoT) - TCP/IP Overview - Numbering Systems - *IP Addressing Basics* - Introduction to Sub netting - OSI and TCP/IP Models	**15**
V	Legacy Firewalls - Intrusion Detection and Prevention - Web Content Filters - Virtual Private Networks - Data Loss Prevention - Unified Threat Management - Endpoint Security - *Malware and Anti-Malware* - Firewalls and HIPSs - Mobile Device Management - Server Management - Structured Host and Network Troubleshooting.	**15**
VI	**Current Trends (For CIA only):** - Prevention-First Architecture, Next-Generation Firewalls - App-ID - User-ID - Content-ID - Panorama	

*****……***** Self Study

Text Book(s):

1. Doug Lowe,"Networking All-in-One For Dummies", 8th Edition, John Wiley & Sons, Inc., 2021
2. Lawrence C. Miller, "Cybersecurity For Dummies", Palo Alto Networks Edition, John Wiley & Sons, Inc., 2014
3. Eric Maiwald, "Network Security", A Beginner's Guide, Third Edition, 2013

Reference Book(s):

1. Prof. Dipanjan Kumar Dey, "Cyber Security and Network Security Practices and Applications", Sankalp Publication, 2023

Web Resource(s):

PCCET Study Guide - https://1drv.ms/b/s!AsAdE9MLkuTaii8O8lnzlU1e8uKG?e=T2Nsyb
https://onlinecourses.swayam2.ac.in/nou19_cs08/preview

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Remember the fundamental concepts of Cyber Security	K1
CO2	Identify the various forms of cyber attacks	K2
CO3	Apply security principles, policies and procedures to safeguard information system and to develop secure IoT devices	K3
CO4	Analyze the cyber security needs of an organization	K4
CO5	Evaluate firewall rules and implement intrusion detection and prevention system	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	1	3	3	3	3	2	2	2.5
CO2	3	3	2	2	1	2	3	3	1	3	2.3
CO3	3	3	3	3	3	2	3	3	2	3	2.8
CO4	3	2	3	3	3	2	2	3	3	3	2.7
CO5	3	2	3	2	2	2	3	3	3	2	2.5
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. M.A. Jamal Mohamed Yaseen Zubeir
Mr. P. Mohamed Thahir

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
II	23UIC2CC4	Core - IV	4	4	25	75	100

Course Title	Linux and Windows Fundamentals

SYLLABUS

Unit	Contents	Hours
I	Background on Linux - Interacting With the File system! - Searching for Files - An Introduction to Shell Operators	12
II	Introduction to Flags and Switches -File system Interaction Continued - Permissions 101 - Common Directories	12
III	Terminal Text Editors - General/Useful Utilities - Processes 101 - Maintaining Your System: Automation - Maintaining Your System: Package Management - *Maintaining Your System: Logs*	12
IV	Windows Editions - The Desktop (GUI) - The File System - The Windows\System32 Folders - User Accounts, Profiles, and Permissions - User Account Control - Settings and the Control Panel - ***Task Manager*.**	12
V	System Information - Resource Monitor - Command Prompt - Registry Editor - Windows Updates - Windows Security - Virus & threat protection - Firewall & network protection - App & browser control - Device security - BitLocker - ***Volume Shadow Copy Service***	12
VI	**Current Trends (For CIA only):** Computer Management, System Configuration and Change UAC Settings	

…….. Self Study

Text Book(s):

1. William Pollock, “Linux Basics for Hackers” , 2019
2. Windows Internals 6th Edition by David Solomon and Mark Russinovich, 2012

Reference Book(s):

1. Fundamental of Linux by Oliver Pelz, Packet Publishing Ltd, 2018

Web Resource(s):

1. Linux Security By Paul Cobbaut - http://linux-training.be/
2. https://www.basu.org.in/wp-content/uploads/2020/03/Windows-Linux.pdf
3. https://www.uoanbar.edu.iq/eStoreImages/Bank/20002.pdf
4. https://nptel.ac.in/courses/117106113

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 concept of a Linux file system and learn techniques to search for files using various commands	K1
CO2	Explore the Windows file system, including essential directories and file management techniques	K2
CO3	Apply security credentials for the user accounts and system controls	K3
CO4	Analyze the windows updates and windows security	K4
CO5	Evaluate firewall rules and implement the system security	K5

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2	2	2	3	3	2	2	3	3	2.5
CO2	3	2	2	2	2	2	3	3	3	2	2.4
CO3	2	3	3	2	2	2	2	2	3	2	2.3
CO4	3	2	2	2	2	2	2	2	2	3	2.2
CO5	3	2	1	1	1	1	3	1	3	2	1.8
Mean Overall Score											2.24
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. Syed Kousar Niasi
Mr. P. Mohamed Thahir

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
II	23UIC2AC3	Allied - III	4	3	25	75	100

Course Title	Java Programming

SYLLABUS		
Unit	**Contents**	**Hours**
I	Introduction to Java Programming: Introduction-Features of Java-Applications and Applets-Java Development Kit - The Building Blocks of Java - Data Types - Variable Declarations: Declaring, Initializing and Variables - Variable Types in Java -Wrapper Classes - Operators-*Control Structures*-Arrays-Strings	**12**
II	Java as an OOP Language: Defining Classes - Defining Methods - Knowing this - Passing Arguments to Methods - Overloading Methods - Constructor Methods - Inheritance- Overriding Methods - Finalizing Classes, Methods and Variables - Abstract Classes and Methods - Packages - *Interfaces*	**12**
III	Exception Handling: Basics of Exception Handling in Java - Exception Hierarchy - Throwable Class - Handling Exceptions in Java - Throwing User Defined Exceptions. Multithreading - Overview of Threads - Creating Threads - Thread Life - cycle - Thread Priorities and *Thread Scheduling*.	**12**
IV	Files and I/O Streams: Java I/O - File Streams - FileInputStream and FileOutputStream - Serialization. Basic classes in AWT - Event Handling - AWT Components - Layout Managers - *The Swing package*	**12**
V	Networking and RMI: Introduction to Networking- understanding ports-Networking classes: Introduction to RMI - *RMI Architecture*-Implementing Remote class and Interfaces-Security	**12**
VI	**Current Trends (For CIA only):** Solving simple real-world problems using Java	

……. Self Study

Text Book:

P.Radha Krishna, "Object Oriented Programming through JAVA", Universities Press, 2007.

Reference Book(s):

1. Herbert Schildt," JAVA-The Complete Reference", TATA McGraw Hill Edition, 2011.
2. C.Muthu, "Programming with Java", Second Edition, Vijay Nicole imprints Pvt. Ltd., 2008.

Web Resource(s):

1. https://www.javatpoint.com/java-tutorial
2. shttps://www.geeksforgeeks.org/java/
3. https://www.programiz.com/java-programming
4. https://onlinecourses.nptel.ac.in/noc22_cs47/preview

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 features and basic building blocks of Java Programming	K1
CO2	Differentiate the concepts of method overloading and method overriding	K2
CO3	Apply the user interfacing controls and exception handling technique	K3
CO4	Examine the client server communication using RMI techniques	K4
CO5	Develop small projects for 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	1	2	3	3	3	2	2	1	2.3
CO2	3	2	3	2	1	3	3	3	2	2	2.4
CO3	3	2	3	2	3	2	3	3	3	1	2.5
CO4	2	3	2	2	3	3	3	2	3	3	2.6
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. Abdul Saleem

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
II	23UIC2AC4P	Allied - IV	3	3	20	80	100

Course Title	Java Programming Lab - Practical

Develop a Java Program to demonstrate:

1. a) Finding biggest among three numbers (If statements)
   b) Displaying sum of the individual digits of a given number (while/do..while loop)
   c) Finding factorial of a given number (for loop)
   d) Displaying the day of a week (switch statement)

2. a) Sorting a set of given numbers(Arrays)
   b) Arranging the given names in alphabetical order(String)

3. a) Area of a circle (class and objects)
   b) Students Mark Sheet (Single inheritance)

4. a) Area of the shapes (interface)
   b) EB-Bill preparation (package)|

5. a) Handling multiple exceptions
   b) Creating threads using *Runnable i*nterface

6. a) Copying the contents of one file in to another file
   b) Object Serialization

7. a) Displaying geometrical shapes on a Frame window
   b) Displaying the zonal areas names using BorderLayout

8. Simple user interface using AWT components

9. Simple client-server application using sockets

10. Simple distributed application using RMI

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 building blocks of Java Programming	K1, K2
CO2	Differentiate the usage of Sting and StringBuffer classes	K2
CO3	Apply the user interfacing controls and exception handling technique.	K3
CO4	Examine the two ways of creating threads, object serialization	K4
CO5	Develop small client-server applications using Sockets and RMI 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	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.S. Abdul Saleem

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
II	23UCN2SS	Soft Skills Development	2	2	-	100	100

Course Title	Soft Skills Development

SYLLABUS		
Unit	**Contents**	**Hours**
I	**Communication Skills:** Verbal and Non - Verbal communication - The active vocabulary - Conversational Etiquette - KOPPACT syndrome	6
II	**Emotional Skills:** Emotional Intelligence - The five steps to Emotional Quotient - Self Awareness and Regulation - Empathy - Social Intelligence - stress management - coping with failures	6
III	**Functional Skills:** Using the tools of communicatory and emotional skills - Resume writing - Preparation of Curriculum Vitae - interview skills - Acing the interview - Group dynamics - Mock interviews and Group discussions	6
IV	**Interpersonal Skills:** Synergising relationships - SWOT analysis - SOAR analysis - The social skills - Time Management - Decision making - problem solving - prioritising and Implementation	6
V	**Personality Skills:** Leadership skills - Attributes and Attitudes - Social leader Vs The Boss - critical and creative thinking	6

Hours of Teaching : 5 hours and Hours of Activity: 25 hours

Textbook(s):

1. Social intelligence: The new science of human relationships - Daniel Goleman; 2006.
2. Body Language in the workplace - Allan and Barbara Pease; 2011.
3. Student's Hand Book: Skill Genie - Higher education department, Government of Andhra Pradesh.

Web References:

1. https://nptel.ac.in/courses/109105110

EVALUATION CRITERIA

Work Book (Each unit carries 10 marks) - 50 Marks
Examination - 50 Marks

1. Teacher who handles the subject will award 50 marks for work book based on the performance of the student.
2. On the day of examination the examiners (Internal & External) will jointly award the marks for the following categories:

    - Self-Introduction - 20 Marks
    - Resume - 10 Marks
    - Mock Interview - 20 Marks

To assess the self-introduction, Examiners are advised to watch the video presentation submitted by the students. If they failed to submit the video presentation, the Examiners may direct the student to introduce himself orally and a maximum 10 marks only will be awarded.

Mock Interview Marks Distribution (**20-Marks**)

Attitude (self interest, confidence etc.) (4 Marks)	Physical appearance including dress code (4 Marks)	Communication Skills (6 Marks)	Answering questions asked from the resume and work book (6 Marks)

Course Coordinator:
Dr. M. Syed Ali Padusha

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
III	23UIC3CC5T	Core - V (a)	3	3	10	40	50

Course Title	Ethical Hacking Essentials

SYLLABUS		
Unit	**Contents**	**Hours**
I	Elements of Information Security - Motives, Goals, and Objectives of Information Security Attacks - Classification of Attacks - Information Security Attack Vectors - Cyber Kill Chain Methodology - Tactics, Techniques, and Procedures - Indicators of Compromise - Hacking Concepts and Hacker Classes - Phases of Hacking Cycle - Ethical Hacking Tools - Threat and Threat Sources - Malware and Components of Malware - Types of Malware - *Vulnerability and Vulnerability Classification* - Vulnerability Assessment and Types - Vulnerability Scoring Systems - Vulnerability Assessment Tools	9
II	Password Cracking and Complexity - Microsoft Authentication - Types of Password Attacks - Password Cracking Tools - Social Engineering Concepts - Social Engineering Techniques - Insider Threats - Identity Theft - Social Engineering Countermeasures - Packet Sniffing and Types of Sniffing - Various Sniffing Techniques and Tools - Sniffing Countermeasures - *Types of DoS and DDoS Attacks* - DoS/DDoS Attack Tools - DoS/DDoS Attack Countermeasures	9
III	Web Server Concepts and Attacks - Web Server Attack Tools and Countermeasures - Web Application Architecture - Web Application Threats and Attacks - Web Application Attack Tools and Countermeasures - Types of SQL Injection Attacks - SQL Injection Tools - Wireless Terminology - Wireless Encryption Algorithms - Wireless Network-Specific Attack - Different Wireless Attack Tools - Bluetooth Attack Techniques - *Wireless Attack Countermeasures*.	9
IV	Anatomy of a Mobile Attack - Mobile Platform Attack Vectors - Mobile Platform Vulnerabilities - Mobile Device Management - IoT Concepts - IoT attacks and IoT attack Tools - OT Concepts - OT Attacks and OT Attack Tools - OT Attack Countermeasures	9
V	Cloud Computing Concepts - Container Technology - Cloud Computing Threats - Cloud Attacks and Tools - Cloud Attack Countermeasures - Penetration Testing and its Benefits - Types of Penetration Testing - Understanding Phases of Penetration Testing - *Penetration Testing Methodologies* - Guidelines and Recommendations - Risks Associated with Penetration Testing.	9
VI	**Current Trends (For CIA only):** Session Hijacking and Types of Session Hijacking	

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Text Book(s):
Michael T. Simpson, Kent Backman, and James E. Corley, "Hands-On Ethical Hacking and Network Defense", 2nd Edition, Delmar Cengage Learning, 2011
Reference Book(s):
Rob Wilson, "Hands-On Ethical Hacking and Network Defense", Cengage Learning, 2022
Web Resource(s):
EHE Study Guide - https://1drv.ms/b/s!AsAdE9MLkuTamEcNnaWO4dt5kn3R?e=LHMSYz https://onlinecourses.nptel.ac.in/noc22_cs13/preview

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Learn and Understand about various types of attacks, attackers and security threats and vulnerabilities present in the computer system	K1,K2
CO2	Understand the complexity in password cracking and social engineering countermeasures	K2
CO3	Examine how social engineering can be done by attacker to gain access of useful & sensitive information about the confidential data	K3
CO4	Explain the Web Server attacks, mobile attacks and Cloud Computing Attacks	K4
CO5	Compose the encryption algorithms for wireless networks	K5

Relationship Matrix:

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

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

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

Course Coordinator: Dr. M.A. Jamal Mohamed Yaseen Zubeir
Mr. P. Mohamed Thahir

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
III	23UIC3CC5P	Core - V (b)	2	2	10	40	50

Course Title	Ethical Hacking Essentials Lab - Practical

1. Information Security Threats and Vulnerabilities
    a. Creating a Trojan to Gain Access to the Target System
    b. Creating a Virus to Infect the Target System
    c. Creating a Worm using Internet Worm Maker Thing
    d. User System Monitoring and Surveillance using SpytechSpyAgent
    e. Finding Vulnerabilities on Exploit Sites
2. Password Cracking
    a. Password Cracking using L0phtCrack, John the Ripper, THC-Hydra
3. Social Engineering
    a. Sniff Users Credentials using the Social-Engineer Toolkit (SET)
    b. Perform Phishing using ShellPhish
    c. Detect Phishing using Netcraft and PhishTank
4. Network Level Attacks
    a. Active Sniffing - Perform ARP Poisoning using arpspoof
    b. Perform Password Sniffing using Wireshark
    c. Detect ARP Attacks using Xarp
    d. Perform a DoS Attack (SYN Flooding) on a Target Host using Metasploit
    e. Hijack a Session using Zed Attack Proxy (ZAP)
    f. Detect Session Hijacking using Wireshark
5. Web Application Attacks
    a. Perform Web Application Reconnaissance using whatweb
    b. Perform a Brute-force Attack using Burp Suite
    c. Perform Parameter Tampering using Burp Suite
    d. Exploit Parameter Tampering and XSS Vulnerabilities in Web Applications
    e. Perform Cross-Site Request Forgery (CSRF) Attack
6. Wireless Attacks
    a. Find Wi-Fi Networks in Range using NetSurveyor
    b. Find Wi-Fi Networks and Sniff Wi-Fi Packets using Wash and Wireshark
    c. Crack a WEP Network using Wifiphisher
    d. Crack a WPA Network using Fern Wifi Cracker
    e. Crack a WPA2 Network using Aircrack-ng
7. Mobile Attacks
    a. Hack an Android Device by Creating Binary Payloads using Parrot Security
    b. Analyze a Malicious App using Online Android Analyzers
8. IOT & OT Attacks
    a. Gather Information using Online Footprinting Tools
    b. Capture and Analyze IoT Traffic using Wireshark
9. Cloud Computing Threats
    a. Enumerate S3 Buckets using lazys3
    b. Enumerate S3 Buckets using S3Scanner
    c. Exploit Open S3 Buckets using AWS CLI

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Learn and Understand about various types of attacks, attackers and security threats and vulnerabilities present in the computer system	**K1**
CO2	Understand the complexity in password cracking and social engineering countermeasures	**K2**
CO3	Examine how social engineering can be done by attacker to gain access of useful & sensitive information about the confidential data	**K3**
CO4	Explain the Web Server attacks, mobile attacks and Cloud Computing Attacks	**K4**
CO5	Compose the encryption algorithms for wireless networks	**K5**

Relationship Matrix:

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

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

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

Course Coordinator: Dr. M.A. Jamal Mohamed Yaseen Zubeir
Mr. P. Mohamed Thahir

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
III	23UIC3CC6	Core - VI	3	3	25	75	100

Course Title	Advanced Linux and Windows Active Directory

SYLLABUS		
Unit	**Contents**	**Hours**
I	Running Linux in a Virtual Environment - Securing User Accounts - Setting up sudo privileges - Locking down users' home directories - Enforcing strong password criteria - Locking user accounts - An overview of ip tables - *Uncomplicated Firewall*.	9
II	GNU Privacy Guard - Encrypting partitions - Encrypting directories - Creating and managing keys - Using chmod to set permissions - Using SUID and SGID - Creating an access control list - Creating an inherited access control list - *Creating a shared directory* - Using ACLs to access files	9
III	Implementing Mandatory Access - Troubleshooting - Working with SELinux policies - Installing and updating ClamAV and maldet - Scanning with ClamAV and maldet - Using ausearch and aureport - Looking at Snort and Security Onion - Scanning and hardening with Lynis - Finding vulnerabilities with OpenVAS - Password-protecting the GRUB 2 bootloader	9
IV	Active Directory - building blocks of Active Directory - DNS namespace - Requirements for Active Directory - Gathering Business Information - Gathering Technical Information - Designing an Active Directory Implementation Plan - Need for DNS - Active Directory Requirements for DNS - Types of Active Directory Naming - Creating a Logical Structure - *The Physical Side of Active Directory* - Designing a Site Topology - Installing Windows Server 2008 - Deploying AD DS on a Core Server	9
V	AD LDS - Federating Active Directory - AD Certificate Services and Rights Management Services - Managing Users, Groups, and Other Objects - Managing Active Directory Replication - Schema-ing! - *Managing Security with Active Directory Domain Services* - Maintaining Active Directory - The Ten Most Important Active Directory Design Points.	9
VI	**Current Trends (For CIA only):** Ten Cool Web Sites for Active Directory Info - Ten Troubleshooting Tips for Active Directory	

…… Self Study

Text Book(s):

1. Donald A. Tevault, "Mastering Linux Security and Hardening", 2018
2. Steve Clines and Marcia Loughry, "Active Directory For Dummies", Wiley Publisher, 2nd Edition, 2009

Reference Book(s):

Ahmed AlKabary, "Learn Linux Quickly", Packet Publishing Ltd, 2020

Web Resource(s):

1. Active Directory
2. Advanced Linux
3. https://onlinecourses.swayam2.ac.in/aic20_sp24/preview

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Learn and understand the Active Directory Requirements for DNS	K1, K2
CO2	Describe the Active Directory Building Blocks	K2
CO3	Apply Linux commands to set permissions	K3
CO4	Evaluate using Linux as a firewall.	K4
CO5	Develop and Manage Security with Active Directory Domain Services	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	1	3	2	2	2	2	2.3
CO4	2	3	2	1	1	3	2	2	2	2	2.0
CO5	3	3	3	3	2	3	3	2	2	3	2.7
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: Mr. P. Sheik Abdullah
P. Mohamed Thahir

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
III	23UIC3AC5	Allied - V	2	2	25	75	100

Course Title	Web Technology

SYLLABUS		
Unit	**Contents**	**Hours**
I	Internet - Protocol Layering - Internet Addressing - Accessing the Internet - Internet organisation - Email - *File Transfer* - Remote Login	6
II	DNS - Domain Hierarchy - Top-Level Domain - Second-Level Domain - Sub domain - DNS Record Types - DNS request	6
III	HTTP - HTTPS - URL - Making a Request - HTTP Methods - HTTP Status Codes - Headers - Common Request Headers - *Common Response Headers* - Cookies	6
IV	How web work - HTML - JavaScript - Sensitive Data Exposure - HTML Injection	6
V	Load Balancers - Content Delivery Networks - Databases - Web Application Firewall - Web servers - How Web servers work - Virtual Hosts - Static Vs Dynamic Content - "Scripting and Backend Languages*.	6
VI	**Current Trends (For CIA only):** HTML formatting elements, JavaScript objects	

…….. Self Study

Text Book(s):

3. Akshi Kumar, "Web Technology Theory and Practice", Taylor & Francis Group, First Edition, 2018
4. M. Srinivasan, "Web Technology Theory and Practice " First Edition, 2012

Reference Book(s):

C. Xavier, "World Wide Web Design with HTML", TATA McGraw-Hill Education, 2001

Web Resource(s):

1. https://cyberhealsuk-my.sharepoint.com/:b:/g/personal/thahir_cyberheals_com/EWb4d4AJcKRBpOPeFsNztJkBx5D4JdyaxEhHw4Cj3yiCuA?e=DyBG3v
2. https://onlinecourses.swayam2.ac.in/nou20_cs05/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 basics Internet protocols and Internet services	K2
CO2	Distinguish the role of domain and sub domains	K2
CO3	Apply the HTML formatting elements for displaying the text.	K3
CO4	Examine the functionalities of DNS, Web servers and virtual Hosts	K4
CO5	Develop the interactive web pages using Java Script	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	2	2	2	2.4
CO5	3	3	3	3	2	3	3	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: Mr. A. Jainuabudeen
P. Mohamed Thahir

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
III	23UIC3AC6T	Allied - VI (a)	2	2	10	40	50

Course Title	Python Programming

SYLLABUS		
Unit	**Contents**	**Hours**
I	Introduction: Using Python-Input, Processing and Output: Displaying Output with the print Function - Comments - Variables - Reading Input from the Keyboard - Simple Functions: Introduction to Functions - Defining and Calling a Function - Passing Arguments to Functions.	6
II	Decision Structures and Boolean Logic: The if Statement - The if-else Statement - Comparing Strings - Nested Decision Structures and the if-elif-else Statement - Logical Operators - Boolean Variables - Repetition Structures: The while Loop: a Condition-Controlled Loop-The for Loop: a Count-*****Controlled Loop***.**	6
III	Value-Returning Functions and Modules: Introduction toValue-Returning Functions: Generating Random Numbers - Writing Your Own Value-Returning Functions-The math Module - Storing Functions in Modules-Files and Exceptions: Introduction to File Input and Output - *****Exceptions***.**	6
IV	Lists and Tuples: Sequences-Introduction to Lists-List Slicing-Finding Items in Lists with the in Operator - List Methods and Useful Built-in Functions - Copying Lists-Processing Lists-Two-Dimensional Lists-Tuples-More About Strings: Basic String Operations - *****String Slicing*****.	6
V	Classes and Object- Oriented Programming: Procedural and Object-Oriented Programming - Classes - Working with Instances - Techniques for Designing Classes - Inheritance: Introduction to Inheritance -*****Polymorphism*****.	6
VI	**Current Trends (For CIA only):** Installing Python, NumPy-Ndarray, widgets, Panda and Django	

…… Self Study

Text Book(s):

1. Tony Gaddis, “Starting Out with Python”, Addison-Wesley Pearson Education, 2nd Edition, 2012

Reference Book(s):

MarkLutz, “Programming Python”, O'Reilly,Media,Inc.Publisher,4th Edition, 2010

Web Resource(s):

1. https://www.w3schools.com/python/
2. https://docs.python.org/3/tutorial/
3. https://onlinecourses.swayam2.ac.in/cec22_cs20/preview

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Remember the fundamental concept of Python	K1
CO2	Illustrate the concepts like decision structure and Boolean logic with examples	K2
CO3	Apply appropriate problem solving strategies for functions and modules	K3
CO4	Evaluate the lists, tuples and their applications in real world problems	K5
CO5	Develop small application using object oriented concepts	K5

Relationship Matrix:

Course Outcomes(COs)	Programme Outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	3	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: Mr. A. Usaif Ahamed

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
III	23UIC3AC6P	Allied - VI (b)	2	2	10	40	50

Course Title	Python Programming Lab - Practical

Develop a Program in Python to

1. Demonstrate different number data types.
2. Find the NCR value of given numbers using function.
3. Print the eligibility of voting using if-else statement.
4. Find whether the given value is prime or not using if-elif statement.
5. Count the number of vowels, consonants and words in a file.
6. Define a module to find odd or even numbers between 1 and 100. Import and use this module in a program.
7. Create a list and demonstrate the following methods:

   a) insert() b)remove() c) append() d)len() e) pop()
8. Create a tuple and demonstrate following methods :

   a) Concatenation b)Membership c)Access items d) Slicing
9. Find the area of a rectangle using Class and Object.
10. Implement Simple Inheritance

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 different Number data types, if-else statement and if-elif statement in Python	K1
CO2	Understand the concept of modules and files and their usage	K2
CO3	Apply appropriate problem solving strategies using Lists and Tuples	K3
CO4	Examine the procedure oriented and Object Oriented approaches	K5
CO5	Develop the programs using Object Oriented Concepts	K5

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	3	1	2	3	3	3	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: Mr. A. Usaif Ahamed

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
III	23UIC3GE1	Generic Elective - I	2	2	-	100	100

Course Title	Social Networks

SYLLABUS		
Unit	**Contents**	**Hours**
I	Social Network Analysis: The Social Networks perspective - Historical and Theoretical foundations - Fundamental concepts in Network Analysis -*Distinctive features**.	6
II	Social Network Data: Introduction - Boundary specification and sampling - Types of networks - Network data, measurement and collection	6
III	Notation for Social Network Data : Graph theoretic notation - sociometric notation - algebraic notation - *two sets of actors*.	6
IV	Graphs and Matrices : Graphs - Matrices - *Properties*	6
V	Centrality and Prestige : Prominence - Nondirectional relations - Directional relations	6
VI	**Current Trends (For CIA only):** Social media and Services-Whatsapp, Instagram, Twitter and other internet based services	

…… Self Study

Text Book(s):
S. Wasserman and K. Faust. "Social Network Analysis: Methods and Applications", Cambridge University Press.
Reference Book(s):
D. Easley and J. Kleinberg, "Networks, Crowds and Markets: Reasoning about a highly connected world" , Cambridge University Press, 1st Edition, 2010

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Understand of social networks for business and professional use	K1,K2
CO2	Explain the concept of for social network data and sociometric notations	K2
CO3	Demonstrate the proficiency and the use of social network analysis	K3
CO4	Examine the non-directional and directional relations	K4
CO5	Create basic matrix operations that are used in social network analysis	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	3	2.5
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											2.58
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
IV	23UIC4CC7	Core - VII	5	5	25	75	100

Course Title	Network Defense Essentials

SYLLABUS		
Unit	**Contents**	**Hours**
I	Network Security Fundamentals, Goals of Network Defense, Information Assurance, Challenges of Network Defense, Types of Network Defense Approaches, Types of Network Security Controls, Network Security Protocols, Identity and Access Management, User Access Management, Types of Authentication, *****Types of Authorization, User Accounting***.**	15
II	Network Security Controls - Regulatory Frameworks, Laws, and Acts - Good Security Policy - Design and Develop Security Policies - Types of Security Policies - Importance of Physical Security - Physical Security Attack Vectors - Types of Physical Security Controls - Physical Security Policy - Types of Firewalls and their Roles - Types of IDS/IPS and their Roles - Types of Honeypots - Virtual Private Networks - Security Incident and Event Management - *****Antivirus/Anti-malware Software*****	15
III	Virtualization - OS Virtualization Security and Concerns - Cloud Computing and its Benefits - Types of Cloud Computing Services - Cloud Deployment Models - Wireless Terminology - Wireless Network Topologies - Components of a Wireless Network - Encryption Mechanisms - Wireless Network Authentication Methods - Wireless Security Tools	15
IV	Mobile Device Connection Methods - Mobile Device Management - Mobile Use Approaches in Enterprises - Security Risk and Guidelines - Mobile Security Management Solutions - IoT - IoT Application Areas and IoT Devices - IoT Architecture and IoT Communication Models - Security in IoT-Enabled Environments - *IoT Device Management*	15
V	Cryptographic Techniques - Different Encryption Algorithms - Different Hashing Algorithms - Cryptography Tools and Hash Calculators - Public Key Infrastructure - Digital Signatures and Digital Certificates - Data Security and its Importance - Different Data Security Technologies - Data Backup and Retention - Data Loss Prevention (DLP) and DLP Solutions - Network Traffic Monitoring - Network Traffic Signatures - Suspicious Traffic Signatures - Signature Analysis Techniques - *****Network Monitoring Tools***.**	15
VI	**Current Trends (For CIA only):** Network Traffic Monitoring, Network Traffic Signatures, Suspicious Traffic Signatures, Signature Analysis Techniques	

…….. Self Study

Text Book(s):
Guide to Network Defense and Counter measures by Randy Weaver, Dawn Weaver, Dean Farwood
Reference Book(s):
Randy Weaver, Network Defense, Thomson Press(India) Ltd.,2009
Web Resource(s):
1. NDE Study Guide - https://1drv.ms/b/s!AsAdE9MLkuTamEhdklT_GrohYl17?e=8E0B7H 2. https://codered.eccouncil.org/course/network-defense-essentials

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 goals of Network defense, Types of Network Security Controls and Network Security Protocols	**K1,K2**
CO2	Illustrate the Network Security , firewalls and their roles	**K2**
CO3	Apply the different encryption techniques in cryptography	**K3**
CO4	Test the security risks in IoT devices	**K4**
CO5	Develop the IoT devices with high security	**K5**

Relationship Matrix:

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

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

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

Course Coordinator: Dr. K. Syed Kousar Niyasi
Mr. P. Mohamed Thahir

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
IV	23UIC4CC8P	Core - VIII	4	3	20	80	100

Course Title	Network Defense Essentials Lab - Practical

1. Identification, Authentication, and Authorization
    a. Implementing Access Controls in Windows Machine
    b. Managing Access Controls in Linux Machine
    c. Implementing Role-Based Access Control in Windows Admin Center (WAC)
    d. Implementing Centralized Authentication Mechanism
2. Network Security Controls - Administrative Controls
    a. Implementing Password Policies using Windows Group Policy
    b. Implementing Auditing Policies
    c. Implementing a Secure Network Policy
    d. Implementing a PowerShell Security Policy
3. Network Security Controls - Technical Controls
    a. Implementing Host-based Firewall Protection with iptables
    b. Implementing Host-based Firewall Functionality
    c. Implementing Network-Based Firewall Functionality
    d. Implementing Host-based IDS Functionality using Wazuh HIDS
    e. Implementing Network-based IDS Functionality using Suricata IDS
4. Virtualization and Cloud Computing
    a. Auditing Docker Host Security using Docker-Bench-Security Tool
    b. Creating IAM Credentials on Google Cloud Platform
    c. Implementing AWS Identity and Access Management
    d. Implementing Key Management Services in AWS
    e. Securing Amazon Web Services Storage
5. Wireless Network Security
    a. Configuring Security on a Wireless Router
6. Mobile Device Security
    a. Implementing Enterprise Mobile Security using Miradore MDM Solution
7. IoT and OT Security
    a. Secure IoT Device Communication using TLS/SSL
8. Cryptography
    a. Calculating One-way Hashes using HashCalc
    b. Calculating MD5 Hashes using MD5 Calculator and HashMyFiles
    c. Encrypting and Decrypting Data using BCTextEncoder
    d. Creating and Using Self-signed Certificates
    e. Creating and Managing Certificates using OpenSSL
    f. Imaging Steganography using OpenStego
9. Data Security
    a. Performing Disk Encryption using BitLocker Drive Encryption and VeraCrypt
    b. Implementing Built-in File System-level Encryption on Windows
    c. Performing Data Backup using Genie Backup Manager
    d. File Recovery using EaseUS Data Recovery Wizard
    e. Backing Up and Restoring Data in Windows
    f. Performing Data Destruction using Windows DiskPart Utility
10. Network Traffic Monitoring
    a. Intercepting Network Traffic using Wireshark and tcpdump
    b. Applying Various Filters in Wireshark
    c. Analyzing and Examining Various Network Packet Headers in Linux using tcpdump
    d. Scanning Network to Identify Hosts in the Local Network

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 Role-Based Access Control in Windows Admin Center	**K1**
CO2	Explain the IoT and OT Security	**K2**
CO3	Apply the Various Filters in Wireshark	**K3**
CO4	Analyzing and Examining Various Network Packet Headers in Linux	**K4**
CO5	Creating and Using Self-signed Certificates	**K5**

Relationship Matrix:

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

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

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

Course Coordinator: Dr. K. Syed Kousar Niyasi
Mr. P. Mohamed Thahir

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
IV	23UIC4AC7	Allied - VII	4	3	25	75	100

Course Title	Numerical Methods

SYLLABUS		
Unit	**Contents**	**Hours**
I	Solution of Algebraic and Transcendental equation-Bisection Method - ***Iteration Method*-Method of false position -Newton -Raphson Method.	12
II	Interpolation: Finite differences - Forward differences-*Backward differences*-Newton's formula for interpolation, Interpolation with unevenly spaced points-Lagrange's interpolation formula*.	12
III	Numerical differentiation and integration -Numerical differentiation -Numerical integration-Trapezoidal Rule-*Simpson's Rule.*	12
IV	Matrices and linear system of equation: Gaussian Elimination Method- Gauss-Jordan Method-Iterative Method-*Gauss Jacobi*- Gauss- Seidel Methods.	12
V	Numerical solution of ordinary differential equations-Solution by Taylor series-Picard's method of successive approximations- Euler method-*Modified Euler Method*-Runge-Kutta Methods of second order and fourth order.	12
VI	**Current Trends (For CIA only):** Model questions related to above topics from TNPSC question bank to be solved	

…… Self Study

Textbook (s):

S.S.Sastry, "Introductory Methods of Numerical Analysis", Prentice Hall o India Learning Private Limited, Fourth Edition (2009).
P. Kandasamy, K. Thilagavathy, K. Gunavathi, "Numerical Methods", S. Chand & Company Ltd(2010).

Reference Book(s):

A.Singaravelu, "Numerical Methods", Meenachi Agency, 2000

Web Resource(s):

1. http://mcatutorials.com/mca-tutorials-numerical-methods-tutorial.php
2. **htt**ps://onlinecourses.nptel.ac.in/noc19_ma21/preview

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Remember methods for algebraic and transcendental equations with Examples	**K1**
CO2	Demonstrate and discuss System of Linear Equations with examples	**K2**
CO3	Apply domain knowledge for Gauss elimination and Gauss Jordon	**K3**
CO4	Examine and illustrate the examples of Numerical Integration	**K4**
CO5	Classify and study the ordinary differential equations with examples.	**K5**

Relationship Matrix:

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

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

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

Course Coordinator: Dr. A. Mohamed Ismayil

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
IV	23UIC4AC8	Allied - VIII	3	2	25	75	100

Course Title	Number Theory

SYLLABUS		
Unit	**Contents**	**Hours**
I	Divisibility Theory in the integers: The Division Algorithm- -The Euclidean Algorithm- The Diophantine Equation ax+by=c.	9
II	Primes and Their Distribution: The Fundamental theorem of Arithmetic- The Sieve of Eratosthenes	9
III	The Theory of Congruences -Basic Properties of Congruence -Linear Congruences and The Chinese Remainder Theorem	9
IV	Number Theoretic Functions: The Sum and Number of Divisors-The Mobius Inversion Formula	9
V	Euler's generalization of Fermat's Theorem: Euler's Phi-function- Euler's Theorem	9
VI	**Current Trends (For CIA only):** Model questions related to above topics from TNPSC question bank to be solved	

Text Book(s):
David M. Burton, Elementary Number Theory, Seventh Edition, Tata McGraw Hill (2012).
Reference Book(s):
1. George E. Andrews, Number Theory, Dover Publications Inc.; New edition, 1995. 2. G. H. Hardy, An Introduction to the Theory of Numbers, Oxford University Press; 6th Edition,2008

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 divisibility concept and number theoretic functions	K1
CO2	Demonstrate the fundamental theorem of arithmetic	K2
CO3	Apply the Chinese remainder theorem in numbers	K3
CO4	Examine the number of divisors of a number	K4
CO5	Prove the Fermat's and Euler's Theorems	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	1	3	2	2	2	2	2.3
CO4	2	3	2	1	1	3	2	2	2	2	2.0
CO5	3	3	3	3	2	3	3	2	2	3	2.7
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. A. Mohamed Ismayil

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
IV	23UIC4GE2	Generic Elective - II	2	2	-	100	100

Course Title	Digital Commerce

SYLLABUS		
Unit	**Contents**	**Hours**
I	Meaning and concept - E- commerce v/s Traditional Commerce- E- Business & E-Commerce - History of E- Commerce - Impacts, Challenges & Limitations of E-Commerce	6
II	Business to Business - Business to customers- Customers to Customers - Business to Government.	6
III	Website - components of website - Concept & Designing website for E- Commerce - Corporate Website - Portal - Search Engine - *Internet Advertising*	6
IV	Introduction - Online payment systems - prepaid and postpaid payment systems - e- cash, e- cheque, Smart Card, Credit Card , Debit Card - *Security issues on electronic payment system*	6
V	Biometrics - Types of biometrics - Security issues in E- Commerce-Regulatory framework of E- commerce	6
VI	**Current Trends (For CIA only):** E-Commerce Platforms, Online Transactions and Services	

…… Self Study

Text Book(s):
Ravi Kalakota and Andrew B. Whinston , “Frontiers of Electronic Commerce”, Addison - Wesley, Delhi, 2004
Reference Book(s):
Turban, Efraim, and David King, “Electronic Commerce: A Managerial Perspective”, Pearson Education Asia, Delhi, 2010.
Web Resource(s):
1. https://cloudinary.com/guides/e-commerce-platform/digital-commerce-complete-guide-to-the-future-of-commerce 2. https://onlinecourses.swayam2.ac.in/cec19_cm01/preview

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Identify the impacts and challenges in the E-commerce	K1
CO2	Understand the types of E-Commerce	K2
CO3	Examine the prepaid and post paid payment system	K3
CO4	Analyze the impact of E-commerce on business models and strategy.	K4
CO5	Explain the process that should be followed in building an E-commerce presence.	K5

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	3	2	3	1	3	3	3	3	3	2.7
CO2	3	3	3	3	1	3	3	3	3	3	2.8
CO3	3	3	3	3	2	2	3	2	3	2	2.6
CO4	3	3	3	2	1	3	3	3	3	2	2.6
CO5	3	3	3	3	2	2	3	2	1	1	2.3
Mean Overall Score											2.6
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: Mr. P. Sheik Abdulla

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.