DEPARTMENT OF COMPUTER SCIENCE

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

Programme: B.Sc. IT with Cyber Security





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

g	Course Code Part Course Category Course Title		Ins.	a ru	Ma	rks	T ()		
Sem	Course Code	Part	Course Category	Course Title	Hrs/ Week	Credit	CIA	ESE	Total
	23U1LT1/LA1/LF1	T	Language - L		6	3	25	75	100
	/ LH1/LU1	1			0	5	25	75	100
	23UCNILEI	Ш	English - I	English for Communication - 1	6	3	25	75	100
I	23UIC1CC2P		Core - I	3	3	23	75 80	100	
	23UIC1AC1	Ш	Allied - I	Mathematical Foundations	4	3	25	75	100
	23UIC1AC2		Allied - II	4	3	25	75	100	
	23UCN1AE1	IV	AECC - I	CC - I Value Education					
				Total	30	22			700
	23U2LT2/LA2/LF2	Ι	Language - II		6	3	25	75	100
	/ LH2/LU2	т	English U	English for Communication II	6	2	25	75	100
	23UCN2LE2	11	English - II	English for Communication - II	0	3	25	75	100
	23UIC2CC3		Core - III	Security	5	5	25	75	100
	23UIC2CC4	ш	Core - IV	Linux and Windows Fundamentals	4	4	25	75	100
п	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 / சமிம் இலக்கியமும் வாலாளம் - I	-	-	-	100 #	-
	[@] Only grades will be	e given		தமழ் இல்கவ்படும் வரலாறும் - 1 Total	30	23			700
	23U3LT3/LA3/LF3			Total	50	20			700
	/ LH3/LU3	Ι	Language - III		6	3	25	75	100
	23UCN3LE3	II	English - III	English for Communication - III	6	3	25	75	100
	23UIC3CC5T		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
ш	23UIC3CC6	ш	Core - VI	Advanced Linux and Windows Active	3	3	25	75	100
	23UIC3AC5	- 111	Allied - V	Web Technology	2	2	25	75	100
	23UIC3AC6T		Allied - VI (a)	Python Programming	2	2	10	40	50
	23UIC3AC6P	23UIC3AC6P Allied - VI (b)		Python Programming Lab - Practical	2	2	10	40	50
	23UIC3GE1	TV.	Generic Elective - I		2	2	-	100	100
	23UCN3AE2	IV	AECC - II	Environmental Studies	2	2	-	100	100
	2011/1 10/10/10/10/10	r –		Total	30	24			800
	23U4L14/LA4/LF4 / LH4/LU4	Ι	Language - IV		6	3	25	75	100
	23UCN4LE4	II	English - IV	English for Communication - IV	6	3	25	75	100
	23UIC4CC7		Core - VII	Network Defense Essentials	5	5	25	75	100
	23UIC4CC8P	ш	Core - VIII	Network Defense Essentials Lab - Practical	4	3	20	80	100
IV	23UIC4AC7	m	Allied - VII	Numerical Methods	4	3	25	75	100
	23UIC4AC8		Allied - VIII	Number Theory	3	2	25	75	100
	23UIC4GE2	IV	Generic Elective - II	Testering 1 to	2	2	-	100	100
	23UCN4EL 23UCN4EA	V	Experiential Learning	NCC NSS etc	-	2	-	100	100
	23U4BT2 /	v	Basic Tamil - II /		-	1	-	-	-
	23U4AT2		Advanced Tamil - II	தமிழ் இலக்கியமும் வரலாறும் - II	-	-	-	100 #	-
			1	Total	30	24		1	800
	23UIC5CC9T	1	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	III	Core - X (b)	Data Structures Lab - Practical	3	3	10	40	50
N7	23UIC5CC11		Core - XI	Pentesting Fundamentals	4	4	25	75	100
v	23UIC5CC12P		Core - XII Disgipling Specific Electives I (a)	Pentesting Lab - Practical	3	3	20	80	50
	23UIC5DE1AD/DD		Discipline Specific Electives - I (a)		2	2	10	40	50
	23UIC5DETAP/BP		Shill Enhancement Course J	Caban Lanus and Ethics	2	2	10	40	100
	23UIC5SE2	IV	Skill Enhancement Course - I	Eurodamentals of SOC	2	1	-	100	100
	23UIC5EC1		Extra Credit Course - I*	Online Course	-	*	_	-	-
		I	······································	Total	30	27		1	700
	23UIC6CC13		Core - XIII	Artificial Intelligence	5	5	25	75	100
	23UIC6CC14	1	Core - XIV	Web Application Security	5	5	25	75	100
	23UIC6CC15	ш	Core - XV	Network Security Expert	5	5	25	75	100
	23UIC6CCPW		Project Work	Project Work	5	4	-	100	100
VI	23UIC6DE2A/B	4	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 23UCN6FCA1	1	Extra Credit Course for all*	Entrepreneurship Development	-	+	-	-	-
	* Programme Specif	l fic Onli	ne Course for Advanced Learners	Entoproteursmp Development		<u> </u>		1	
	** Any Online Cour	se for H	Enhancing Additional Skills	Total	30	28			700
	⁺ Course for Enhance	ing En	trepreneurial Skills	C	d Total	1/19			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
п	23U2BT1	Basic Tamil - I (எழுத்தும் இலக்கியமும் அறிமுகம் - I)
11	23U2AT1	Advanced Tamil - I (தமிழ் இலக்கியமும் வரலாறும் - I)
IV	23U4BT2	Basic Tamil - II (எழுத்தும் இலக்கியமும் அறிமுகம் - II)
ĨV	23U4AT2	Advanced Tamil - II (தமிழ் இலக்கியமும் வரலாறும் - II)

<u>Mandatory</u>

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
	23UIC5DE1AT	Cloud Computing and its Security
V	23UIC5DE1BT	Blockchain Technology
v	23UIC5DE1AP	Cloud Computing Lab - Practical
	23UIC5DE1BP	Blockchain Technology Lab - Practical
	23UIC6DE2A	Mobile Communication
VI	23UIC6DE2B	Cyber Defense
VI	23UIC6DE3AP	Mobile Communication Lab - Practical
	23UIC6DE3BP	Cyber Defense Lab - Practical

SemesterCourse CodeCourse CategoryWeekCreatisCIAESETotaI23UIC1CC1CORE - I552575100	Somestan	Course Code	Course Cotogory	Hours/	Credita	Marks for Evaluation			
I 23UIC1CC1 CORE - I 5 5 25 75 100	Semester	Course Code	Course Category	Week	Creatis	CIA	ESE	Total	
	Ι	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. <u>https://www.geeksforgeeks.org/object-oriented-programming-in-cpp/</u>
- 3. <u>https://onlinecourses.nptel.ac.in/noc22_cs40/preview</u>
- 4. https://archive.nptel.ac.in/courses/106/105/106105151/
- 5. https://nptel.ac.in/courses/106105151

Course Outcomes										
Upon suc	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	К3								
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								

Course	Р	rogramn	ne Outco	mes (PO	s)	Progra	Mean Seere of				
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs
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											
									Cor	relation	High

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

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

Course Coordinator: Dr. O.A. Mohamed Jafar

Somester	Course Code		Course Cotogory	Hours/	Credita	Marks for Evaluation				
Semester			Course Category	Week	Creatis	CIA	ESE	Total		
I 23UIC1CC2		UIC1CC2P	CORE - II	3	3	20	80	100		
Course Ti	tle	C and C++ I	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 suc	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									

Course	Programme Outcomes (POs)						Programme Specific Outcomes (PSOs)					
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs	
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												
									Cor	relation	High	

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

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

Course Coordinator: Dr. O.A. Mohamed Jafar

Semester	Course Code	Course Cotogory	Hours/	Credita	Marks for Evaluation			
	Course Coue	Course Category	Week	Creans	CIA	ESE	Total	
Ι	23UIC1AC1R	ALLIED - I	4	3	25	75	100	

Course Title M

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 suc	cessful completion of this course, the student will be able to:							
CO No. CO Statement								
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						

Course	Pro	gramm	e Outco	omes (P	Os)	Progra	Mean Score of				
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs
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
\geq 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Dr. T. Shiek Pareeth

Semester	Course Code	Course Cotogomy	Hours/	Credita	Marks for Evaluation			
	Course Coue	Course Category	Week	Creans	CIA	ESE	Total	
Ι	23UIC1AC2R	ALLIED - II	4	3	25	75	100	
		•						

Course Title | PROBABILITY AND STATISTICS

SYLLABUS					
Unit	Contents	Hours			
Ι	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 suc	cessful completion of this course, the student will be able to:						
CO No. CO Statement							
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	К3					
CO4	Examine and illustrate the basic terminology of mean, median and mode	K4					
CO5	Classification the correlation and its types with examples	K5					

Course	Pro	gramm	e Outco	omes (P	Os)	Progra	Mean Score of				
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs
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
\geq 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Dr. T. Shiek Pareeth

Somester	Course Code	Course Cotogory	Hours/	Credite	Marks for Evaluation			
Semester	Course Coue	Course Category	Week	Creatis	CIA	ESE	Total	
II	23UIC2CC3	Core - III	5	5	25	75	100	

Course Title Fundame	ntals of Cyber Security and Net	work 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-Generative Firewalls - App-ID - User-ID - Content-ID - Panorama	ion
*	* 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 - <u>https://1drv.ms/b/s!AsAdE9MLkuTaii8O8lnzlU1e8uKG?e=T2Nsyb</u> https://onlinecourses.swayam2.ac.in/nou19_cs08/preview_

	Course Outcomes							
Upon suc	cessful 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	К3						
CO4	Analyze the cyber security needs of an organization	K4						
CO5	Evaluate firewall rules and implement intrusion detection and prevention system	K5						

Course Programme Outcomes(POs)						Prog	Mean				
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs
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

Somostor	Course Code	Course Cotogory	Hours/	Hours/ Credita		Marks for Evaluation			
Semester Course Code C		Course Category	Week	Creatis	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 Chan Settings	nge UAC			

..... 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. <u>https://www.uoanbar.edu.iq/eStoreImages/Bank/20002.pdf</u>

4. https://nptel.ac.in/courses/117106113

Course Outcomes							
Upon suc	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	К3					
CO4	Analyze the windows updates and windows security	K4					
CO5	Evaluate firewall rules and implement the system security	K5					

Course Programme Outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean	
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs
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

Somostor	Course Code	Course Cotogory	Hours/	Credits	Marks for Evaluation			
Semester	Course Coue	Course Calegory	Week		CIA	ESE	Total	
Π	23UIC2AC3	Allied - III	4	3	25	75	100	
Course Ti	tle Java Program	nming						

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				

Course	Programme Outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs
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/	Credite	Marks for Evaluation			
	Course Coue		Week	Creuits	CIA	ESE	Total	
Π	23UIC2AC4P	Allied - IV	3	3	20	80	100	
Course Ti	tle Java Progra	mming 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 exceptionsb) Creating threads using *Runnable interface*
- 6. a) Copying the contents of one file in to another fileb) Object Serialization
- 7. a) Displaying geometrical shapes on a Frame windowb) Displaying the zonal areas names using Border Layout
- 8. Simple user interface using AWT components
- 9. Simple client-server application using sockets
- 10. Simple distributed application using RMI

	Course Outcomes						
Upon suc	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					

Course	Programme Outcomes(POs)					Prog	Mean				
Outcomes (COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Score of COs
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/	Credits	Marks for Evaluation			
	Course Coue		Week		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					
*	* Self Study					

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 - <u>https://ldrv.ms/b/s!AsAdE9MLkuTamEcNnaWO4dt5kn3R?e=LHMSYz</u> https://onlinecourses.nptel.ac.in/noc22_cs13/preview

	Course Outcomes						
Upon suc	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	К3					
CO4	Explain the Web Server attacks, mobile attacks and Cloud Computing Attacks	K4					
CO5	Compose the encryption algorithms for wireless networks	K5					

Course	Programme Outcomes (POs)						Programme Specific Outcomes (PSOs)				
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs
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

Somostor	Course Code		Course Cotogory	Hours/	Cradita	Marks for Evaluation			
Semester	U	Jurse Coue	Course Category	Week	Creats	CIA	ESE	Total	
III	2	3UIC3CC5P	Core - V (b)	2	2	10	40	50	
Course Ti	tle	Ethical Hack	zing Essentials Lab - Practica	1					

- 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 suc	cessful 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	К3						
CO4	Explain the Web Server attacks, mobile attacks and Cloud Computing Attacks	K4						
CO5	Compose the encryption algorithms for wireless networks	K5						

Course	Programme Outcomes (POs)						Programme Specific Outcomes (PSOs)				
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs
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

Somostor	Course Code	Course Code Course Category		Credite	Marks for Evaluation			
Semester	Course Coue	Course Category	Week Credits		CIA	ESE	Total	
III	23UIC3CC6	Core - VI	3	3	25	75	100	
			•				•	

Course Title Advanced Linux and Windows Active Directory

	SYLLABUS	
Unit	Contents	Hours
Ι	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
- Advanced Linux 2.
- 3. https://onlinecourses.swayam2.ac.in/aic20_sp24/preview

	Course Outcomes						
Upon suc	cessful 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					

Course	Programme Outcomes(POs)						Programme Specific Outcomes(PSOs)				
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs
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

Somostor	Course Code	Course Category	Hours/	Cradita	Marks for Evaluation			
Semester	Course Coue	Course Category	Week Credits CIA ESE		ESE	Total		
III	23UIC3AC5	Allied - V	2	2	25	75	100	
Course Ti	tle Web Techno	ology						

	SYLLABUS	
Unit	Contents	Hours
Ι	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
Ш	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):

1. Akshi Kumar, "Web Technology Theory and Practice", Taylor & Francis Group, First Edition, 2018

2. 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 suc	Upon successful completion of this course, the student will be able to:									
CO No.	CO No. CO Statement									
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.	К3								
CO4	Examine the functionalities of DNS, Web servers and virtual Hosts	K4								
CO5	Develop the interactive web pages using Java Script	K5								

Course Outcomes (COs)	Î	Progra	amme Ou	utcomes(POs)	Prog	Mean				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Score of COs
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: Dr. A. Jainuabudeen Mr. P. Mohamed Thahir

Semester	Course Code	Course Cotogomy	Hours/	Credita	Marks for Evaluation			
	Course Coue	Course Category	Week	Creans	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						
П	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 suc	Upon successful completion of this course, the student will be able to:									
CO No.	CO No. CO Statement									
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								

Course		Progra	amme Ou	utcomes((POs)	Prog	Mean				
Outcomes (COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Score of COs
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
									Cor	relation	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 Cotogomy	Hours/	Cradita	Marks for Evaluation			
	Course Coue	Course Category	Week	Creatis	CIA	ESE	Total	
III	23UIC3AC6P	Allied - VI (b)	2	2	10	40	50	
Course Ti	tle Python Prog	ramming 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 No. CO Statement								
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							

Course		Progra	amme Ou	itcomes ((POs)	Prog	Mean				
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs
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										

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 Course Category Week Creans CIA ESE	Somester	Course Code	Course Cotogory	Hours/ Crodita		Marks for Evaluation			
	Semester	Course Coue	Course Category	Week	Creats	CIA	ESE	Total	
III23UIC3GE1Generic Elective - I22-100	III	23UIC3GE1	Generic Elective - I	2	2	-	100	100	

Course Title Social Networks

SYLLABUS					
Unit	Contents	Hours			
Ι	Social Network Analysis: The Social Networks perspective - Historical and Theoretical foundations - Fundamental concepts in Network Analysis -*Distinctive features*.	6			
Π	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, Twitte other internet based services	er and			
*	* Salf Study				

..... 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 suc	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					

Course	Programme Outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs
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

Somester	Course Code	Course Cotogory	Hours/ Credits		Marks for Evaluation			
Semester	Course Coue	Course Category	Week	Creats	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				
п	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 Si Suspicious Traffic Signatures, Signature Analysis Techniques	gnatures,				
*	* 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 - <u>https://ldrv.ms/b/s!AsAdE9MLkuTamEhdklT_GrohY117?e=8E0B7H</u>

2. https://codered.eccouncil.org/course/network-defense-essentials

Course Outcomes						
Upon suc	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	К3				
CO4	Test the security risks in IoT devices	K4				
CO5	Develop the IoT devices with high security	K5				

Course Programme Ou				utcomes(POs)	Programme Specific Outcomes(PSOs)					Mean
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs
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		
				Cor	relation						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

Somester	C	ourse Code	Course Cotogomy	Hours/	Credita	Marks for Evaluation		
Semester	Course Coue		Course Category	Week	Creatis	CIA	ESE	Total
IV	2	3UIC4CC8P	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 | | | | | | | | | | |
| 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 | К3 | | | | | | | | |
| CO4 | Analyzing and Examining Various Network Packet Headers in Linux | K4 | | | | | | | | |
| CO5 | Creating and Using Self-signed Certificates | K5 | | | | | | | | |

Course	Programme Outcomes(POs)						Programme Specific Outcomes(PSOs)					
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs	
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												
	Correlation											

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	C	ourse Code	Course Cotogony	Hours/	Cradita	Marks for Evaluation			
	Course Coue		Course Category	Week	Creans	CIA	ESE	Total	
IV	2	23UIC4AC7 Allied - VII		4	3	25	75	100	
Course Title		Numerical 1	Methods						

SYLLABUS								
Unit	Contents	Hours						
Ι	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 que bank to be solved	iestion						

Textbook (s):

1. S.S.Sastry, "Introductory Methods of Numerical Analysis", Prentice Hall o India Learning Private Limited, Fourth Edition (2009).

2. 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. https://onlinecourses.nptel.ac.in/noc19_ma21/preview

	Course Outcomes									
Upon suc	Upon successful completion of this course, the student will be able to:									
CO No. CO Statement										
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								

Course		Progra	amme Ou	utcomes(POs)	Programme Specific Outcomes(PSOs)					Mean	
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs	
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												
	Correlation											

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 Cotogory	Hours/	Cradita	Marks for Evaluation			
	Course Coue	Course Category	Week	Creans	CIA	ESE	Total	
IV	23UIC4AC8	Allied - VIII	3	2	25	75	100	
			•					

Course Title Number Theory

	SYLLABUS									
Unit	Contents	Hours								
Ι	Divisibility Theory in the integers: The Division AlgorithmThe Euclidean Algorithm- The Diophantine Equation ax+by=c.	9								
II	Primes and Their Distribution: The Fundamental theorem of Arithmetic- The Sieve of Eratosthenes	9								
ш	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 que bank to be solved	uestion								

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	К3								
CO4	Examine the number of divisors of a number	K4								
CO5	Prove the Fermat's and Euler's Theorems	K5								

Course	Programme Outcomes(POs)						Programme Specific Outcomes(PSOs)					
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs	
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												
	Correlation											

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

Somestan	Course Code	Course Cotogony	Hours/	Credita	Marks for Evaluation			
Semester	Course Coue	Course Category	Week	Creatis	CIA	ESE	Total	
IV	23UIC4GE2	Generic Elective - II	2	2	-	100	100	

Course Title | Digital Commerce

SYLLABUS						
Unit	Contents	Hours				
Ι	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 Servic	es				
*.	* 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. <u>https://cloudinary.com/guides/e-commerce-platform/digital-commerce-complete-guide-to-the-future-of-commerce</u>

2. https://onlinecourses.swayam2.ac.in/cec19_cm01/preview

	Course Outcomes							
Upon suc	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	К3						
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						

Course		Progra	amme Ou	utcomes(POs)	Prog	Mean				
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Score of COs
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			
									Cor	relation	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

Somestan	C	ouma Cada	Course Cotogowy	Hours/	Credita	Marks for Evaluation			
Semester	U	ourse Code	Course Category	Week	Creans	CIA	ESE	Total	
IV	23UCN4EL		Experiential Learning	-	2	-	100	100	
<u>а</u> т.	41	т. 1'							
Course Th	tle	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.

			Hours/		Marks for Evaluation				
Semester	Course Code	Course Category	Week	Credits	CIA	ESE	Total		
V	23UIC5CC9T	CORE – IX (a)	4	4	10	40	50		

```
Course Title
```

Digital Forensics Essentials

SYLLABUS							
Unit	Contents	Hours					
I	Fundamentals of Computer Forensics - Digital Evidence - Forensic Readiness - Roles and Responsibilities of a Forensic Investigator - Legal Compliance in Computer Forensics - Forensic Investigation Process - Pre-investigation Phase - Investigation Phase - *Post-investigation Phase*.	12					
П	Different Types of Disk Drives - Logical Structure of a Disk - Booting Process of Windows, Linux, and Mac Operating Systems - File Systems of Windows, Linux, and Mac Operating Systems - File System Examination - Data Acquisition Fundamentals - Types of Data Acquisition - *Data Acquisition Format* - Data Acquisition Methodology	12					
III	Anti-forensics and its Techniques - Anti-forensics Counter measures - Volatile and Non- Volatile Information -Windows Memory and Registry Analysis - Cache, Cookie, and History Recorded in Web Browsers -*Windows Files and Metadata*	12					
IV	Volatile and Non-Volatile Data in Linux - Analyze File system Images Using The Sleuth Kit - Memory Forensics - Mac Forensics - Network Forensics Fundamentals - Event Correlation Concepts and Types - Identify Indicators of Compromise (IoCs) from Network Logs - Investigate Network Traffic - Web Application Forensics - *IIS and Apache Web Server Logs*.	12					
V	Dark Web - Dark Web Forensics - Tor Browser Forensics - Email Basics - Email Crime Investigation - Malware - Components of Malware - Distribution Methods - Malware Forensics Fundamentals - Types of Malware Analysis - Static Malware Analysis - Analyze Suspicious Word Documents - Dynamic Malware Analysis - *System Behaviour Analysis* - Network Behaviour Analysis	12					
VI	Current Trends (For CIA only): - Investigating Web Attacks on Windows-based Detect and Investigate Attacks on Web Applications	Servers -					

..... Self study

Text Book(s):

- 1. Linda Volonino, Reynaldo Anzaldua and Jana Godwin, Computer Forensics: Principles and Practices Paperback 21 August 2006
- 2. Chris Prosise, Kevin Mandia, Incident Response & Computer Forensics Paperback 1 June 2003

Reference Book(s):

1. Nihad A. Hassan, Digital Forensics Basics: A Practical Guide Using Windows OS Paperback – 26 February 2019

Web Resource(s):

1.DFE Study Guide

	Course Outcomes							
Upon suc	cessful completion of this course, the students will be able to:							
CO No. CO Statement								
CO1	Understand the fundamentals of computer forensics, forensic readiness, and the responsibilities of a forensic investigator.	K1						
CO2	Illustrate the various types of disk drives, file systems, and data acquisition methods for Windows and Linux operating systems.	K2						
CO3	Use appropriate countermeasures against anti-forensic techniques and perform registry, memory, and browser artifact analysis on Windows systems	K3						
CO4	Analyze network logs, event correlations, and network traffic to identify Indicators of Compromise (IoCs) and investigate web attacks on different platforms.	K4						
CO5	Evaluate malware distribution methods, perform static and dynamic malware analysis, and investigate the dark web and Tor browser forensic techniques.	K5						

Course	Programme Outcomes(POs)						Programme Specific Outcomes(PSOs)				
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs
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. S.A. Jameel Mr. P. Mohamed Thahir

Someston	Course Code		Course Cotogomy	Hours/	Credita	Marks for Evaluation			
Semester			Course Category	Week	Creatis	CIA	ESE	Total	
V	23UIC5CC9P		CORE-IX (b)	3	3	10	40	50	
	4	D' '/ 1 D		1					
Course Title		Digital Fore	nsics Essentials Lab – Praction	cal					

- 1. Computer Forensics Investigation Process
 - a. Performing Hash or HMAC Calculations
 - b. Comparing Hash Values of Files to Check their Integrity
 - c. Viewing Files of Various Formats
 - d. Creating a Disk Image File of a Hard Disk Partition
- 2. Understanding Hard Disks and File Systems
 - a. Analyzing File System of a Linux Image
 - b. Recovering Deleted Files from Hard Disks
- 3. Data Acquisition and Duplication
 - a. Viewing Contents of Forensic Image File
- 4. Defeating Anti-forensics Techniques
 - a. Recovering Data from Lost / Deleted Disk Partition
 - b. Cracking Application Passwords
 - c. Detecting Steganography
- 5. Windows Forensics
 - a. Understanding windows Forensics
- 6. Linux and Mac Forensics
 - a. Understanding Linux and Mac Forensics
- 7. Network Forensics
 - a. Identifying and Investigating Various Network Attacks using Wireshark
- 8. Investigating Web Attacks
 - a. Identifying and Investigating Web Application Attacks
- 9. Dark Web Forensics
 - a. Understanding Dark Web Forensics
- 10. Investigating Email Crimes
 - a. Investigating a Suspicious Email
- 11. Malware Forensics
 - a. Performing Static Analysis on a Suspicious File
 - b. Forensic Examination of a Suspicious Microsoft Office Document

	Course Outcomes							
Upon suc	Upon successful completion of this course, the students will be able to:							
CO No.	CO No. CO Statement							
CO1	Recall the fundamentals of computer forensics Investigation Process.	K1						
CO2	Understand the File System of a Linux Image and Recovering Deleted Files from Hard Disks.	K2						
CO3	Use appropriate countermeasures against anti-forensic techniques	K3						
CO4	Analyze the Email Crimes and investigate Suspicious Email, web attacks on different platforms.	K4						
CO5	Evaluate malware distribution methods, perform static and dynamic malware analysis.	K5						

Course	•	Progra	amme Ou	utcomes(POs)	Programme Specific Outcomes(PSOs)					Mean
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Score of COs
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. S.A. Jameel Mr. P. Mohamed Thahir

Someston	Course Code	Course Cotogory	Hours/	Credita	Marks for Evaluation			
Semester	Course Coue	Course Category	Week	Creans	CIA	ESE	Total	
V	23UIC5CC10T	CORE –X (a)	4	4	10	40	50	

Course Title

Data Structures

SYLLABUS							
Unit	Contents	Hours					
I	Introduction to Data Structures: Overview – The Need for Data Structures - Definitions – Data Structures. ARRAYS: Overview – Introduction – Range of an Array – Primitive operations – Element Access in an Array – One- dimensional Array - Two-dimensional Array-*Multidimensional Arrays*. Linked Lists - Overview – Introduction – Memory Allocation– Benefits – Limitations – Types – Basic Operations – Singly Linked Lists – Simple Algorithms on Linked Lists – Circular Linked Lists - Doubly Linked Lists.	12					
П	Stacks, Queues and Recursion: Introduction – Stacks – Array and Linked Representations of Stacks – Arithmetic Expressions; Polish Notation – Recursion: Towers of Hanoi – Queues: Array representation of Queues – Linked Representation of Queues – *Deques*.	12					
III	Trees: Introduction – Binary Trees– Representing Binary Tress in Memory – Traversing Binary Trees – Traversal Algorithms using Stacks – Header Nodes - Binary Search Trees – Searching and Inserting in Binary Search Trees – Deleting in a Binary Search Tree - *Heap Sort*.	12					
IV	Graphs and their Applications: Sequential Representation of Graphs – Warshall's Algorithm – Linked Representation of a Graph – Operations on Graphs Traversing a Graph – *Topological Sorting*.	12					
V	Sorting and Searching: Introduction – Insertion Sort – Selection Sort- Merging – Merge Sort – *Radix Sort* – Quick Sort - Searching and Data Modification – Hashing.	12					
VI	Current Trends (For CIA only):						

..... Self Study

Text Book(s):

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

UNIT I : Chapters 1, 3 and 4

2. Seymour Lipschutz, Data Structures, Tata McGraw – Hill Publishing Company Limited, New Delhi, 2006

UNIT II : Chapter 6	UNIT III : Chapter 7 (7.1 – 7.9)
UNIT IV : Chapter 8	UNIT V : Chapter 9

Reference Book(s):

1. Jean Paul Tremblay and Paul G. Sorenson, An Introduction to Data Structures with Applications, Tata McGraw-Hill, Second Edition

Web Resource(s):

- 1. <u>https://www.geeksforgeeks.org/data-structures</u>
- 2. https://nptel.ac.in/courses/106102064
- 3. <u>https://archive.nptel.ac.in/courses/106/102/106102064/</u>
- 4. <u>https://onlinecourses.swayam2.ac.in/cec19_cs04/preview</u>

	Course Outcomes						
Upon suc	Upon successful completion of this course, the students will be able to:						
CO No.	CO Statement	Cognitive Level (K-Level)					
CO1	Acquire knowledge in the representation of arrays and linked lists	K1					
CO2	Implement the application of arrays and linked lists in various structures	K2					
CO3	Evaluate the use of stack, queue, trees and graphs	К3					
CO4	Describe the concept of graphs and their applications	K4					
CO5	Apply the appropriate structures and sorting techniques in problem solving.	K5					

Course	Pro	gramm	e Outco	omes (P	Os)	Progra	Mean Score				
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	of COs
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. O.S. Abdul Qadir

Someston	Course Code		Course Cotogowy	Hours/	Cuadita	Marks for Evaluation			
Semester			Course Category	Week	Creans	CIA	ESE	Total	
V	23	UIC5CC10P	Core –X (b)	3	3	10	40	50	
Course Title Data Structu			res Lab – Practical						

Develop a program in C++ to

- 1. Perform basic operations on arrays.
- 2. Create a linked list and insert a node at specific position.
- 3. Implement stack using array
- 4. Implement queue using array
- 5. Insert values into a binary search tree
- 6. Sort a set of numbers using heap sort.
- 7. Implement Warshall's algorithm.
- 8. Implement graph traversal (DFS & BFS) using stack and queue
- 9. Implement Insertion Sort
- 10. Implement Selection sort
- 11. Implement Quick Sort

	Course Outcomes						
Upon suc	Upon successful completion of this course, the students will be able to:						
CO No.	CO Statement	Cognitive Level (K-Level)					
CO1	Recall basic array operations and the structure of linked lists.	K1					
CO2	Understand the process of manipulating elements on queue, stack and BST	K2					
CO3	Implement DFS, BFS, and Warshall's algorithm using stack and queue.	K3					
CO4	Analyze the efficiency and stability of sorting algorithms	K4					
CO5	Evaluate the best data structure for a given problem.	K5					

Course Programme Outcomes (POs)						Progra	Mean Score				
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	of COs
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. O.S. Abdul Qadir

Somester	Course Code	Course Cotogowy	Hours/	Cradita	Marks for Evaluation			
Semester	Course Coue	Course Category	Week	Creatis	CIA	ESE	Total	
V	23UIC5CC11	UIC5CC11 Core-XI		4	25	75	100	

Course Title	Pentesting Fundamentals
---------------------	-------------------------

	SYLLABUS							
Unit	Contents	Hours						
Ι	Introduction to Offensive Security - Intro to Defensive Security - Career in Cyber Security - Pentesting Fundamentals - Principles of Security	12						
II	Walking an Application - Content Discovery - Subdomain Enumeration - Authentication Bypass – IDOR - File Inclusion - Intro to SSRF - Intro to XSS - Command Injection - *SQL Injection*.	12						
ш	Burp Suite: Basics - Burp Suite: Repeater - Burp Suite: Intruder - Burp Suite: Other Modules - Burp Suite: Extensions	12						
IV	Passive Reconnaissance - Active Reconnaissance - Nmap Live Host Discovery - Nmap Basic Port Scan - Nmap Advanced Port Scan - Nmap Post Port Scan - Protocols and Servers - *Net Sec Challenge*	12						
V	Metasploit: Introduction - Metasploit: Exploitation - Metasploit: Meterpreter - What is a Shell - Linux Privilege Escalation - Windows Privilege Escalation	12						
VI	Current Trends (For CIA only): Vulnerabilities 101 - Exploit Vulnerabilities - Vulnerability Capstone -							
**	Self study							

Text book(s):

Phillip L. Wylie, Kim Crawley, The Pentester Blue print, John Wiley & Sons, 2020.
Georgia Weidman, Penetration Testing: Hands-on Introduction to Hacking, No Starch Press, 2014.

Web Reference(s):

https://tryhackme.com/r/path/outline/jrpenetrationtester

	Course Outcomes							
Upon suc	Upon successful completion of this course, the students will be able to:							
CO No. CO Statement								
CO1	Recall the basic concepts of offensive and defensive security	K1						
CO2	Explain the functionalities of tools like Repeater, Intruder, and Burp Suite extensions.	K2						
CO3	Apply the fundamentals of pentesting to analyze real-world cyber security threats.	K3						
CO4	Differentiate between various roles in cyber security and assess their relevance to offensive security.	K4						
CO5	Evaluate the effectiveness of privilege escalation techniques in both Linux and Windows systems, determining the severity of discovered vulnerabilities.	К5						

L	1210									
Pı	rogram	me Out	comes	(POs)	Prog	Programme Specific Outcomes(PSOs)				
PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	of COs
3	3	2	3	2	3	2	2	1	2	2.3
3	3	3	3	2	3	2	2	2	2	2.5
3	3	2	3	2	3	2	2	2	2	2.4
3	3	3	2	2	3	2	3	3	2	2.6
3	3	3	3	2	3	2	3	3	3	2.8
Mean Overall Score								2.52		
Correlation								High		
	P1 PO1 3 3 3 3 3 3	PO1 PO2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	PO1 PO2 PO3 3 3 2 3 3 3 3 3 2 3 3 3 3 3 3 3 3 3 3 3 3	Programme Outcomes PO1 PO2 PO3 PO4 3 3 2 3 3 3 3 3 3 3 2 3 3 3 2 3 3 3 3 2 3 3 3 3 3 3 3 3 3 3 3 3	Pote PO2 PO3 PO4 PO5 PO1 PO2 PO3 PO4 PO5 3 3 2 3 2 3 3 2 3 2 3 3 2 3 2 3 3 2 3 2 3 3 2 3 2 3 3 3 2 2 3 3 3 3 2 3 3 3 3 2	Programme Outcomes (POs) Prog PO1 PO2 PO3 PO4 PO5 PS01 3 3 2 3 2 3 3 3 2 3 2 3 3 3 2 3 2 3 3 3 2 3 2 3 3 3 2 3 2 3 3 3 3 2 2 3 3 3 3 2 3 3 3 3 3 3 2 3	Programme Outcomes (POs) Programme S PO1 PO2 PO3 PO4 PO5 PSO1 PSO2 3 3 2 3 2 3 2 3 3 2 3 2 3 2 3 3 2 3 2 3 2 3 3 2 3 2 3 2 3 3 2 3 2 3 2 3 3 3 2 3 2 3 2 3 3 3 2 3 2 3 2 3 3 3 3 2 3 2 3	Programme Outcomes (POs) Programme Specific O PO1 PO2 PO3 PO4 PO5 PS01 PSO2 PSO3 3 3 2 3 2 3 2 2 3 3 2 3 2 3 2 2 3 3 2 3 2 3 2 2 3 3 2 3 2 3 2 2 3 3 2 3 2 3 2 2 3 3 3 2 2 3 2 3 3 3 3 2 2 3 2 3 3 3 3 2 3 2 3 3	Programme Outcomes (POs) Programme Specific Outcomes PO1 PO2 PO3 PO4 PO5 PSO1 PSO2 PSO3 PSO4 3 3 2 3 2 3 2 1 3 3 2 3 2 3 2 2 3 3 2 3 2 3 2 2 3 3 2 3 2 3 2 2 3 3 2 3 2 3 2 2 3 3 2 2 3 2 2 2 3 3 3 2 3 2 3 3 3 3 3 2 3 2 3 3 3 3 3 2 3 2 3 3 4 4 5 5 5 5 5 5 5	PO1 PO2 PO3 PO4 PO5 PS01 PS02 PS03 PS04 PS05 3 3 2 3 2 3 2 1 2 3 3 2 3 2 3 2 2 1 2 3 3 2 3 2 3 2 2 1 2 3 3 3 2 3 2 2 2 2 2 3 3 2 3 2 3 2 2 2 2 3 3 2 3 2 3 2 2 2 2 3 3 3 2 3 2 3 3 2 3 3 3 2 3

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

Course Coordinator: Dr. A. Jainulabudeen Mr. P. Mohamed Thahir

Somostor	Course Code	Course Cotogory	Hours/	Credite	Marks for Evaluation			
Semester	Course Coue	Course Category	Week	Creatis	CIA	ESE	Total	
V	23UIC5CC12P	Core-XII	3	3	20	80	100	
Course Ti	tle Pentesting	Lab - Practical						

1. Web Hacking

- a. Discovering Content Through Automated Scanning
- b. Enumerating Sub domains for Information Gathering
- c. Bypassing Authentication Mechanisms
- d. Exploiting Insecure Direct Object References (IDOR)
- e. Exploiting Directory Traversal Vulnerabilities
- f. Introduction to Server-Side Request Forgery (SSRF)
- g. Introduction to Cross-Site Scripting (XSS)
- h. Exploiting Command Injection Vulnerabilities
- i. Exploiting SQL Injection Vulnerabilities
- j. Exploiting Session Fixation Vulnerabilities
- 2. Burp Suite
 - a. Burp Basics
 - b. Burp Repeater
 - c. Burp Intruder
 - d. Burp Extensions
- 3. Network Security
 - a. Performing Port Scanning
 - b. Packet Analysis
 - c. Exploiting Default Credentials
 - d. Performing Service Enumeration
- 4. Vulnerability Research
 - a. Wordpress Zero-day research
- 5. Metasploit
 - a. Exploiting SMB with EternalBlue (MS17-010)
 - b. Meterpreter Reverse Shell via Browser Exploit
 - c. Exploiting a Vulnerable FTP Service
 - d. Exploiting a Drupal CMS Vulnerability
- 6. Privilege Escalation
 - a. Exploit CVE-2021-4034 (PwnKit)
 - b. Privilege Escalation via SUID Binaries

	Course Outcomes							
Upon suc	Upon successful completion of this course, the students will be able to:							
CO No.	CO Statement	Cognitive Level (K-Level)						
CO1	Recall key vulnerabilities in web applications like IDOR, XSS, and SQL Injection.	K1						
CO2	Explain the functionality of Burp Suite modules in the context of web security testing.	K2						
CO3	Apply tools like Nmap for live host detection, packet analysis, and service enumeration in network penetration tests.	K3						
CO4	Analyze the exploitability of zero-day vulnerabilities and their implications for security.	K4						
CO5	Evaluate the effectiveness of Metasploit as a tool for professional pentesting and vulnerability exploitation.	К5						

Course		Prog	gramme	Outcome	s(POs)	Prog	gramme	Mean Score of			
Outcomes (COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs
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
≥1.5and <2.5	Medium
≥ 2.5	High

Course Coordinator: Dr. A. Jainulabudeen

Mr. P. Mohamed Thahir

Semester	Course Code	Course Cotogory	Hours/	Credite	Marks for Evaluation			
	Course Coue	Course Category	Week	Creans	CIA	ESE	Total	
V	23UIC5DE1AT	DSE-I(a)	3	2	10	40	50	

Course Title

Cloud Computing and its Security

SYLLABUS						
Unit	Contents	Hours				
Ι	Cloud Computing Fundamentals: Essential Characteristics, Architectural Influences, Technological Influences	9				
II	Cloud Computing Architecture: Cloud Delivery Models - Cloud Software as a Service (SaaS) - Cloud Platform as a Service (PaaS) - Cloud Infrastructure as a Service (IaaS) - *Cloud Deployment Models*.	9				
ш	Cloud Computing Software Security Fundamentals: Cloud Information Security Objectives - Cloud Security Services - Relevant Cloud Security Design Principles - Secure Cloud Software Requirement - Secure Development Practices - Approaches to Cloud Software Requirements Engineering.	9				
IV	Cloud Computing Security Architecture: Architectural Considerations - General Issues - Trusted Cloud Computing - Secure Execution Environments and Communications – Micro architectures.	9				
V	Cloud Computing Security Challenges: Security Policy Implementation - Policy Types - Computer Security Incident Response Team (CSIRT) - Virtualization Security Management - Virtual Threats - VM Security Recommendations - *VM- Specific Security Techniques*.	9				
VI	Current Trends(For CIA only): Cloud Security Policy Implementation and Decompo	osition				

*......*Self study

Text Book(s):

Krutz, R. L., & Vines, R. D, Cloud security: A comprehensive guide to secure cloud computing. Wiley Publishing, Inc., 2010.

UNIT I – CHAPTER 1 (Pages: 1 – 22) UNIT II – CHAPTER 2 (Pages: 33-51) UNIT III – CHAPTER 3 (Pages: 61 – 81) UNIT IV – CHAPTER 6 (Pages: 177 – 203) UNIT V – CHAPTER 5 (Pages: 154 – 172)

Reference Book(s):

1. Ashish Mishra, "Cloud Security Handbook for Architect: Practical Strategies and Solutions for Architecting Enterprise Cloud Security using SECaaS and DevSecOps", First Edition, Orange Education Pvt Ltd, AVA[™], 2023

Web Resource(s):

- 1. <u>https://www.geeksforgeeks.org/cloud-computing-security/</u>
- 2. https://www.javatpoint.com/what-is-cloud-security
- 3. https://onlinecourses.nptel.ac.in/noc21_cs14/preview
- 4. <u>https://www.shiksha.com/online-courses/cloud-computing-basics-by-nptel-course-nptel25</u>

	Course Outcomes							
Upon suce	Upon successful completion of this course, the students will be able to:							
CO No.	CO Statement	Cognitive Level (K-Level)						
CO1	Identify the key architectural components and their roles in cloud environments.	K1						
CO2	Understand the fundamental concepts, benefits, and limitations of cloud computing.	K2						
CO3	Apply relevant cloud security design principles to ensure data confidentiality, integrity, and availability.	К3						
CO4	Classify different types of security policies and their importance.	K4						
CO5	Evaluate the role of micro architectures in enhancing cloud security.	K5						

Course	Programme Outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Score of COs
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	2	2	2	3	3	2	2	2	3	2	2.3
CO5	3	2	3	2	2	2	3	3	3	2	2.5
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
≥1.5and <2.5	Medium
≥ 2.5	High

Course Coordinator: Dr. S. Vaaheedha Kfatheen

Semester	Course Code	Course Cotogory	Hours/	Credite	Marks for Evaluation			
	Course Coue	Course Category	Week	Creans	CIA	ESE	Total	
V	23UIC5DE1BT	DSE-I(a)	3	2	10	40	50	
			•				•	

Course Title Blockchain Technology

	SYLLABUS	
Unit	Contents	Hours
Ι	Basics of Blockchain Introduction-Concept of Blockchain-History-Definition of Blockchain-Fundamentals of Blockchain-Characteristics of Blockchain- Consensusin Trust-Building Exercise-Public, Private, and Hybrid Blockchains- Distributed Ledger Technologies-DLT Decentralized Applications and Databases - Architecture of Blockchain-Transactions-Chaining Blocks-Value Proposition of Blockchain Technology - Decentralized System – Introduction - Distributed Decentralized Databases - Decentralization- Disintermediation-*Decentralized Enterprise Regulation*	9
п	Hash Functions Introduction-Hashing-Message Authentication Code-Secure Hash Algorithms(SHA-1)-Secure Hash Algorithm Version - Distributed Hash Tables- Hashing and Data Structures – Hashing in Blockchain Mining-Consensus- Introduction-Approach Consensus-Consensus Algorithms-Byzantine Agreement Methods-Blockchain Components – Introduction – Ethereum - History-Ethereum Virtual Machine - Working of Ethereum - Ethereum Clients-Ethereum Key Pairs – Ethereum Addresses – Ethereum Wallets-Ethereum Transactions-Ethereum Languages – *Ethereum Development Tools*.	9
ш	Smart Contracts-Introduction-Smart Contracts-Absolute and Immutable- Contractual Confidentiality-Law Implementation and Settlement – Characteristics –Internet of Things-Utilities: Smart Grid – Proofs of Origin – Supply Chain Management –Medical Sciences – Finance – Media and Entertainment – Public Services-*Legal Services - Darknet*	9
IV	Bitcoins - Introduction Working of Bitcoin - Merkle Trees - Bitcoin Block Structure – Bitcoin Address – Bitcoin Transactions – Bitcoin Network –Bitcoin Wallets – Bitcoin Payments – Bitcoin Clients – Decentralized Applications-Introduction- Today'sWebApplicationsRequirement-*Mining in Blockchain Bitcoin*-Blocks Validation and Identification – Bitcoins Creation-Mining Hardware-Mining Software-Running Miner Software - Executing Several Miners-Bitcoins Management – Reasons for Bitcoin Mining-Swarm –Side chain Hopping - Blockchain Forks.	9
V	Blockchain Vertical Solutions and Use Cases - Blockchain in Insurance-Life Insurance and Claim Processing in Case of Death-Healthcare-Assets Management- Financial Institutional Assets-Smart Assets-Electronic Currency-Manufacturing- Blockchain and Allied Technologies-Blockchain and Cloud Computing- Characteristics of Blockchain Cloud – Blockchain and Artificial Intelligence – Blockchain and IoT-Blockchain and Machine Learning-*Blockchain and Robotic Process Automation*	9
VI	Current Trends (For CIA only): Cryptography, Cryptography Primitives, Symmetric Cryptography and Asymmetric Cryptography.	
**	Self study	

Text Book(s):

Kumar Saurabh, Ashutosh Saxena, "Blockchain Technology–Concept and Applications", Wiley Publication, 2020

Reference Book(s):

- 1. Bashir I, "Mastering Blockchain: A Deep Dive In To Distributed Ledgers, Consensus Protocols, Smart Contracts, DApps, Cryptocurrencies, Ethereum and More", Packt Publishing, 2020
- 2. PeterGaffney, KyleSonlin, HerwigKonings, "BlockchainExplained:Your Ultimate Guide to the Tokenization of Finance" KindleEdition2,
- 3. DanielDrescher, "Blockchain Basics: A Non-Technical Introduction in 25 Steps" First Edition
- 4. S Chopra, P Valencourt, "Blockchain Quick Reference by Brenn Hill", Packt Publishing, 2018

Web Resource(s):

- 1. https://www.geeksforgeeks.org/how-does-the-blockchain-work/
- 2. https://onlinecourses.nptel.ac.in/noc22_cs44/preview

	Course Outcomes							
Upon succ	Upon successful completion of this course, the students will be able to:							
CO No.	CO Statement	Cognitive Level (K-Level)						
CO1	Remember the basics of Blockchain and Decentralized system.	K1						
CO2	Understand the Hash functions and Blockchain components.	K2						
CO3	Apply and estimate the Smart contracts.	К3						
CO4	Analyze the Bitcoins and Decentralized Applications.	K4						
CO5	Evaluate the Blockchain vertical solution and allied Technology.	K5						

Relationship Matrix:

Course	Programme Outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean
Outcomes (COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Score of COs
CO1	3	3	1	3	1	3	1	3	3	1	2.2
CO2	3	3	1	3	2	3	2	2	2	3	2.4
CO3	3	3	1	1	3	2	2	2	3	2	2.4
CO4	3	3	1	3	2	3	2	3	2	1	2.3
CO5	2	3	2	2	3	3	3	3	1	3	2.5
Mean Overall Score										2.36	
	Correlation									Medium	

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

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

Somestor	Course Code		Course Cotogomy	Hours/	Credita	Marks for Evaluation			
Semester	U	ourse Coue	Course Category	Week	Creans	CIA	ESE	Total	
V	23	BUIC5DE1AP	DSE-I(b)	2	2	10	40	50	
Course Title		Cloud Comp	outing Lab - Practical						

- 1. Install Virtual box / VMware Workstation with different flavours of linux or windows OS on top of windows7 or 8.
- 2. Install a C compiler in the virtual machine created using virtual box and execute Simple Programs
- 3. Install Google App Engine. Create hello world app and other simple web applications using Python/Java.
- 4. Use GAE launcher to launch the web applications.
- 5. Simulate a cloud scenario using Cloud Sim and run a scheduling algorithm that is not present in Cloud Sim.
- 6. Find a procedure to transfer the files from one virtual machine to another virtual machine.
- 7. Find a procedure to launch virtual machine using try stack(Online Open-stack Demo Version)
- 8. Install Hadoop single node cluster and run simple applications like word count.

	Course Outcomes							
Upon succ	Upon successful completion of this course, the students will be able to:							
CO No. CO Statement								
CO1	Recall and recognize key cloud computing concepts, such as virtualization, hypervisors, and cloud architecture.	K1						
CO2	Explain the functionality of virtualization tools like VirtualBox and VMware.	K2						
CO3	Demonstrate the installation and configuration of virtual machines using VirtualBox or VMware.	K3						
CO4	Analyze cloud deployment models and simulate cloud scenarios using tools such as CloudSim.	K4						
CO5	Evaluate the performance of scheduling algorithms in a cloud simulation environment and optimize based on specific criteria.	K5						

Course	P	rogram	ne Outco	omes(POs	s)	Programme Specific Outcomes(PSOs)					Mean
Outcomes (COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Score of COs
CO1	3	2	2	3	2	3	2	2	2	2	2.3
CO2	3	2	3	3	2	3	2	2	2	2	2.4
CO3	3	2	2	3	2	3	2	2	2	2	2.3
CO4	3	3	3	2	2	3	2	3	3	2	2.6
CO5	3	2	3	3	2	3	3	3	3	3	2.8
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
≥1.5and<2.5	Medium
≥ 2.5	High

Course Coordinator: Dr. S. Vaaheedha Kfatheen

Somester	Course Code		Course Cotogomy	Hours/	Credits	Marks for Evaluation			
Semester			Course Category	Week		CIA	ESE	Total	
V	23UIC5DE1BP		BP DSE-I(b)		2	10	40	50	
Course Title B		Blockchain	Technology Lab - Practical						

Develop the following using Java:

- 1. Creating Merkle tree
- 2. Creation of Block
- 3. Blockchain Implementation Programming code
- 4. Creating ERC20 token
- 5. Implementing blockchain in Merkle Trees
- 6. Implementing Mining using Blockchain
- 7. Implementing peer-to-peer using Blockchain
- 8. Creating a Crypto-currency Wallet.

	Course Outcomes						
Upon succ	essful completion of this course, the students will be able to:						
CO No.	CO Statement	Cognitive Level (K-Level)					
CO1	Recognize and recall the fundamental concepts of blockchain technology, such as blocks, mining, and Merkle trees.	K1					
CO2	Explain how blockchain structures like Merkle trees and cryptographic hashes work.	K2					
CO3	Develop simple Java programs for blockchain-related tasks, such as creating a block, implementing a blockchain, or generating a Merkle tree.	K3					
CO4	Analyze the efficiency of blockchain implementations by comparing different mining techniques or peer-to-peer mechanisms	K4					
CO5	Assess the security and scalability of blockchain applications by developing and testing features such as crypto-currency wallets or ERC20 tokens.	K5					

Course		Prog	gramme	Outcome	s(POs)	Programme Specific Outcomes(PSOs)					Mean
Outcomes (COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Score of COs
CO1	3	3	2	3	2	3	2	2	1	3	2.4
CO2	3	3	3	3	2	3	1	2	1	2	2.3
CO3	3	3	2	3	2	3	1	2	1	2	2.2
CO4	3	3	3	2	2	3	1	3	2	2	2.4
CO5	3	3	3	2	2	3	1	2	2	2	2.3
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
≥1.5and<2.5	Medium
≥ 2.5	High

Course Coordinator: Ms. J. Sahitha Banu

Semester	Course Code	Course Cotogowy	Hours/	Credita	Marks for Evaluation			
	Course Coue	Course Category	Week	Creatis	CIA	ESE	Total	
V	23UIC5SE1	Skill Enhancement Course-I	2	1	-	100	100	

Course Title Cyber Laws and Ethics

	SYLLABUS	
Unit	Contents	Hours
I	Introduction to Cyber law: Evolution of computer Technology, emergence of cyber space. Cyber Jurisprudence, Jurisprudence and law, Doctrinal approach, Consensual approach, Real Approach, Cyber Ethics, Cyber Jurisdiction, *Hierarchy of courts*, Civil and criminal jurisdictions.	6
п	Information Technology Act: Overview of IT Act, 2000, Amendments and Limitations of IT Act, Digital Signatures, Cryptographic Algorithm, Public Cryptography, Private Cryptography, Electronic Governance. Legal Recognition of Electronic Records, Legal Recognition of Digital Signature, Certifying Authorities, *Cyber Crime and Offences*.	6
Ш	Cyber law and Related Legislation: Patent Law, Trademark Law, Copyright, Software – Copyright or Patented, Domain Names and Copyright disputes, Electronic Data Base and its Protection, IT Act and Civil Procedure Code, *IT Act and Criminal Procedural Code*, Relevant Sections of Indian Evidence Act, Online Dispute Resolution (ODR).	6
IV	Electronic Business and legal issues: Evolution and development in E-commerce, paper vs paper less contracts E-Commerce models- B2B, B2C, E security. Business, taxation, electronic payments, supply chain, EDI, *E-markets*, Emerging Trends.	6
V	Cyber Ethics: The Importance of Cyber Law, Significance of cyber Ethics, Need for Cyber regulations and Ethics. Ethics in Information society, Introduction to Artificial Intelligence Ethics: Ethical Issues in AI and core Principles, Introduction to Block chain Ethics.	6
VI	Current Trends (For CIA only): Cyber Crime and Offences, Network Service Provide Liability, Cyber Regulations Appellate Tribunal, Penalties and Adjudication.	rs

..... Self study

Text Book(s):

1. Kumar K, , Pavan Duggal, Cyber Ethics 4.0, Globethic.net, 2018

Reference Book(s):

Christoph Stuckelberger Cyber Laws: Intellectual property & E Commerce, Security, Dominant Publisher, 2011

1. Niit, Information Security policy & Implementation Issues, Prentice Hall India Learning Pvt. Ltd, 2003

2. V. D. Dudeja, Cyber Crimes and Law Enforcement, Commonwealth Publishers, New Delhi, 2012.

Web Resource(s):

1. https://www.javatpoint.com/what-is-cyber-law

2. https://onlinecourses.swayam2.ac.in/cec24_cs14/preview

3. https://onlinecourses.nptel.ac.in/noc23_cs127/preview

	Course Outcomes								
Upon suce	Jpon successful completion of this course, the students will be able to:								
CO No.	CO No. CO Statement								
CO1	Recall the relevant sections of the IT Act, Civil Procedure Code, and Indian Evidence Act.	K1							
CO2	Understand how patent law, trademark law, and copyright apply to software and domain names.	K2							
CO3	Apply knowledge of electronic payments and business taxation in e-business.	K3							
CO4	Analyze the legal challenges of supply chain management in e-markets.	K4							
CO5	Evaluate emerging trends in e-commerce and their implications for legal frameworks	K5							

Course	Programme Outcomes (POs)						Programme Specific Outcomes (PSOs)				
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs
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
≥1.5and <2.5	Medium
≥ 2.5	High

Course Coordinator: Dr. K. Syed Kousar Niasi

Somostor	Course Code	Course Cotogowy	Hours/	Cradita	Marks for Evaluation			
Semester	ster Course Code Course	Course Category	Week	Creans	CIA	ESE	Total	
V	23UIC5SE2	Skill Enhancement Course-II	2	1	-	100	100	
			•	•			•	

Course Title Fundamentals of SOC

	SYLLABUS	
Unit	Contents	Hours
Ι	Security Landscape - Security Operations - Security Orchestration - Components and Technologies of Security Orchestration - Elements in the Business Pillar - Business Objective: Mission, Governance, and Planning - *Staffing* - Budget - Facility - Metrics - Reporting – Collaboration.	6
II	Elements in the People Pillar - Employee Utilization - Training - Career Path Progression - Tabletop Exercises - Elements in the Processes Pillar - Identification - Investigation - *Mitigation* - Continuous Improvement.	6
ш	Help Desk - IT Operations - DevOps - Operational Technology Team - Enterprise Architecture - SOC Engineering - Endpoint Security Team - Network Security Team - Cloud Security Team - Threat Hunting - Content Engineering - Security Automation - Forensics and Telemetry - Governance, Risk and Compliance - Business Liaison - *Vulnerability Management Team*.	6
IV	Elements in the Visibility Pillar - Network Traffic Capture - Endpoint Data Capture - Cloud Computing - Application Monitoring - SSL Decryption - URL Filtering - Threat Intelligence Platform - Vulnerability Management Tools - Analysis Tools - Asset Management - *Knowledge Management* - Case Management.	6
V	Elements in the Technology Pillar - Firewall - Intrusion Prevention and Detection System - Malware Sandbox - Endpoint Security - Behavioural Analytics - Email Security - Web Application Firewall - Honey Pots & Deception - Virtual Private Networks - Mobile Device Management - Network Access Control - Identity & Access Management - SIEM - SOAR - SOAR Systems - Parts of Security Orchestration - *Workflows/Playbooks - Security Gaps and Risks*.	6
VI	Current Trends(For CIA only): Threat Intelligence Team, Red & Purple Team	

*.....*Self study

Text Book(s):

1. Joseph Muniz, Gary McIntyre & Nadhem AlFardan, Security Operations Center: Building, Operating, and Maintaining your SOC 1st Edition, Kindle Edition, 2015

2. Recorded Future, The Threat Intelligence Handbook: A Practical Guide for Security Teams to Unlocking the Power of Intelligence Kindle Edition, 2018

Reference Book(s):

1. Alfred Basta, Nadine Basta, Waqar Anwar, Mohammad Ilyas Essar, Open-Source Security Operations Center (SOC), Wiley Publication, 2024

Web Resource(s):

https://beacon.paloaltonetworks.com/student/collection/737796/path/831807 https://www.youtube.com/watch?v=2KYLdHIowCU

	Course Outcomes						
Upon succ	Jpon successful completion of this course, the students will be able to:						
CO No.	CO Statement	Cognitive Level (K-Level)					
CO1	Identify the primary components and technologies involved in security orchestration	K1					
CO2	Explain the role of security orchestration in improving efficiency and effectiveness of security operations.	К2					
CO3	Apply security orchestration principles to optimize security operations workflows and automate tasks.	К3					
CO4	Analyze security gaps and risks identified through security operations activities.	K4					
CO5	Evaluate the overall effectiveness of security operations in protecting organizational assets.	K5					

Course		Prog	gramme	Outcome	es(POs)	Programme Specific Outcomes(PSOs)					Mean
Outcomes (COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Score of COs
CO1	3	3	2	1	3	3	3	3	2	2	2.5
CO2	3	2	2	2	1	2	3	2	1	3	2.1
CO3	3	3	3	2	3	2	3	2	2	3	2.6
CO4	3	2	3	1	3	2	2	2	2	3	2.3
CO5	3	2	3	2	2	2	3	2	2	2	2.3
Mean Overall Score								2.36			
Correlation									Medium		

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

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

Course Coordinator: Dr. Mozibur Raheman Khan Mr. P. Mohamed Thahir

Somestor	Course Code		Course Cotogory	Hours/	Credita	Marks for Evaluation			
Semester	U	ourse Code	Course Category	Week	Creans	CIA	ESE	Total	
VI	2.	3UIC6CC13	Core-XIII	5	5	25	75	100	
Course Title		Artificial Int	telligence						

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				
п	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				
ш	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

Text Book(s):

Kevin Night, Elaine Rich, and Nair B., "Artificial Intelligence", McGraw Hill, 2017.

Reference Book(s):

1. Gerhard Welss, - Multi Agents Systems, Second Edition, 2013

2. David L. Poole and Alan K. Mackworth, - Artificial Intelligence: Foundations of Computational Agents, Cambridge University Press, 2010.

Web Resource(s):

- 1. https://www.javatpoint.com/artificial-intelligence-ai
- 2. <u>https://www.udemy.com/course/learn-basics-of-artificial-intelligence/</u>
- 3. <u>https://onlinecourses.swayam2.ac.in/cec21_cs08/preview</u>
- 4. <u>https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_overview.html</u>
- 5. <u>https://onlinecourses.nptel.ac.in/noc22_cs56/preview</u>

	Course Outcomes							
Upon suc	Upon successful completion of this course, the student will be able to:							
CO No.	CO Statement	Cognitive Level (K-Level)						
CO1	Define the fundamental concepts of Artificial Intelligence, including its history, key problems, and foundational principles.	K1						
CO2	Explain the structure and functioning of problem-solving agents, including problem formulation and the nature of environments.	K2						
CO3	Apply problem-solving techniques to formulate and solve AI-related problems using appropriate search algorithms.	K3						
CO4	Analyze the effectiveness of different search strategies and algorithms in solving specific AI problems, including adversarial search in game playing.	K4						
CO5	Develop a simple expert system by integrating knowledge engineering principles and understanding the human element in expert systems.	K5						

Relationship Matrix:

Course Outcomes	Pr	ogramn	Ds)	Pı	Mean Score						
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	of COs
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
\geq 1.5and <2.5	Medium
≥ 2.5	High

Course Coordinator: Dr. S.A. Jameel

Semester	Course Code	Course Cotogory	Hours/	Cradita	Marks for Evaluation			
	Course Coue	Course Category	Week	Creuits	CIA	ESE	Total	
VI	23UIC6CC14	Core-XIV	5	5	25	75	100	

Course Title | Web Application Security

	SYLLABUS	
Unit	Contents	Hours
Ι	FUNDAMENTALS OF WEB APPLICATION SECURITY The history of Software Security-Recognizing Web Application Security Threats, Web Application Security, Authentication and Authorization, Secure Socket layer, Transport layer Security, *Session Management*-Input Validation.	15
П	SECURE DEVELOPMENT AND DEPLOYMENT Web Applications Security - Security Testing, Security Incident Response Planning, The Microsoft Security Development Lifecycle (SDL), OWASP Comprehensive Lightweight Application Security Process (CLASP), The Software Assurance Maturity Model (SAMM)	15
Ш	SECURE API DEVELOPMENT API Security- Session Cookies, Token Based Authentication, Securing Natter APIs: Addressing threats with Security Controls, Rate Limiting for Availability, Encryption, Audit logging, Securing service-to-service APIs: API Keys, OAuth2, Securing Microservice APIs: Service Mesh, *Locking Down Network Connections*, Securing Incoming Requests.	15
IV	VULNERABILITY ASSESSMENT AND PENETRATION TESTING Vulnerability Assessment Lifecycle, Vulnerability Assessment Tools: Cloud-based vulnerability scanners, Host-based vulnerability scanners, Network-based vulnerability scanners, Database-based vulnerability scanners, Types of Penetration Tests: External Testing, Web Application Testing, Internal Penetration Testing, *SSID or Wireless Testing*.	15
V	HACKING TECHNIQUES AND TOOLS Social Engineering, Injection, Cross-Site Scripting(XSS), Broken Authentication and Session Management, Cross-Site Request Forgery, Security Misconfiguration, Insecure Cryptographic Storage, Failure to Restrict URL Access, Tools: Comodo, OpenVAS, *Nexpose, Nikto*, Burp Suite.	15
VI	Current Trends (For CIA only): Mobile Application Testings	

.....* Self study

Text Book(s):

- 1. Andrew Hoffman, Web Application Security: Exploitation and Countermeasures for Modern Web Applications, First Edition, O'Reilly Media, Inc, 2020
- 2. Bryan Sullivan, Vincent Liu, Web Application Security: A Beginners Guide, The McGraw-Hill Companies, 2012.
- 3. Neil Madden, API Security in Action, Manning Publications Co., NY, USA, 2020.

Reference Book(s):

- 1. Michael Cross, Developer's Guide to Web Application Security, Syngress Publishing, Inc., 2007.
- 2. Ravi Das and Greg Johnson, Testing and Securing Web Applications, Taylor & Francis
- Group, LLC, 2021.

Web Resource(s):

- 1. https://nptel.ac.in/courses/128106006
- 2. https://www.youtube.com/watch?v=n9jIQXBpV-E

Course Outcomes							
Upon suc	Upon successful completion of this course, the students will be able to:						
CO No.	CO Statement	Cognitive Level (K-Level)					
CO1	Recall the fundamentals of web application security	K1					
CO2	Illustrate focus on wide aspects of secure development and deployment of web applications	K2					
CO3	Apply the concept how to build secure APIs	K3					
CO4	Analyze basics of vulnerability assessment and penetration testing	K4					
CO5	Get an insight about Hacking techniques and Tools	K5					

Course Outcomes (COs)	Programme Outcomes(POs)					Programme Specific Outcomes (PSOs)					Means of
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Score COs
CO1	3	2	3	2	3	2	2	2	2	3	2.4
CO2	2	3	2	2	2	3	2	2	2	2	2.2
CO3	3	2	2	3	2	2	3	3	2	2	2.4
CO4	2	2	2	2	2	2	2	2	3	2	2.1
CO5	3	2	3	2	3	3	3	2	2	3	2.6
Mean Overall Score										2.34	
Correlation										Medium	

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

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

Course Coordinator: Ms. B. Benazir Butto
Somester (Course Code	Course Cotogory	Hours/	Credits	Marks for Evaluation			
Semester C	Jourse Coue	Course Category	Week		CIA	ESE	Total	
VI 2	23UIC6CC15	Core-XV	5	5	25	75	100	
-								

Course Title]
---------------------	---

Network Security Expert

SYLLABUS							
Unit	Contents	Hours					
I	Introduction and Initial Configuration - High-level features - Basic Administration - Fundamental Maintenance - Firewall Policies - Configuring Firewall Policies - Managing Firewall Policies - Introduction to NAT- Firewall Policy NAT - Central NAT - Firewall Authentication - *Methods of Firewall Authentication* - User groups	15					
П	Logging and Monitoring - Log basics - Local and Remote Logging - Log Setting and Search - Protect Log Data - Certificate Operations - Authenticate and Secure Data using Certificates - Inspect Encrypted Data - Web Filtering Basics - Inspection Modes –Proxy- based Web Filtering - Video Filtering - *Application Control Basics* - Application Control Configuration.	15					
Ш	Antivirus Basics - Antivirus Scanning Modes - Antivirus Configuration - Intrusion Prevention - Denial of Service - Security Fabric - Deploying Security Fabric - Security Fabric Features - *Security Fabric Rating* - Topology View – Cryptography – Types of Cryptography – Common Cryptographic Algorithms	15					
IV	Routing - Routing Monitor - ECMP - RPF - Link Health Monitor - Diagnostics - VDOM Concepts - VDOM Administrators - Configuring VDOMs - Inter-VDOM Links - FSSO function - FSSO with AD - *FSSO Settings* - ZTNA Introduction - Comparing ZTNA to SSL and IPsec VPN	15					
V	SSL VPN Deployment Modes - Configuring SSL VPNs - IPsec Introduction - IPsec configuration - Routing and Firewall policies - Redundant VPNs - High Availability - HA Operation modes - HA Cluster Synchronization - HA Failover and Workload - General Diagnosis - Debug Flow - *CPU and Memory* - Firmware and Hardware	15					
VI	Current Trends(For CIA only): Logging and Monitoring Application Control Events	S					

..... Self study

Text Book(s):

- 1. William Stallings, Network Security Essentials: Applications and Standards 6th Edition, 2018.
- William Stallings, Lawrie Brown, Computer Security: Principles and Practice, 4th Edition Published by Pearson, 2021.

Reference Book(s):

- 1. Neha Saxena, Practical Network Security, BPB Publisher, 2019.
- 2. C Kaufman, R Perlman, M Speciner, Ray Perlner (Author) Network Security: Private Communications in a Public World, 3rd Edition Pearson Publication, 2024.

Web Resource(s):

- 1. https://ptgmedia.pearsoncmg.com/images/9781587133183/samplepages/1587133180.pdf
- 2. https://archive.nptel.ac.in/courses/106/105/106105162/

	Course Outcomes								
Upon succ	Upon successful completion of this course, the students will be able to:								
CO No. CO Statement									
CO1	Understand the foundational concepts of network security.	K1							
CO2	Learn to effectively log and monitor network activities.	K2							
CO3	Implement antivirus solutions and intrusion prevention systems.	K3							
CO4	Master routing protocols and virtual domain (VDOM) configurations.	K4							
CO5	Deploy and manage VPN solutions for secure communications	K5							

Course		Prog	gramme	Outcome	es(POs)	Pro	Mean				
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs
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	2	2	3	2	2	2	2	2	2.2
CO5	3	2	2	2	2	2	3	1	2	2	2.1
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
≥1.5and <2.5	Medium
≥ 2.5	High

Course Coordinator: Dr. Mozibur Raheman Khan Mr. P. Mohamed Thahir

Somostor	C	Course Code	Course Cotogory	Hours/	Credits	Marks for Evaluation			
Semester	U	ourse Coue	Course Category	Week		CIA	ESE	Total	
VI	23	3UIC6CCPW	Project Work	5	4	-	100	100	
Course Title		Project Wor	k						

This course provides basic knowledge of the real time projects and develop a mini real time software using any platforms such as Java, Python, .NET, Burp suite, Metasploit, Nmap etc.

Semester	Course Code	Course Catagory	Hours/	Credite	Marks for Evaluation			
	Course Coue	Course Category	Week	Creans	CIA	ESE	Total	
VI	23UIC6DE2A	Discipline Specific Electives-II	5	4	25	75	100	

bile Communication

SYLLABUS							
Unit	Contents	Hours					
I	Introduction: Applications – A short history of wireless communication – A market for mobile communication – A simplified reference model. Wireless transmission: Frequencies for radio transmission – Signals – Antennas – Signal propagation – *Multiplexing*.	15					
Π	Medium Access Control : Motivation for a specialized MAC – SDMA – FDMA – TDMA – CDMA	15					
ш	Telecommunications Systems: GSM – DECT – TERA. Satellite Systems: History – Applications – Basics – Routing – Localization – *Handover*	15					
IV	Broadcast Systems: Cyclical repetition of data – Digital audio broadcasting – Digital video broadcasting. Wireless LAN: Infra red vs radio transmission – *Infrastructure and ad-hoc network* – IEEE 802.11	15					
V	Mobile Network Layer: Mobile IP – Dynamic host configuration protocol – Mobile ad-hoc networks	15					
VI	Current Trends (For CIA only): Traditional TCP						

*.....*Self study

Text Book(s):

Jochen Schiller, "Mobile Communications" Second Edition, Pearson Education, 2009.

Reference Book(s):

T.G. Palanivelu, R.Nakkeeran, Wireless and Mobile Communication, PHI Learning Private Limited, New Delhi, 2009.

Web Resource(s):

- 1. https://www.javatpoint.com/mobile-communication
- 2. https://www.javatpoint.com/fdma-vs-tdma-vs-cdma
- 3. https://www.javatpoint.com/multiplexing-in-mobile-computing

	Course Outcomes								
Upon succ	Upon successful completion of this course, the student will be able to:								
CO No.	CO No. CO Statement								
CO1	Understand the history, applications, and basic principles of wireless communication and its reference models.	K1							
CO2	Identify different frequencies, signals, antennas, and multiplexing techniques used in wireless transmission.	K2							
CO3	Apply various Medium Access Control (MAC) techniques like SDMA, FDMA, TDMA, and CDMA and their significance in communication.	K3							
CO4	Evaluate telecommunications systems such as GSM, DECT, and TERA, as well as satellite systems' basics, applications, and routing.	K5							
CO5	Analyze and explain Mobile Network Layer	K4							

Course	Pro	ogramn	ne Outc	omes(P	Os)	Progra	Means of				
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Score COs
CO1	3	2	3	2	3	2	2	3	2	3	2.5
CO2	2	3	3	3	2	3	2	3	3	2	2.6
CO3	3	2	3	3	2	2	3	3	2	3	2.6
CO4	3	3	3	3	3	2	2	3	3	3	2.8
CO5	3	2	3	2	3	3	3	2	2	3	2.6
Mean Overall Score											2.62
Correlation											High

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

Mean Overall Score	Correlation
<1.5	Low
\geq 1.5 and $>$ 2.5	Medium
<u>></u> 2.5	High

Course Coordinator: Mr. M. Mohamed Zamam Nazar

~	~ ~ -	Hours/		~	Marks for Evaluation			
Semester	Course Code	Course Category	Week	Credits	CIA	ESE	Total	
VI	23UIC6DE2B	Discipline Specific Electives-II	5	4	25	75	100	
0 7								

Course Title Cyber Defense

	SYLLABUS	
Unit	Contents	Hours
Ι	Introductory Networking - The OSI Model: An Overview - Encapsulation - The TCP/IP Model - Networking Tools Ping - SMB - Telnet - FTP - NFS - SMTP - MySQL - Wireshark - Windows Fundamentals - *Active Directory Basics*.	15
П	Threat and Vulnerability Management - Nessus - Navigation and Scans - Scanning a Web Application! - Introduction to MITRE - Basic Terminology - ATT&CK® Framework - What is Yara? - Introduction to Yara Rules - Expanding on Yara Rules - Yara Modules - Zero Logon - *OpenVAS* - MISP	15
ш	Security Operations & Monitoring - Task Manager - System - Sysinternals Suite - File and Disk Utilities - Networking Utilities - Process Utilities - Security Utilities - System Information - Windows Event Logs - *Event Viewer* - Sysmon Overview - Hunting Metasploit - Hunting Malware - Hunting Persistence – Basics of Osquery and Splunk	15
IV	Attacking Kerberos - Volatility Overview - Memory Extraction - Volatility Hunting and Detection Capabilities - Advanced Memory Forensics - Investigating Windows - Windows Forensics - Data Acquisition - Exploring Windows Registry - Evidence of Execution - Windows file systems - Recovering deleted files - Redline -*The Redline Interface* - Endpoint Investigation – Autopsy.	15
V	Malware Analysis - History of Malware - Purpose of Malware Analysis? - Obtaining MD5 Checksums of Provided Files - Understanding Malware Campaigns - Obfuscation Static Vs. Dynamic Analysis - Strings - Strings in the Context of Malware - *Analysing Malicious Microsoft Office*.	15
VI	Current Trends (For CIA only): REMnux the Redux - Analysing Malicious PDF's	

..... Self study

Text Book(s):

1. Chris Hughes, Nikki Robinson, Effective Vulnerability Management, Wiley Publication, 2024

2. Robert McCrie, Seungmug Lee, Security Operations Management, 4th Edition, 2021

Reference Book(s):

1. Michael Sikorski, Andrew Honig, Practical Malware Analysis: The Hands-On Guide to Dissecting Malicious Software, 1st Edition, 2012.

Web Resource(s):

- 1. acm361/Computer Networks A Tanenbaum 5th edition.pdf at master · gsahinpi/acm361 · <u>GitHub</u>
- 2. <u>Download PDF Networking For Dummies, 8th Edition [PDF] [486mpmsgqds0] (vdoc.pub)</u>
- 3. <u>https://owasp.org/www-project-vulnerability-management-guide/OWASP-Vuln-Mgm-Guide-Jul23-2020.pdf</u>
- 4. <u>The Art of Memory Forensics (zenk-security.com)</u>

	Course Outcomes Upon successful completion of this course, the students will be able to:							
Upon succ								
CO No. CO Statement								
CO1	Identify common threats and vulnerabilities in network environments.	K1						
CO2	Understand the role of Windows Event Logs and Event Viewer in security monitoring.	К2						
CO3	Analyze File and Disk Utilities, Networking Utilities, Process Utilities, and Security Utilities for troubleshooting and security purposes	К3						
CO4	Differentiate between static and dynamic analysis of malware	K4						
CO5	Recover deleted files and artifacts using tools like Redline and Autopsy.	K5						

Course		Prog	gramme	Outcome	s(POs)	Programme Specific Outcomes(PSOs)					Mean
Outcomes (COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Score of COs
CO1	3	3	2	1	3	3	2	3	2	2	2.4
CO2	3	2	2	2	1	2	2	2	1	3	2.0
CO3	3	3	3	2	3	2	2	2	2	3	2.5
CO4	3	2	3	1	3	2	2	2	2	3	2.3
CO5	3	2	3	2	2	2	3	2	2	2	2.3
Mean Overall Score									2.3		
Correlation									Medium		

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

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

Course Coordinator: Dr. Mozibur Raheman Khan Mr. P. Mohamed Thahir

Somostor	Co	Jourse Code	Course Cotogory	Hours/	Credite	Marks for Evaluation			
Semester	Course Coue		Course Category	Week	Creans	CIA	ESE	Total	
VI	23U	IC6DE3AP	Discipline Specific Electives-III	4	4	20	80	100	
Course Title		Mobile Co	mmunication Lab - Practical						

- 1. Develop an android app which displays Welcome message.
- 2. Develop an android app for displaying a form to get user information.
- 3. Using Android, validate the login credentials and display the Welcome message using new activity for a valid user.
- 4. Develop an Android application to design a calculator.
- 5. Study of performing infrared communication.
- 6. Study of Bluetooth file transfer in android
- 7. Study for identifying the Bluetooth devices in the wireless range.
- 8. Create an application that shows different country name on a list view and on selecting an item it displays its corresponding flag.
- 9. Create an application using firebase.
- 10. Case Study on different real time mobile computing services.

	Course Outcomes							
Upon suc	Upon successful completion of this course, the students will be able to:							
CO No.	CO Statement	Cognitive Level (K-Level)						
CO1	Remember the fundamental concepts of mobile communication, including Android app development and wireless communication methods (e.g., Bluetooth, infrared).	K1						
CO2	Explain the functionality of Android activities, Bluetooth communication, and modulation techniques.	K2						
CO3	Develop Android applications and simulate mobile communication techniques using tools like Java for various modulation and channel simulations.	К3						
CO4	Analyze the performance differences between Bluetooth and infrared communication in terms of data transfer speed, range, and energy consumption	K4						
CO5	Evaluate the efficiency and scalability of mobile applications utilizing Firebase for real-time data management.	K5						

Course		Prog	gramme	Outcome	es(POs)	Programme Specific Outcomes(PSOs)					Mean
Outcomes (COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Score of COs
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
≥1.5and<2.5	Medium
≥ 2.5	High

Course Coordinator: Mr. M. Mohamed Zamam Nazar

Semester	Course Code		Course Catagory	Hours/	Credite	Marks for Evaluation			
			Course Category	Week	Creans	CIA	ESE	Total	
VI	23UIC6DE3BP		Discipline Specific Electives-III	4	4	20	80	100	
Course Title (Cyber Defe	ense Lab - Practical						

- 1. Cyber Defense Introduction
 - a. Analyze PCAPs using wireshark
- 2. Threat and Vulnerability Management
 - a. Nessus vulnerability scanner
 - b. Yara Threat intelligence, forensics, and threat hunting
 - c. Exploit the ZeroLogon vulnerability
 - d. OpenVAS Open Vulnerability Assessment Scanning
 - e. MISP Threat Sharing Platform
- 3. Security Operations & Monitoring
 - a. Explore the core processes within a Windows operating system
 - b. Sysinternals Analyze Windows systems or applications.
 - c. Windows Event Logs
 - d. Sysmon Monitor and log endpoints and environments.
 - e. Osquery: The Basics
 - f. Splunk: Basics
- 4. Threat Emulation
 - a. Attacktive Directory Exploit a vulnerable Domain Controller
 - b. Attacking Kerberos Abuse the Kerberos Ticket Granting Service
- 5. Incident Response and Forensics
 - a. Perform memory forensics with Volatility
 - b. Investigating Windows Machine
 - c. Windows Forensics
 - d. Redline Perform memory analysis and to scan for IOCs on an endpoint
 - e. Autopsy Investigate artefacts from a disk image
- 6. Malware Analysis
 - a. Investigating "strings" within an application
 - b. Malware Reverse Engineering
 - c. MAL: REMnux The Redux

Course Outcomes								
Upon succe	Jpon successful completion of this course, the student will be able to:							
CO No.	CO Statement	Cognitive Level (K-Level)						
CO1	Enumerate and exploit various network services and identify mis configurations.	K1						
CO2	Utilize tools like Nessus and OpenVAS for vulnerability scanning and threat intelligence.	K2						
CO3	Analyze Windows systems using tools like Sysinternals and monitor logs with Sysmon.	К3						
CO4	Perform memory forensics and investigate Windows machines using tools like Volatility and Redline.	K4						
CO5	Conduct malware reverse engineering and analyze application strings for malicious behavior.	K5						

Course Outcomes (COs)	Programme Outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs
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
≥1.5and<2.5	Medium
≥ 2.5	High

Course Coordinator: Dr. S.A. Jameel Mr.P. Mohamed Thahir