Dr. M.G.R.
EDUCATIONAL AND RESEARCH INSTITUTE
DEEMED TO BE UNIVERSITY
University with Graded Autonomy Status
(An ISO 21001 : 2018 Certified Institution)
Periyar E.V.R. High Road, Maduravoyal, Chennai-95. Tamilnadu, India.

FACULTY OF HUMANITIES AND SCIENCE

LEARNING OUTCOME BASED CURRICULUM

CURRICULUM & SYLLABUS

(2022-REGULATION)

MASTER OF SCIENCE
CYBER FORENSICS AND INFORMATION SECURITY

DEPARTMENT
OF
COMPUTER SCIENCE AND ENGINEERING

Course :M.Sc (CFIS)

Vision:

To become a Premier Institution of Excellence in Computer Science and Engineering that would develop self-sustaining and globallycompetent Computer Science and Information Technology Professionals.

Mission:

M1 Enable students and faculty with the best of Technologies and Knowledge emerging in the domain of Computer Science and Engineering.

M2 Equip the department laboratories with the power of in-demand Technologies and Software for the On-Demand Industry.

M3 Share and Collaborate knowledge across the IT Industries for holistic development of skilled and talented students.

M4 Impart the students with Ethical values, Critical thinking and Broad-based computational skills, to enable students to become Entrepreneurs.

M5 Motivate the students to comprehend problems across Inter Disciplinary Domains and offer innovative solution using ICT.

Program Educational Objectives (PEO)

PEO1: Apply knowledge and skills acquired to solve the issues in real world network and cyber security areas and to develop feasible and reliable systems to prevent and protect systems from security attack.

PEO2: Demonstrate Environmental, Legal, Cultural, Social, Ethical, Public Safety Issues and work as a member of a team and communicate effectively across team members.

PEO3: Exposure to emerging cutting edge technologies and train them in the field of Computer network, Network security and Cyber security related issues.

PEO4: Operate various security related commercial software tools to solve scientific and business problems.

PEO5: Start career as Security Engineers, Cyber Security Analysts, Cyber Forensic Professionals, Security Architects and Administrators in Organizations or as Scientists at various levels in Research Establishments.

Program Outcomes (PO)

PO1: Acquire in-depth knowledge related to the discipline.

PO2: Apply the recent advancement in the domain knowledge for solving real-life problems.

PO3: Demonstrate critical thinking skills by analyzing, synthesizing and evaluating various research problems.

PO4: Identify and use qualitative and quantitative methods of research in order to pursue a well-researched written work that makes use of wide range of disciplinary techniques and scientific methods applicable.

PO5: Conceive the ways and means to address various social, economic, environmental, human rights and other ethical issues faced by humanity at the local, national and global levels.

PO6: Demonstrate Professional, leadership and Management skills required for professional development and employability.

PO7: Demonstrate the ability for collaborative work and scientific communication through projects, internship and on-site training.

PO8: Use mathematical, analytical, statistical and information technology tools.

PO9: Ability to update knowledge and skills, participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development.

Program Specific Outcomes (PSO)

PSO1: Gain the knowledge and professional skill of cyber forensics and information security to provide ethical solutions to cyber threats, vulnerabilities, exploits and crime investigations.

PSO2: Assess various cyber-security risk management policies and technologiesand identify a method to protect an organization's critical information and assets.

PSO3: Formulate, update and communicate short-term and long-term organizational cyber-security strategies and policies.

PSO4: Use software or tools to analyze existing cyber-security strategies and policies.

EO with mission statement:

	M1	M2	M3	M4	M5
PEO1	3	3	3	2	3
PEO2	1	1	1	1	1
PEO3	3	3	2	1	3
PEO4	3	3	2	3	3
PEO5	2	3	2	3	3

PEO-PO:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
PEO1	3	3	3	3	1	3	1	2	1
PEO2	2	3	1	1	3	1	2	--	1
PEO3	3	1	1	2	1	2	1	--	3
PEO4	3	3	3	3	1	3	3	--	3
PEO5	3	3	3	3	1	3	3	3	3

PEO-PSO:

	PSO1	PSO2	PSO3	PSO4
PEO1	3	3	3	3
PEO2	1	1	3	1
PEO3	3	3	3	2
PEO4	3	3	3	3
PEO5	3	3	3	2

Strength of Correlation 3- High, 2- Medium, 1-Low

I SEMESTER							
S.No.	**SUBJECT CODE**	**SUBJECT NAME**	**Ty/Lb/ETL**	**L**	**T/SLr**	**P/R**	**C**
1	HMCF22001	Mathematics for Information Security	Ty	3	0/0	0/0	3
2	HMCF22002	Advanced Digital Forensics	Ty	3	1/0	0/0	4
3	HMCF22003	Network Troubleshooting and Security	Ty	3	1/0	0/0	4
4	HMCF22EXX	Elective I	Ty	3	0/0	0/0	3
5	HMCC22001	Research Methodology	Ty	3	0/0	0/0	3
PRACTICALS*							
1	HMCF22L01	Advanced Digital Forensics **Lab**	Lb	0	0/0	4/0	2
2	HMCF22L02	Network Troubleshooting and Security **Lab**	Lb	0	0/0	4/0	2
3	HMAC22IXX	Audit Course	Ty	2	0/0	0/0	0

Credits Sub Total: 21

II SEMESTER							
S.No.	**SUBJECT CODE**	**SUBJECT NAME**	**Ty/Lb/ETL**	**L**	**T/SLr**	**P/R**	**C**
1	HMCF22004	Security of Cloud Computing	Ty	3	1/0	0/0	4
2	HMCF22005	Information Security Tools and Technologies	Ty	3	0/0	0/0	3
3	HMCF22006	Advanced Information Security	Ty	3	0/0	0/0	3
4	HMCF22EXX	Elective II	Ty	3	0/0	0/0	3
5	HMCC22002	Intellectual Property Rights and Patents	Ty	3	0/0	0/0	3
PRACTICALS*							
1	HMCF22L03	Information Security Tools and Technologies **Lab**	Lb	0	0/0	4/0	2
2	HMCF22L04	Advanced Information Security **Lab**	Lb	0	0/0	4/0	2
3	HMCF22I01	Summer Internship	IE	0	0/0	4/0	2

Credits Sub Total: 22

III SEMESTER							
S.No.	**SUBJECT CODE**	**SUBJECT NAME**	**Ty/Lb/ETL**	**L**	**T/SLr**	**P/R**	**C**
1	HMCF22007	Malware Analysis and Security	Ty	3	1/0	0/0	4
2	HMCF22008	Cyber Criminology and Law Enforcement	Ty	3	0/0	0/0	3
3	HMCF22009	Application Security	Ty	3	0/0	0/0	3
4	HMCF22010	E-Mail Security and Forensics	Ty	3	0/0	0/0	3
5	HMCF22EXX	Elective – III	Ty	3	0/0	0/0	3
6	HMOL22IE1	Open Elective (Self study paper) – Swayam / NPTEL / Any MOOC	IE	3	0/0	0/0	3
PRACTICALS*							
1	HMCF22I02	Project Phase –I	IE	0	0/0	4/0	2

Credits Sub Total: 21

IV SEMESTER							
S.No.	**SUBJECT CODE**	**SUBJECT NAME**	**Ty/Lb/ETL**	**L**	**T/SLr**	**P/R**	**C**
1	HMCF22L05	Project Phase –II	Lb	0	0/0	18/0	9
2	HMCF22I03	Research Publication	IE	0	0/0	4/0	2

Credits Sub Total: 11
Total Credits: 75

ELECTIVE-I							
S.No.	**SUBJECT CODE**	**SUBJECT NAME**	**Ty/Lb/ETL**	**L**	**T/SLr**	**P/R**	**C**
1	HMCF22E01	Forensic Science and Crime Investigation	Ty	3	0/0	0/0	3
2	HMCF22E02	Bank Frauds and Countermeasures	Ty	3	0/0	0/0	3
3	HMCF22E03	Web Application Security	Ty	3	0/0	0/0	3

ELECTIVE-II							
S.No.	**SUBJECT CODE**	**SUBJECT NAME**	**Ty/Lb/ETL**	**L**	**T/SLr**	**P/R**	**C**
1	HMCF22E04	Vigilance and Security Management	Ty	3	0/0	0/0	3
2	HMCF22E05	Artificial Intelligence Security and Forensics	Ty	3	0/0	0/0	3
3	HMCF22E06	Business Continuity Planning and Disaster Recovery Management	Ty	3	0/0	0/0	3

ELECTIVE-III							
S.No.	**SUBJECT CODE**	**SUBJECT NAME**	**Ty/Lb/ETL**	**L**	**T/SLr**	**P/R**	**C**
1	HMCF22E07	IoT Security	Ty	3	0/0	0/0	3
2	HMCF22E08	Telecom Frauds	Ty	3	0/0	0/0	3
3	HMCF22E09	Mobile Security and Forensics	Ty	3	0/0	0/0	3

C: Credits L: Lecture T: Tutorial P: Practical Ty/Lb: Theory /Lab IE: Internal Evaluation

LIST OF AUDIT COURSES OFFERED IN H&S

AUDIT COURSE							
Sl.No	**Course Code**	**Course Name**	**Ty/Lb/ETL/IE**	**Teaching Scheme**			
				L	**T/SLr**	**P/R**	**C**
1	HMAC22I01	English for Research paper writing	Ty	2	0/0	0/0	0
2	HMAC22I02	Disaster Management	Ty	2	0/0	0/0	0
3	HMAC22I03	Sanskrit for Technical Knowledge	Ty	2	0/0	0/0	0
4	HMAC22I04	Value Education	Ty	2	0/0	0/0	0
5	HMAC22I05	Constitution of India	Ty	2	0/0	0/0	0
6	HMAC22I06	Pedagogy Studies	Ty	2	0/0	0/0	0
7	HMAC22I07	Stress Management by Yoga	Ty	2	0/0	0/0	0
8	HMAC22I08	Personality Development through Life Enlightenment Skills	Ty	2	0/0	0/0	0
9	HMAC22I09	Life skill	Ty	2	0/0	0/0	0

Credit summary

Semester 1 Credits : 21

Semester 2 Credits : 22

Semester 3 Credits : 21

Semester 4 Credits: 11

Total Credits: 75

Components of Curriculum

S. No	CATEGORY	Description	No. of Courses	Credits	Total	Credit Weightage in %	Contact hours
1	Core Courses	Core Theory	10	34	42	56.00	510
		Core Lab	04	08			240
2	Elective Courses	Department Electives/ Skill enhancement electives	03	09	09	12.00	135
3	Open Electives	Theory	01	03	03	04.00	45
		Lab					
4	Inter Disciplinary / Allied Courses	Theory				00.00	
		Lab					
5	Humanities & Social Sciences, Life Skills & Soft Skills	Language 1 & 2	N/A		00	00.00	
		English 1 & 2	N/A				
		Soft Skills	N/A				
		Life Skill	01	00			
		Foreign Language	N/A				
		Environmental Studies					
		Management Papers	N/A				
		Entrepreneurship Development					
		Universal Human values					
		Entrepreneurship	N/A				
6	Projects /Internship /Core Skill	Project	02	11	13	17.33	60
		Core Skills	N/A				
		Internship / NSS / NCC	01	02			30
7	Research Component	Research Methodology, Publication, IPR and Patents etc.	03	08	08	10.67	135
8	Any other						
Total			**25**	**75**	**75**	**100**	**1155**

2: Revision / modification done in syllabus content:

S. No	Course (Subject) Code	Course (Subject) Name	Concept/ topic if any, removed in current curriculum	Concept /topic added in the new curriculum	% of Revision / Modification done
1	HMCF22002	Advanced Digital Forensics		• Phases of Digital Forensics • Seizure of Digital Information • Handheld forensics • CD and DVD Forensics • Router Forensics • Windows Memory Analysis • Log Analysis • Digital Forensics and Investigation	**50%**
2	HMCF22003	Network Trouble and Security		• Troubleshooting Network Performance Issues • Troubleshooting Bandwidth and Traffic • General IP Troubleshooting Theory and Suggestions	**20%**
3	HMCF22L01	Advanced Digital Forensics Lab		• FAT32 File systems • NTFS File Systems • Audio and Video analysis using Forensic Investigation • Documentation Evidence and Reconstructing Evidence	**40%**
4	HMCF22E0	Web Application Security	Unit 1, Unit 2, Unit 3 Unit 4 and Unit 5 content removed	New content added under the following Unit Headings • Introduction to Web Application Security • Methodology of Web Hacking • Understanding Risk Factors • Securing Web Application • Security Enabled Web Application	**100%**
5	HMCF22E06	Business Continuity Planning and Disaster Management	Unit 1, Unit 2, Unit 3 Unit 4 and Unit 5 content removed	New content added under Unit 1, Unit 2, Unit 3 Unit 4 and Unit 5	**100%**
6	HMCF22E07	IoT Security	Unit 1, Unit 2, Unit 3 Unit 4 and Unit 5 content removed	New content added under the following Unit Headings • Introduction • Architecture and Methodologies • Security and Privacy • Securing IoT • IoT Applications	**100%**
7	HMCF22E09	Mobile Security and Forensics	Unit 1, Unit 2, Unit 3 Unit 4 and Unit 5 content remov	New content added under the following Unit Headings • Introduction • Mobile Apps Testing • Mobile Testing Tools • Evidences • Forensics Procedure and Analysis	**100%**

TABLE 3:List of New Courses / value added courses / life skills / Electives / interdisciplinary / courses focusing on employability / entrepreneurship / skill development

S.No	New Courses(subjects)	Value added Courses	Life Skill (Audit Course)	Electives	Inter Disciplinary	Focus on employability / Entrepreneurship / skill development
Sem. 1			English for Research paper Writing	Bank Frauds and Countermeasures	Research Methodology	
			Disaster Management			
			Sanskrit for Technical Knowledge			
			Value Education			
			Constitution of India			
			Pedagogy Studies			
			Stress Management by Yoga			
			Personality Development through Life Enlightenment Skills			
			Life Skill			
Sem. 2	Security of Cloud Computing			Artificial Intelligence Security and Forensics	Intellectual Property Rights and Patents	Summer Internship
Sem. 3	Cyber Criminology and Law Enforcement	Open Elective (Self study paper) – Swayam / NPTEL / Any MOOC		Telecom Frauds		
	Application Security					
Sem.4	Research Publication					Project Work

SEMESTER – I

Subject Code: HMCF22001	Subject Name : MATHEMATICS FOR INFORMATION SECURITY	Ty/Lb/ETL	L	T/S.Lr	P/R	C
	Prerequisite: NIL	Ty	3	0/0	0/0	3

L : Lecture T : Tutorial S.Lr : Supervised Learning P : Project R : Research C: Credits
Ty/Lb/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVES :

This paper will help a student to understand:

- The basic mathematic concepts used in information security field.
- The different cryptographic algorithm and generation of keys
- The working of cryptographic hashing functions and their applications.
- The message authentication codes and its various applications.

COURSE OUTCOMES (COs) : (3- 5)At the end of this course the students would be able to

CO1	Understand thelatest concepts in discrete mathematics, probability and cryptography.
CO2	Apply the mathematic symmetric and asymmetric algorithms related to cryptography
CO3	Evaluate the authentication and hash algorithms.
CO4	Designor modify authentication policies and system level security.
CO5	Deploy appropriate encryption techniques to secure data in transit across data.

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3	1	1	--	--	2	--	--	3
CO2	--	3	3	3	--	3	2	2	--
CO3	3	--	3	3	--	3	--	3	--
CO4	--	3	3	3	--	3	2	--	2
CO5	3	3	--	--	--	2	--	2	--

Mapping of Course Outcomes (COs) with Program Specific Outcomes (PSOs)

COs/PSOs	PSO1	PSO2	PSO3	PSO4
CO1	3	--	--	--
CO2	--	--	3	--
CO3	3	3	3	--
CO4	3	--	1	--
CO5	--	3	3	--

3/2/1 indicates Strength of Correlation 3- High, 2- Medium, 1-Low

Category	**Program Core**	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary / Allied	Skill Component	Practical / Project / Internship	Others			
	✓											

Subject Code: HMCF22001	Subject Name	Ty/Lb/ETL	L	T/S.Lr	P/R	C
	MATHEMATICS FOR INFORMATION SECURITY	Ty	3	0/0	0/0	3

Unit I –Introduction to Mathematic Concepts **11 Hrs**

Number Theory – Divisibility, Factors, Prime numbers – Properties of Divisibility - Representation of Integers in Different Bases –Conversion of Decimal to Binary, Octal and Hexadecimal values - Greatest Common Divisor and Least Common Multiple - The Integers –– Primitive Roots and the Discrete Logarithm – Polynomials and Finite Fields – The Ring of Polynomials ––Congruence Calculus or Modular Arithmetic – Modular Square Roots.

Unit II –Introduction to Cryptography **9 Hrs**

Introduction to Cryptography – The Objectives of Cryptography – Symmetric-Key Encryption – Steam Ciphers – Block Ciphers – DES – AES – Modes of Operation – Public-Key Cryptography – Concepts of Public-Key Cryptography – RSA – Key Generation and Encryption – Digital Signatures – Attacks against RSA

Unit III–Cryptographic Hash Functions **8 Hrs**

Cryptographic Hash Functions – Security requirements for Hash functions – Construction of Hash functions – Data Integrity and Message Authentication – Signatures with Hash functions – Message Digest – MD5 - Secure Hashing Algorithm – SHA1 and SHA2.

Unit IV–Discrete Algorithm and Protocols **8 Hrs**

Elgamal's Encryption – ElGamal's Signature Scheme – Digital Signature Algorithm – Rabin's Encryption – Rabin's Signature Scheme – Key Exchange and Entity Authentication – Kerberos – Diffie-Hellman Key Agreement – Key Exchange and Mutual Authentication – Station-to-Station Protocol – Public-Key Management Techniques.

Unit V–Message Authentication Codes **9 Hrs**

Secure communication and Message integrity – Encryption vs Message Authentication – Message Authentication Codes – Constructing Secure Message Authentication Codes – CBC-MAC – Collision Resistant Hash Functions – Weaker notions of Security for Hash functions – A Generic "Birthday" Attack – The Merkle -Damgard Transform – Collision-Resistant Hash Functions in Practice.

Total Hrs: 45

Text Books:

1. Hans Delfs, Helmut Knebl, "Introduction to Cryptography Principles and Applications", 2nd Edition, Springer, 2007, ISBN-13 978-3-540-49243-6.
2. Jonathan Katz and Yehuda Lindell, "Introduction to Modern Cryptography", Chapman & Hall/CRC, 2008, ISBN-13: 978-1-58488-551-1.

Subject Code: **HMCF22002**	Subject Name : **ADVANCED DIGITAL FORENSICS**	**Ty/Lb/ETL**	**L**	**T/S.Lr**	**P/R**	**C**
	Prerequisite: NIL	Ty	3	1/0	0/0	4

L : Lecture T : Tutorial S.Lr : Supervised Learning P : Project R : Research C: Credits
Ty/Lb/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVES :

- To understand forensic software and hardware
- To understand the windows and linux file systems
- To gain insight data recovery tools

COURSE OUTCOMES (COs) : (3- 5) At the end of this course the students would be able to

CO1	Understand data acquisition techniques and data retrieval techniques in a forensically sound manner so that the evidence can be presented in court.
CO2	Identify suitable techniques and procedures to perform a digital investigation, analysis of physical storage media and perform volume analysis and acquisition of artifacts that reside in hard disks and random access memory
CO3	Design forensic disk image analysis and reporting and windows registry examining strategies to uncover forensic evidences and analyze Windows event logs
CO4	Perform live analysis, capture volatile data, make images of media, analyze files systems, analyze network traffic, analyze files, perform memory analysis, and analyze malware on a Linux system
CO5	Learn tools used for investigation

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3	1	1	1	--	--	--	--	2
CO2	--	3	2	2	2	2	--	--	3
CO3	--	2	3	--	2	3	3	1	--
CO4	--	3	3	3	2	3	3	3	--
CO5	3	--	--	--	--	3	--	--	3

Mapping of Course Outcomes (COs) with Program Specific Outcomes (PSOs)

COs/PSOs	PSO1	PSO2	PSO3	PSO4
CO1	3	1	1	--
CO2	--	3	2	--
CO3	--	3	3	--
CO4	--	1	--	3
CO5	3	--	1	3

3/2/1 indicates Strength of Correlation 3- High, 2- Medium, 1-Low

Category	**Program Core**	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary / Allied	Skill Component	Practical / Project / Internship	Others			
	✓											

Subject Code: HMCF22002	Subject Name	Ty/Lb/ETL	L	T/S.Lr	P/R	C
	ADVANCED DIGITAL FORENSICS	Ty	3	1/0	0/0	4

Unit I - Digital Forensics **12 Hrs**

Phases of Digital Forensics – Seizure of Digital Information – Handheld forensics - Forensic Software and Hardware - Analysis and Advanced Tools - Forensic Technology and Practices - Forensic Ballistics and Photography, Face, Iris and Fingerprint Recognition, Audio Video Analysis.

Unit II - Disk and file system analysis **12 Hrs**

Media analysis concepts – the sleuth kit – partitioning and disk layouts – special containers – hashing – carving – forensic imaging – CD and DVD Forensics – Router Forensics

Unit III - Windows Forensics **12 Hrs**

Windows file systems – Registry – event logs – recycle bin - prefetch files – shortcut files – windows executables – Volatile and Non-Volatile information – Windows Memory Analysis – Executable File Analysis – Metadata – IIS Logs – Parsing DHCP Server and Windows Firewall logs – Evaluating Account Management Events – Examining Audit-Policy Change Events, System Log entries and Application Log entries

UnitIV - Linux systems artefact **12 Hrs**

Linux file systems – File Analysis - Linux boot process and services – Linux system organization and artifacts – user accounts – home directories – logs – scheduling tasks – Linux Forensic Tools

UnitV –Digital Forensics and Investigation **12 Hrs**

Data Acquisition – Computer Forensics Tools – Computer Forensics Analysis and Validation – Recovering Graphics Files – Email Investigations – Cell Phone and Mobile Device Forensics

Total Hrs: 60

Text Books:

1. EC-Council, "Investigating Hard Disks, File and Operating Systems", Cengage Learning, ISBN- 13: 978-1-4354-8350-7
2. John Sammons, "The basics of Digital Forensics", 2nd Edition, Elsevier Publication, 2012
3. Harlan Carvey, "Windows Forensics Analysis Tool kit", 3rd Edition, Syngress Publication, 2007.
4. EC-Council¸ "Computer Forensics Investigating Hard Disks, File & Operating Systems:, Course Technology Cengage Learning, 2010, ISBN- 13: 978-1-4354-8350-7

Reference Books:

1. Kevin Mandia, Chris Prosise, Matt Pepe, "Incident Response and Computer Forensics", Tata McGraw -Hill, New Delhi, 2006.
2. "Understanding Forensics in IT ", NIIT Ltd, 2005.
3. Bill Nelson, Amelia Phillips, Christopher Steuart. " Guide to Computer Forensics and Investigations", 4th Edition, Course Technology Cengage Learning, ISBN-13: 978-1-435-49883-9
4. Tyler Cohen, Amber Schroader, "Alternate Data Storage Forensics", Syngress Publishing, Inc., ISBN 13:978-1-59749-163-1

Subject Code: **HMCF22003**	Subject Name : **NETWORK TROUBLE SHOOTING AND SECURITY**	**Ty/Lb/ETL**	**L**	**T/S.Lr**	**P/R**	**C**
	Prerequisite: NIL	Ty	3	1/0	0/0	4

L : Lecture T : Tutorial S.Lr : Supervised Learning P : Project R : Research C: Credits
Ty/Lb/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVES :

- To prepare student in finding, isolating, and troubleshooting network faults in the fastest way possible.
- To impart the functionality of layered network architecture.
- Explain students how to design networks and protocols for diverse situations

COURSE OUTCOMES (COs) : (3- 5)At the end of this course the students would be able to

CO1	Analyse the requirements for a given organizational structure and select the most appropriate networking architecture and technologies
CO2	Analyse, specify and design the topological and routing strategies for an IP based networking infrastructure
CO3	Understand various protocols for network security to protect against the threats in the networks.
CO4	Compare and contrast technologies in networking and security designed to solve similar problems
CO5	Students will know how to administer a small, medium, or large network infrastructure including server and node management

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	--	3	3	--	3	3	--	1	--
CO2	--	3	3	--	--	3	--	2	--
CO3	3	2	--	2	--	--	--	--	3
CO4	--	--	3	3	--	3	--	--	--
CO5	3	--	--	--	2	3	3	--	--

Mapping of Course Outcomes (COs) with Program Specific Outcomes (PSOs)

COs/PSOs	PSO1	PSO2	PSO3	PSO4
CO1	--	3	2	3
CO2	--	3	--	--
CO3	3	--	2	--
CO4	--	3	--	--
CO5	3	--	3	3

3/2/1 indicates Strength of Correlation 3- High, 2- Medium, 1-Low

Category	**Program Core**	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary / Allied	Skill Component	Practical / Project / Internship	Others			
	✓											

Subject Code: HMCF22003	Subject Name	Ty/Lb/ETL	L	T/S.Lr	P/R	C
	NETWORK TROUBLE SHOOTING AND SECURITY	Ty	3	1/0	0/0	4

Unit I – Introduction **12Hrs**

Seven layers in action –Troubleshooting Layer 3 Problems- Network security model classical Encryption techniques (Symmetric cipher model, substitution techniques, transposition Techniques, steganography).–Topology – Cabling - Networking Industry Standards IEEE - Ethernet topology.

Troubleshooting Network Performance Issues -Baseline Network Performance-Collect Network Device Performance Metrics - Switch/Router CPU Utilization - Switch/Router Memory Utilization - Interface/Bandwidth Utilization.

Unit II - TCP/IP Basics & Routing **12 Hrs**

Introduction to MAC address - Introduction to IP address - Classes of IP address - Need for subnetting - Basics of IPV6 - Static IP addressing, Dynamic IP addressing, Special IP addresses - Tools for Troubleshooting IP Problems - How routers work - Routing tables - Network Address Translation - Dynamic routing – distance vector, link state – EIGRP – OSPF - Troubleshooting Hot Standby Router Protocol (HSRP) -Dynamic routing – Working with routers - Connecting to routers, basic router configuration, router problems.

Troubleshooting Bandwidth and Traffic - NetFlow -Applications-Protocols-Troubleshooting Configuration Issues-Tools for Network Troubleshooting.

Unit III - Packet Switched Connection **12 Hrs**

Types of connections – Circuit switched, Packet switched - Why packet switched is preferred - Types of protocols and need for protocols - Packet switched Protocols - TCP/ IP - RSA Algorithm - Knapsack Algorithm - Blowfish Algorithm - General IP Troubleshooting Theory and Suggestions

Unit IV - TCP/IP Applications **12 Hrs**

Origins of TCP/ IP and evolution of Internet - IP Layers Vs OSI - IP number concepts - Network address - Classes of Networks-Subnet masking - Static and dynamic IP numbers - UDP - Establishing a TCP session (Three way handshake) - Troubleshooting Physical Connectivity Problems -Name to address translation - Domain Name System - Transport layer protocols –TCP, UDP, ICMP, IGMP – the power of port numbers - registered ports, connection status, rules for determining good vs. bad communications – Common TCP/IP applications - the world wide web, Telnet, Email, FTP, Internet applications

Unit V - Network Naming **12Hrs**

Introduction to Domains and Work Groups - Network naming – DNS – how DNS works, DNS servers Troubleshooting DNS – WINS – Configuring WINS clients, Troubleshooting WINS – Diagnosing TCP/IP Networks - Introduction to ADS (Active Directory Service) - File sharing within network - Understanding DHCP - Introduction to Mail Exchange server and ISA server - Network operating system - Client Server applications - Peer to Peer Applications - Measuring performance - Monitoring tools.

Total Hrs: 60

Text Books:

1. Mike Meyers, "CompTIA Network+ Certification All-in-One Exam Guide", McGraw Hill Education; 5th Edition, 2017, ISBN-10: 125902553.
2. Dr. William Stallings, "Cryptography and Network Security", 7thEdition, Pearson Education Publication, 2017.
3. Tanenbaum, "Computer Networks", 5thEdition, Pearson Education India,2013.

Reference Books:

1. Todd Lammle, "Comptia Network Study Guide", 3rd Edition, Wiley, ISBN-10: 8126556412, 2015.
2. Todd Lammle, "CCNA Routing and Switching Complete Study Guide", 2nd Edition, Wiley,2016.
3. Wm. Arthur Conklin, Chuck Cothren, Roger Davis, Dwayne Williams, Greg White, "CompTIA Security+ All-in-One Exam Guide", 4th Edition McGraw-Hill Education, 16 December 2014.
4. William Stallings, "Cryptography and Network Security", 6th Edition, Pearson Education, 2013, SBN 10: 0133354695.
5. AtulKahate, "Cryptography and Network Security", 2nd Edition, McGraw Hill Education India (Pvt Ltd), 2009, ISBN 10: 0070151458.
6. Charlie Kaufman, Radia Perlman, Mike Speciner, " Network Security: Private Communication in a Public World", 2nd Edition, Prentice Hall, 2002, ISBN 10: 0130460192.
7. Charles Pfleeger, Shari Lawrence Pfleeger "Security in computing", 4thEdition, Prentice Hall, ISBN 10: 0132390779.

Subject Code : HMCC22001	Subject Name : RESEARCH METHODOLOGY	Ty/Lb/ETL/ EVL	L	T/SLr	P/R	C
	Prerequisite : None	Ty	3	0/0	0/0	3

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES :

- Design and formulation of research problem.
- Analyze research related information and statistical methods in research.
- Carry out research problem individually in a perfect scientific method
- Understand the filing patent applications processes, Patent search, and various tools of IPR, Copyright, and Trademarks

COURSE OUTCOMES (Cos) : (3 – 5)Students completing the course were able to

CO1	Design and Formulation of research problem.
CO2	Analyze research related information and statistical methods in research.
CO3	Carry out research problem individually in a perfect scientific method
CO4	Understand Patent Filing application Process.
CO5	Patent Search and various tools used.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3	2	2	3	3	3	2	1	3	2
CO2	3	2	1	3	3	1	1	1	1	2	3	2	1
CO3	3	3	2	1	2	2	3	3	3	2	3	2	1
CO4	3	3	2	2	1	2	2	2	2	3	2	1	1
CO5	3	3	3	3	3	2	3	3	3	2	1	1	3

Category	Program Core	Program Elective	**Humanities and Social Science**	Open Elective	Skill Enhancing Elective	Inter Disciplinary / Allied	Skill Component	Practical / Project / Internship	Others
			✓						

Subject Code : HMCC22001	Subject Name : RESEARCH METHODOLOGY	Ty/Lb/ETL/EVL	L	T/SLr	P/R	C
	Prerequisite : None	Ty	3	0/0	0/0	3
L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory / Lab / Embedded Theory and Lab						

Unit I **9 Hrs**

Introduction to research, Definitions and characteristics of research, Types of Research, Research Process, Problem definition, Objectives of Research, Research Questions, Research design, Quantitative vs. QualitativeApproach,BuildingandValidatingTheoreticalModels,Exploratoryvs.ConfirmatoryResearch, Experimental vs. Theoretical Research, Importance of reasoning in research.

Unit II **9 Hrs**

ProblemFormulation,UnderstandingModeling&Simulation,LiteratureReview,Referencing,Information Sources, Information Retrieval, Indexing and abstracting services, Citation indexes, Development of Hypothesis, Measurement Systems Analysis, Error Propagation, Validity of experiments, Statistical Design of Experiments, Data/Variable Types & Classification, Data collection, Numerical and Graphical Data Analysis: Sampling, Observation, Interpretation of Results.

Unit III **9 Hrs**

Statistics:Probability&Samplingdistribution,Estimation,MeasuresofcentralTendency,Arithmeticmean, Median, Mode, Standard deviation, Co efficient of variation (Discrete serious and continuous serious), Hypothesis testing & application, Correlation & regression analysis, Orthogonal array, ANOVA, Standard error, Concept of point and interval estimation, Level of significance, Degree of freedom, Analysis of variance, One way and two way classified data, 'F'test.

Unit IV **9 Hrs**

PreparationofDissertationandResearchPapers,Tablesandillustrations,Guidelinesforwritingtheabstract, introduction,methodology,resultsanddiscussion,conclusionsectionsofamanuscript.References,Citation and listing system of documents.

Unit V **9 Hrs**

Intellectual property rights (IPR) patents copyrights Trademarks Industrial design geographical indication. Ethics of Research Scientific Misconduct Forms of Scientific Misconduct. Plagiarism, Unscientific practices in thesis work, Ethics in science.

Total Hrs: 45

Text Books:

1. K. S. Bordens, and B. B.Abbott, , "Research Design and Methods – A Process Approach", 8th Edition, McGraw Hill,2011.
2. C. R. Kothari, "Research Methodology – Methods and Techniques", 2nd Edition, NewAge International Publishers

Subject Code: **HMCF22L01**	Subject Name : **ADVANCED DIGITAL FORENSICS LAB**	**Ty/Lb/ETL**	**L**	**T/S.Lr**	**P/R**	**C**
	Prerequisite: NIL	Lb	0	0/0	4/0	2

L : Lecture T : Tutorial S.Lr : Supervised Learning P : Project R : Research C: Credits
Ty/Lb/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVES :

At the end of the course students will be able to

- Handle electronic evidence using forensic standards
- Examining of File systems
- Acquisition and Analyzing Mobile Data

COURSE OUTCOMES (COs) : (3- 5)

CO1	Learn Cyber Security Fundamentals for Forensic Investigation
CO2	Perform network, mobile and computer forensic analysis using tools
CO3	Demonstrate the ability to design and create models to analyze and interpret data

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	3	1	1	1	1	--	1	--	1
CO2	--	3	3	3	--	2	2	--	--
CO3	1	3	3	3	2	--	2	--	

Mapping of Course Outcomes (COs) with Program Specific Outcomes (PSOs)

COs/PSOs	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	2	1	1
CO2	--	--	2	3
CO3	2	--	3	2

3/2/1 indicates Strength of Correlation 3- High, 2- Medium, 1-Low

Category	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary / Allied	Skill Component	**Practical** / ~~Project~~/ Internship	Others			
								✓				

Subject Code: HMCF22L01	Subject Name	Ty/Lb/ETL	L	T/S.Lr	P/R	C
	ADVANCED DIGITAL FORENSICS LAB	Lb	0	0/0	4/0	2

Schedule subject to Change

1. Cyber Security Fundamentals for Forensic Investigation
2. **FAT32 File systems** - History and background on FAT - Allocation Tables - Directory Entries - Bitmaps - Deleted files and unallocated space
3. **NTFS File Systems** - History & background of NTFS - Master File Table (MFT) - MFT Entries - Deleted Entries - Unallocated space
4. **File sharing**–File sharing logs - Network logs - Advanced BitTorrent Analysis
5. **Executable File Analysis** - Static Analysis - Dynamic Analysis - Virtualization
6. **Email and Internet Analysis** - Web cache, history, bookmarks - Mail header analysis - Email server analysis - Building timelines
7. **Windows Registry** - Registry locations - Windows registry keys and values - Useful registry keys - Automated tools for registry analysis
8. Network forensics analysis using “Xplico “.
9. Perform digital forensics incident response using “CAIN-8”.
10. Perform digital forensics data analysis using “Autopsy”.
11. SIM card analysis data acquisition using SIM card reader.
12. Forensic image analysis using SANS SIFT
13. Mobile data acquisition and analysis using Mobile Check
14. Audio and Video analysis using forensic investigation
15. Documenting Evidence and Reconstructing Evidence

Total Hrs : 45

Subject Code:	Subject Name : **NETWORK TROUBLE SHOOTING AND SECURITY LAB**	Ty/Lb/ETL	L	T/S.Lr	P/R	C
HMCF22L02	Prerequisite: NIL	Lb	0	0/0	4/0	2

L : Lecture T : Tutorial S.Lr : Supervised Learning P : Project R : Research C: Credits
Ty/Lb/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVES :

At the end of the course students will be able to

- Understand networking protocols, and their hierarchical relationship in the context of a conceptual model
- Articulate the threats to CIA and be able to analyze a given architecture, discern vulnerabilities, and recommend physical, logical, or administrative controls to mitigate the threat
- Design an IT infrastructure including devices, topologies, protocols, systems software, management, and security

COURSE OUTCOMES (COs) : (3- 5)

CO1	Demonstrate expertise in configuring host and network level technical security controls, and host firewalls.
CO2	Design user access controls, host logging and network filtering, intrusion detection, and prevention systems
CO3	Demonstrate analytical skills in identifying and troubleshooting networking, security, and performance issues

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3	--	2	--	--	3	--	--	--
CO2	--	3	3	--	--	3	2	--	--
CO3	3	--	2	--	--	3	--	--	3

Mapping of Course Outcomes (COs) with Program Specific Outcomes (PSOs)

COs/PSOs	PSO1	PSO2	PSO3	PSO4
CO1	3	--	1	--
CO2	--	3	3	2
CO3	3	3	2	3

3/2/1 indicates Strength of Correlation 3- High, 2- Medium, 1-Low

Category	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary / Allied	Skill Component	**Practical** / ~~Project / Internship~~	Others			
								✓				

Subject Code: HMCF22L02	Subject Name	Ty/Lb/ETL	L	T/S.Lr	P/R	C
	NETWORK TROUBLE SHOOTING AND SECURITYLAB	Lb	0	0/0	4/0	2

1. Packet and Protocol analysis
2. Detect man-in-the–middle (MitM), denial-of-service (DoS), and advanced persistent threat (APT) attacks.
3. Password Cracking
4. Packet capturing and sniffing
5. Configure User Datagram Protocol(UDP)
6. Configure Transmission Control Protocol(TCP)
7. Configure Dynamic Host Configuration Protocol(DHCP)
8. Configure Domain Name Server (DNS)
9. Configure File Transfer Protocol (FTP) and Hypertext Transfer Protocol (HTTP)
10. Configure SMTP, POP3 and IMAP using relevant software
11. Use Telnet to Login a remote machine
12. Configure Firewalls and IDS

Total Hrs : 45

SEMESTER – II

Subject Code: **HMCF22004**	Subject Name : **SECURITY OF CLOUD COMPUTING**	**Ty/Lb/ETL**	**L**	**T/S.Lr**	**P/R**	**C**
	Prerequisite: NIL	Ty	3	1/0	0/0	4

L : Lecture T : Tutorial S.Lr : Supervised Learning P : Project R : Research C: Credits
Ty/Lb/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVES :

- To give students an overview of the field of Cloud Computing, its enabling technologies, main building block
- To bridge the gaps between traditional and cloud architectures
- To be familiar with the lead players in cloud.

COURSE OUTCOMES (COs) : (3- 5)At the end of this course the students would be able to

CO1	Understand core cloud computing concepts and fundamental principles, including standard delivery models and service designs.
CO2	Understand standard cloud security network designs and architecture models.
CO3	Analyse and design the cloud security strategy for organization.
CO4	Learns the various levels of services that can be achieved by cloud.
CO5	Identify the regulatory requirements an organization need to secure data in the cloud and the strategies in meeting those requirements.

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3	--	--	1	--	--	--	1	2
CO2	3	--	--	2	--	--	--	1	2
CO3	--	3	3	2	--	3	3	--	--
CO4	3	--	--	--	--	--	--	1	2
CO5	--	2	3	2	--	3	3	--	--

Mapping of Course Outcomes (COs) with Program Specific Outcomes (PSOs)

COs/PSOs	PSO1	PSO2	PSO3	PSO4
CO1	3	1	1	--
CO2	3	1	1	--
CO3	--	--	3	3
CO4	3	2	2	--
CO5	--	3	2	2

3/2/1 indicates Strength of Correlation 3- High, 2- Medium, 1-Low

Category	**Program Core**	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary / Allied	Skill Component	Practical / Project / Internship	Others			
	✓											

Subject Code: HMCF22004	Subject Name	Ty/Lb/ETL	L	T/S.Lr	P/R	C
	SECURITY OF CLOUD COMPUTING	Ty	3	1/0	0/0	4

Unit I - Introduction **12Hrs**

Cloud Computing – Network-Centric Computing and Network-Centric Content – Cloud Delivery Models and Defining Attributes – Ethical Issues in Cloud Computing – Cloud Vulnerabilities – Cloud Computing Delivery Models and Services - Amazon Web Services - Evolution of AWS – Google Clouds – Azure and Online Services – Cloud Storage Diversity and Vendor Lock-in – Cloud Computing Interoperability – Service Level Agreements and Compliance Level Agreements – Responsibility Sharing between a User and the CSP – Software Licensing – Major Challenges faced by Cloud Computing – Evolution of Storage Technologies – Storage Models, File Systems and Databases – Distributed File System – General Parallel File System – Google File System - OLTP – Bigtable – Megastore – Storage Reliability at Scale – Disk Locality vs Data Locality – Virtualization – Peer-to-Peer Systems

Unit II - Architecture and Process **12Hrs**

Data, Thread and Task-Level Parallelism – Parallel Architectures – SIMD Architectures; Vector Processing and Multimedia Extensions – Graphic Processing Units – Speedup, Amdhal's Law and Scaled Speedup – Multicore Processor Speedup – Distributed Systems – Soft Modularity vs Enforced Modularity – Layering and Architecture – Concurrency and Cloud Computing – Communication and Concurrency in Computing – Computational Models – Model for Multicore Computing – Process State – Communication Protocols and Process Coordination – Communication, Logical Clocks and Message Deliver Rules – Runs and Cuts – Threads and Activity Coordination – Critical Sections, Locks, Deadlocks and Atomic Actions – Consensus Protocols – Load Balancing – Transformation of Internet - Interconnection Networks for Computer Clouds – Multistage Interconnection Network – Infinib and Myrinet – Network Resource Management algorithms – Content Delivery Networks – Vehicular Ad Hoc Networks

Unit III - Cloud Computing Security Fundamentals **12Hrs**

Cloud Delivery Models - Cloud Deployment Models - Cloud Information Security Objectives - Cloud Security Services - Cloud Security Design Principles - Secure Cloud Software Requirements - Cloud Security Policy Implementation - Secure Cloud Software Testing - Cloud Penetration Testing - Cloud Computing and Business Continuity Planning/Disaster Recovery - The CIA Triad - Privacy and Compliance Risks - Common Threats and Vulnerabilities - Cloud Access Control Issues - Cloud Service Provider Risks - Security Policy Implementation - Computer Security Incident Response Team - Virtualization Security Management - Architectural Considerations - Trusted Cloud Computing - Identity Management and Access Control - Access Control - Autonomic Security

Unit IV Cloud Computing Security **12 Hrs**

Understanding Cloud Computing - The IT Foundation for Cloud - Roots of Cloud Computing - A Brief Primer on Security - Security Architecture - Cloud Is Driving Broad Changes - Cloud Computing: Security Concerns - Assessing Your Risk Tolerance in Cloud Computing - Legal and Regulatory Issues - Security Requirements for the Architecture - Security Patterns and Architectural Elements - Cloud Security Architecture - Planning Key Strategies for Secure Operation - Overview of Data Security in Cloud Computing - Data Encryption: Applications and Limits - Cloud Data Security: Sensitive Data Categorization - Cloud Lock-in

Unit V – Securing Cloud **12Hrs**

Overall Strategy: Effectively Managing Risk - Overview of Security Controls - The Limits of Security Controls - Best Practices - Security Monitoring - Private Clouds - Security Criteria for Ensuring a Private Cloud - Selecting a CSP: Overview of Assurance - Overview of Risks - Security Criteria - Evaluating Cloud Security - Checklists for Evaluating Cloud Security - Metrics for the Checklist - From Architecture to Efficient and Secure Operations - Security Operations Activities

Total Hrs:60

Text Books:

1. Vic (J.R.) Winkler ,"Securing the Cloud Cloud Computer Security Techniques and Tactics", Syngress, 2011, ISBN: 978-1-59749-592-9.
2. Dan C. Marinescu, "Cloud Computing Theory and Practice", Morgan Kaufmann Elsevier Inc, 2018, ISBN: 978-0-12-812810-7.
3. Ronald L. Krutz Russell Dean Vines, "Cloud Security A Comprehensive Guide to Secure Cloud Computing", Wiley Publishing, Inc, 2010, ISBN: 978-0-470-58987-8.

Reference Books:

1. George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud" O'Reilly.
2. James E. Smith, Ravi Nair, "Virtual Machines: Versatile Platforms for Systems and Processes", Elsevier/Morgan Kaufmann, 2005.
3. Katarina Stanoevska-Slabeva, Thomas Wozniak, SantiRistol, "Grid and Cloud Computing – A Business Perspective on Technology and Applications", Springer.
4. Ronald L. Krutz, Russell Dean Vines, "Cloud Security – A comprehensive Guide to Secure Cloud Computing", Wiley – India, 2010.
5. RajkumarBuyya, Christian Vecchiola, S.ThamaraiSelvi, 'Mastering Cloud Computing", TMGH, 2013.

Subject Code: **HMCF22005**	Subject Name : **INFORMATION SECURITY TOOLS AND TECHNOLOGIES**	**Ty/Lb/ETL**	**L**	**T/S.Lr**	**P/R**	**C**
	Prerequisite: NIL	Ty	3	0/0	0/0	3

L : Lecture T : Tutorial S.Lr : Supervised Learning P : Project R : Research C: Credits
Ty/Lb/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVES :

- Covers the theoretical bases for cyber threats and vulnerabilities, and delves into selection and application of penetration testing methodologies
- Covers the main techniques used by computer hackers and penetration testers in order to better defend against intrusions and security violations in live systems.
- Become familiar with the entire penetration testing process including planning, reconnaissance, scanning, exploitation, post-exploitation and result reporting.

COURSE OUTCOMES (COs) : (3- 5)At the end of this course the students would be able to

CO1	Understand different types of vulnerabilities and assessments and perform penetration testing
CO2	Perform risk assessment of hacked or compromised Application, Service, Desktop or a server
CO3	Students understand the basic of vulnerability assessment & penetration testing
CO4	Plan and perform penetration testing and establish robust security to protect an organization's information systems from cyber-attacks
CO5	Identify methodologies to document, report on, and provide a clear roadmap for remediation of exposed security issues.

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3	1	--	--	--	--	--	--	--
CO2	--	3	3	--	--	3	1	--	2
CO3	3	1	--	--	--	--	--	--	--
CO4	--	2	3	--	2	2	2	3	2
CO5	--	2	2	1	1	2	1	1	2

Mapping of Course Outcomes (COs) with Program Specific Outcomes (PSOs)

COs/PSOs	PSO1	PSO2	PSO3	PSO4
CO1	3	1	1	--
CO2	--	3	--	--
CO3	3	1	1	--
CO4	--	--	3	3
CO5	--	3	1	2

3/2/1 indicates Strength of Correlation 3- High, 2- Medium, 1-Low

Category	**Program Core**	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary / Allied	Skill Component	Practical / Project / Internship	Others			
	✓											

Subject Code: **HMCF22005**	**Subject Name**	**Ty/Lb/ETL**	**L**	**T/S.Lr**	**P/R**	**C**
	INFORMATION SECURITY TOOLS AND TECHNOLOGIES	Ty	3	0/0	0/0	3

UnitI - Introduction to Vulnerability Assessment and Penetration Testing **9 Hrs**

What is VA & PT? – Need & Benefits of VA & PT – Types of VA & PT – Application – How is VA & PT performed – Challenges & Limitations of VA & PT – Skillset Required – Ethics

Unit II - Hacking Methodology **9 Hrs**

Hacking Methodology, Process of Malicious Hacking, Footprinting and Scanning: Footprinting, Scanning. Enumeration: Enumeration. System Hacking and Trojans: System Hacking, Trojans and Black Box Vs White Box Techniques

Unit III- Web and Network Hacking Vulnerability Assessment **9 Hrs**

SQL Injection, Hacking Wireless Networking, Viruses, Worms Denial of Service, Sniffers, Session Hijacking and Hacking Web Servers: Session Hijacking, Hacking Web Servers. Web Application Vulnerabilities and Web Techniques Based Password Cracking: Web Application Vulnerabilities, Web Based Password Cracking Techniques

Unit IV- Penetration Testing **9 Hrs**

Pen Testing Strategies - Usefulness of Test Results – Assets Connection Testing – Security Risk Assessment – Manual VS. Automated Testing – Various Tools for PT

Unit V - Report Writing and Mitigation **9 Hrs**

Introduction to Report Writing & Mitigation, requirements for low level reporting & high level reporting of Penetration testing results, Demonstration of vulnerabilities and Mitigation of issues identified including tracking

Total Hrs: 45

Text Books:

1. Mark Dowd, John McDonald, Justin Schuh, "The Art of Software Security Assessment: Identifying and Preventing Software Vulnerabilities", Addison Wesley, 2006.

Reference Books:

1. Georgia Weidman,"Penetration Testing: A Hands-On Introduction to Hacking", No Starch Press, 2014.
2. Felicia M. Nicastro, "Security Patch Management", CRC Press, 2011.
3. Stuart McClure, Joel Scambray, George Kurtz, "Hacking Exposed", 7th Edition, McGraw Hill, 2010.
4. Patrick Engerbrestson, 'Basic of Hacking and Penetration',2010.

Subject Code: **HMCF22006**	Subject Name : **ADVANCED INFORMATION SECURITY**	**Ty/Lb/ETL**	**L**	**T/S.Lr**	**P/R**	**C**
	Prerequisite: NIL	Ty	3	0/0	0/0	3

L : Lecture T : Tutorial S.Lr : Supervised Learning P : Project R : Research C: Credits
Ty/Lb/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVES :

- To enhance technical, communication, problem solving and teaming skills, as they relate to the study of Information Security and Information Assurance.
- Security vulnerabilities that affect operating systems and how they can be mitigated.
- Access controls and authentication as they are used to secure systems and how they can be mitigated.

COURSE OUTCOMES (COs) : (3- 5)At the end of this course the students would be able to

CO1	Understand Digital Rights Management concepts and schemes.
CO2	Analyse security measures implemented in process and memory management.
CO3	Learns the complexity of authentication protocols.
CO4	Identify the protocols to secure information during transmission.
CO5	Introduce security controls in applications.

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	3	--	1	--	--	2	--	--	--
CO2	--	1	3	--	--	3	--	3	--
CO3	3	--	1	--	--	1	--	--	3
CO4	--	2	3	2	--	3	--	--	--
CO5	--	3	3	2	2	3	3	--	--

Mapping of Course Outcomes (COs) with Program Specific Outcomes (PSOs)

COs/PSOs	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	--	1	1
CO2	--	1	1	3
CO3	3	1	1	1
CO4	--	3	1	--
CO5	--	--	3	--

3/2/1 indicates Strength of Correlation 3- High, 2- Medium, 1-Low

Category	**Program Core**	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary / Allied	Skill Component	Practical / Project / Internship	Others			
	✓											

Subject Code: HMCF22006	Subject Name	Ty/Lb/ETL	L	T/S.Lr	P/R	C
	ADVANCED INFORMATION SECURITY	Ty	3	0/0	0/0	3

Unit I – Digital Rights Management **8Hrs**

DigitalRights Management - Meaning of Digital Rights Management (DRM) - Need for DRM and preventing illegal file sharing on the Internet - DRM schemes - Microsoft DRM 2.0, and the Content Scrambling System - Reasons why DRM schemes have been unsuccessful so far - Requirements for a good DRM scheme - secure hardware, secure software, and an efficient legal system

Unit II- Operating System and Security **12Hrs**

Overview of operating systems, functionalities and characteristics of OS - concept of a process, operations on processes, process states, concurrent processes, process control block, process context - Interrupt processing, operating system organization - Job and processor scheduling, scheduling algorithms, process hierarchies - Problems of concurrent processes, critical sections, mutual exclusion, synchronization, deadlock – Inter process Communication (IPC), Message Passing, Direct and Indirect - Deadlock: prevention, detection, avoidance - Memory organisation and management - Virtual memory concepts, paging and segmentation - File organization and directory structure - OS and Security - Security breaches - Types of attacks - Attack prevention methods - Access control lists – support for internet and general network security.

Unit III – Authentication Protocols **8Hrs**

Common Authentication Protocols - Authentication concepts - Various authentication protocols - Password Authentication Protocol (PAP) - Challenge Handshake Authentication Protocol and MS Chap - Extensible Authentication Protocols - Remote Access with RADIUS and TACACS - Single Sign on – Kerberos, SEASAME – Authentication in Wireless networks

Unit IV – Security Protocols **8Hrs**

Real World Protocols – IPSec, SSL, IKH, AH and ESP - Introduction to IPSec - IPSec building blocks - Security Associations (SAs) - Security Parameter Index (SPI) - IPSec Architecture - IPSec Protocols - Authentication Header (AH) - Encapsulation Security Payload (ESP) - Tunneling and Transport Mode - Internet Key Exchange (IKE) – ISAKMP

Unit V – Application Security **9Hrs**

Application System Security - SDLC concepts - Different SDLC and cost estimation models - Testing: types, methods and issues - Program coding and security to be built into it - Software maintenance and change control processes - Configuration management - Software Capability Maturity model (CMM) - DBMS concepts & terms: types, with focus on Relational model - Data dictionary – Interfaces to databases (ODBC, ADOJDBC, XML) - Database security features - User access rights – Database auditing features and logs.

Total Hrs: 45

Text Books:

1. James M. Stewart, Mike Chapple, Darril Gibson, "Certified Information Systems Security Professional Official Study Guide) – CISSP", 7thEdition, Sybex, 2015, ISBN: 978-1-119-04271-6.
2. Thomas R. Peltier, "Information Security Fundamentals", Auerbach Publications; 2nd Edition 29 June 2017, ISBN-13: 978-1138436893.

Reference Books:

1. UmeshNayak, UmeshRao, "The InfoSec Handbook: An Introduction to Information Security", 1st Edition, Apress,10 September 2014¸ISBN-13: 978-143026382.
2. Adam Gordon, "Official (ISC)2 Guide to the CISSP CBK (ISC)", 4th Edition, Auerbach Publications,2015, ISBN-13: 978-1482262759.
3. Jason Andress "The Basics of Information Security: Understanding the Fundamentals of InfoSec in Theory and Practice", 2nd Edition, Syngress,14 July 2014, ISBN-13: 978-0128007440.
4. Michael E. Whitman, Herbert J. Mattord, "Principles of Information Security", 6th Edition, Cengage Learning India Private Limited,2018, ISBN-13: 978-9387994232.
5. John Vacca, "Computer and Information Security Handbook", 3rd Edition, Morgan Kaufman, 2017, ISBN: 9780128038437.
6. Mark Rhodes-Ousley, "Information Security: The Complete Reference", McGraw Hill Education, 2nd Edition,1 May 2013, ISBN-13: 978-1259098345.

Subject Code: HMCC22002	Subject Name: INTELLECTUAL PROPERTY RIGHTS AND PATENT.	Ty/Lb	L	/S.Lr	P/R	C
	Prerequisite: Nil	Ty	3	0/0	0/0	3

T/L/:Theory/Lab L:Lecture T:Tutorial P:Practical/ Project R:ResearchC:Credits

OBJECTIVE: .

- To introduce fundamental aspects of Intellectual property Rights to students who are going to play a major role in development and management of innovative projects in industries.
- To develop expertise in the learners in IPR related issues and sensitize the learners with the emerging issues in IPR and the rationale for the protection of IPR.

COURSEOUTCOMES(COs):The students will be able to

CO1	Imbibe the knowledge of Intellectual Property and its protection through various laws.
CO2	Apply the knowledge of IPR for professional development
CO3	Develop a platform for protection and compliance of Intellectual Property Rights & knowledge
CO4	Create awareness amidst academia and industry of IPR and Copyright compliance
CO5	Deliver the purpose and function of IPR and patenting

Mapping of Course Outcomes with Program Outcomes(POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	3	2	2	2	3	3	2	2	3	1	1
CO2	3	3	1	2	3	2	2	2	3	2	1	3
CO3	3	3	2	2	3	3	2	3	2	2	1	3
CO4	3	3	2	3	2	2	2	1	2	2	2	1
CO5	3	2	1	2	2	2	3	2	2	2	1	1

1/2/3indicatesStrength ofCorrelation1-High,2-Medium,3-Low

Category	Program Core	Program Elective	**Humanities and Social Science**	Open Elective	Skill Enhancing Elective	Inter Disciplinary / Allied	Skill Component	Practical / Project / Internship	Others
			✓						

Subject Code: HMCC22002	Subject Name: INTELLECTUAL PROPERTY RIGHTS AND PATENT.	Ty/Lb	L	/S.Lr	P/R	C
	Prerequisite: Nil	Ty	3	0/0	0/0	3
T/L/:Theory/Lab L:Lecture T:Tutorial P:Practical/ Project R:Research C:Credits						

Unit I **9Hrs**

Introduction to IPRs, Basic concepts and need for Intellectual Property – Meaning and practical aspects of Patents, Copyrights, Geographical Indications, IPR in India and Abroad .Nature of Intellectual Property, Industrial Property, technological Research, Inventions and Innovations – Important examples of IPR.

Unit II **9Hrs**

Intellectual Property Rights. The IPR tool kit, Patents, the patenting process, Patent cooperation treaties: International Treaties and conventions on IPRs: Trade Related Aspects of Intellectual Property Rights Agreement, Patent Cooperation Treaty, Patent Act of India, Patent Amendment Act, Design Act, Trademark Act, Geographical Indication Act.

Unit III **9Hrs**

Intellectual Property Protections IPR of Living Species, protecting inventions in biotechnology, protections of traditional knowledge, biopiracy and documenting traditional knowledge, Digital Innovations and Developments as Knowledge Assets – IP Laws, Cyber Law and Digital Content Protection. Case studies: The basmati rice issue, revocations of turmeric patent, revocation of neem patent.

Unit IV **9Hrs**

Exercising and Enforcing of Intellectual Property Rights Rights of an IPR owner, licensing agreements, criteria for patent infringement. Case studies of patent infringement, IPR – contract, unfair competitions and control, provisions in TRIPS,

Unit V **9Hrs**

Role of Patents in Product Development & Commercialization Recent changes in IPR laws impacting patents and copy rights, intellectual cooperation in the science and allied industry. Patentable and non-patentable research. Case studies .

Total Hrs:45

Text book:

1. Nithyananda, K.V. (2019). Intellectual Property Rights : Protection and Management. India, IN: Cengage Learning India Private Limited.
2. Neeraj, P., &Khusdeep, D. (2014). Intellectual Property Rights. India, IN: PHI learning Private Limited.

References:

1. P.B. Ganguli, Intellectual Property Rights: Unleashing the Knowledge Economy. Tata McGraw Hill, 2001. Steve Smith, The Quality Revolution.1st ed., Jaico Publishing House, 2002.
2. KompalBansal and PraishitBansal. Fundamentals of IPR for Engineers, 1st Edition, BS Publications, 2012.
3. PrabhuddhaGanguli. Intellectual Property Rights. 1st Edition, TMH, 2012.

4. R Radha Krishnan & S Balasubramanian. Intellectual Property Rights. 1st Edition, Excel Books, 2012.

5. M Ashok Kumar &Mohd. Iqbal Ali. Intellectual Property Rights. 2nd Edition, Serial Publications, 2011. VinodV. Scople, Managing Intellectual Property. Prentice Hall of India PvtLtd, 2012.
6. Deborah E. Bouchoux. Intellectual Property: The Law of Trademarks, Copyrights, Patents and Trade Secrets. Cengage Learning, 3rd ed. Edition, 2012.
7. PrabuddhaGanguli. Intellectual Property Rights: Unleashing the Knowledge Economy. McGraw Hill Education, 2011. Edited by Derek Bosworth and Elizabeth Webster.The Management of Intellectual Property. Edward Elgar Publishing Ltd., 2013.
8. Wadhera (2004), Intellectual Property Rights, Universal Law Publishing Co.
9. Ramappa (2010), Intellectual Property Rights Law in India, Asia Law House

E-resources:

1. Subramanian, N., &Sundararaman, M. (2018). Intellectual Property Rights – An Overview. Retrieved from http://www.bdu.ac.in/cells/ipr/docs/ipr-eng-ebook.pdf
2. World Intellectual property Organisation. (2004). WIPO Intellectual property Handbook. Retrieved from https://www.wipo.int/edocs/pubdocs/en/intproperty/489/wipo_pub_489.pdf

Reference Journal:

1. Journal of Intellectual Property Rights (JIPR): NISCAIR

Useful Websites:

1. Cell for IPR Promotion and Management (http://cipam.gov.in/)
2. World Intellectual Property Organisation (https://www.wipo.int/about-ip/en/)
3. Office of the Controller General of Patents, Designs & Trademarks (http://www.ipindia.nic.in/)

Subject Code: **HMCF22L03**	Subject Name : **INFORMATION SECURITY TOOLS AND TECHNOLOGIES LAB**	**Ty/Lb/ETL**	**L**	**T/S.Lr**	**P/R**	**C**
	Prerequisite: NIL	Lb	0	0/0	4/0	2

L : Lecture T : Tutorial S.Lr : Supervised Learning P : Project R : Research C: Credits
Ty/Lb/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVES :

- Students will enhance technical, communication, problem solving and teaming skills, as they relate to the study of Information Security and Information Assurance.
- Students get exposed to cryptography, intrusion detection systems, data firewalls, and malicious software.
- Students will learn about the threats against an organization's digital assets, as well as the tools and methods to mitigate those threats.

COURSE OUTCOMES (COs) : (3- 5)At the end of this course the students would be able to

CO1	Find the security loopholes in a network or software system.
CO2	Assesses gaps and weaknesses in information systems and computer networks.
CO3	Independently present and perform demonstrations of pen-tests

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3	--	2	--	1	2	3	--	1
CO2	3	--	3	2	--	1	--	2	1
CO3	3	3	2	--	2	3	3	--	1

Mapping of Course Outcomes (COs) with Program Specific Outcomes (PSOs)

COs/PSOs	PSO1	PSO2	PSO3	PSO4
CO1	2	3	--	3
CO2	--	3	2	2
CO3	--	--	3	--

3/2/1 indicates Strength of Correlation 3- High, 2- Medium, 1-Low

Category	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary / Allied	Skill Component	**Practical** / ~~Project~~ / Internship	Others			
								✓				

Subject Code: **HMCF22L03**	Subject Name : **INFORMATION SECURITY TOOLS AND TECHNOLOGIES LAB**	**Ty/Lb/ETL**	**L**	**T/S.Lr**	**P/R**	**C**
	Prerequisite: NIL	Lb	0	0/0	4/0	2

1. Monitoring Network Traffic
2. Host & Services Discovery using Nmap
3. Vulnerability Scanning using OpenVAS
4. Internal Penetration Testing
   - Mapping
   - Scanning
   - Gaining access through CVE's
   - Sniffing POP3/FTP/Telnet Passwords
   - ARP Poisoning
   - DNS Poisoning
5. External Penetration Testing
   - Evaluating external Infrastructure
   - Creating topological map & identifying IP address of target
   - Lookup domain registry for IP information
   - Examining use of IPV6 at remote location
6. Dumping Windows Password Hashes
7. Cracking windows Password Hashes
8. Keylogging

Total Hrs: 45

Subject Code: **HMCF22L04**	Subject Name : **ADVANCED INFORMATION SECURITY LAB**	**Ty/Lb/ETL**	**L**	**T/S.Lr**	**P/R**	**C**
	Prerequisite: NIL	Lb	0	0/0	4/0	2

L : Lecture T : Tutorial S.Lr : Supervised Learning P : Project R : Research C: Credits
Ty/Lb/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVES :

At the end of the course students will be able to

- Understands encryption and hashing techniques
- Collect and analyze data
- Understand the characteristics of Digital Certificates

COURSE OUTCOMES (COs) : (3- 5)At the end of this course the students would be able to

CO1	Install and configure software and tools
CO2	Use appropriate tools to evaluate security threats
CO3	Generate and implement digital certificates

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	3	--	--	--	--	3	1	--	1
CO2	2	3	3	--	2	3	1	--	--
CO3	2	3	--	--	--	--	--	--	2

Mapping of Course Outcomes (COs) with Program Specific Outcomes (PSOs)

COs/PSOs	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	1	--
CO2	2	3	1	3
CO3	2	1	3	--

3/2/1 indicates Strength of Correlation 3- High, 2- Medium, 1-Low

Category	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary / Allied	Skill Component	**Practical** / ~~Project / Internship~~	Others			
								✓				

Subject Code: **HMCF22L04**	Subject Name : **ADVANCED INFORMATION SECURITY LAB**	**Ty/Lb/ETL**	**L**	**T/S.Lr**	**P/R**	**C**
	Prerequisite: NIL	Lb	0	0/0	4/0	2
L : Lecture T : Tutorial S.Lr : Supervised Learning P : Project R : Research C: Credits Ty/Lb/ETL : Theory/Lab/Embedded Theory and Lab						

1) Use of security tools like
    a) Freeware Vulnerability Scanners
    b) Freeware Packet Analysers
    c) Disk Editors
    d) Backup Tools
    e) Firewalls
2) Installing typical operating systems and hardening them
3) Identifying missing security patches for typical OS
4) Installing and Configuring anti-virus suites
5) Interpreting email headers
6) Collecting data about internet websites from public sources
7) Exercises in using check digits
8) Simple exercises in encryption and hashing tools and understanding effect of tampering data
9) Obtaining Digital Certificates of a few sites and interpreting their features
10) Generating digital certificates and validating them in a private LAN

Total Hrs: 45

Subject Code: **HMCF22I01**	Subject Name : **SUMMER INTERNSHIP**	**Ty/Lb/ETL**	**L**	**T/S.Lr**	**P/R**	**C**
	Prerequisite: NIL	IE	0	0/0	4/0	2
L : Lecture T : Tutorial S.Lr : Supervised Learning P : Project R : Research C: Credits Ty/Lb/ETL : Theory/Lab/Embedded Theory and Lab						

Students are supposed to undergo internship in related Industries for a minimum period of 30days cumulatively during the semester. They have to prepare a report on the Internship with a certificate in proof from competent authority in the industry. At the end of the semester Viva-Voce examination will be conducted by the Examiners duly appointed by the Head of the department and the students will be evaluated.

SEMESTER – III

Subject Code: **HMCF22007**	Subject Name : **MALWARE ANALYSIS AND SECURITY**	**Ty/Lb/ETL**	**L**	**T/S.Lr**	**P/R**	**C**
	Prerequisite: NIL	Ty	3	1/0	0/0	4

L : Lecture T : Tutorial S.Lr : Supervised Learning P : Project R : Research C: Credits
Ty/Lb/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVES :

- To introduce the fundamentals of malware, types and its effects
- To identify and analyze various malware types
- To deal with detection, analysis, understanding, controlling, and eradication of malware

COURSE OUTCOMES (COs) : (3- 5)At the end of this course the students would be able to

CO1	Understand the concept of malware analysis, types of malware analysis and differentiate malware and a virus
CO2	Learn Dynamic analysis tools and their features, steps involved in dynamic analysis
CO3	Design security strategies withsandboxes and multi-AV scanners
CO4	Identify and correlate information regarding domains, hostnames, and IP addresses
CO5	Analyse the challenges encountered in the field of malware analysis

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	3	--	--	--	--	--	--	--	--
CO2	3	--	--	--	--	--	---	3	2
CO3	--	3	3	--	2	3	3	3	1
CO4	--	--	2	--	--	3	--	--	--
CO5	--	--	--	--	--	3	--	--	--

Mapping of Course Outcomes (COs) with Program Specific Outcomes (PSOs)

COs/PSOs	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	1	2	1
CO2	3	-	1	1
CO3	--	--	3	--
CO4	--	3	2	1
CO5	--	--	--	3

3/2/1 indicates Strength of Correlation 3- High, 2- Medium, 1-Low

Category	**Program Core**	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary / Allied	Skill Component	Practical / Project / Internship	Others			
	✓											

Subject Code: HMCF22007	Subject Name	Ty/Lb/ETL	L	T/S.Lr	P/R	C
	MALWARE ANALYSIS AND SECURITY	Ty	3	1/0	0/0	4

Unit I - Malware Analysis Introduction **12 Hrs**

Malware – Malware Analysis – Why malware analysis - Malware categories – Malware analysis techniques: Static malware analysis – Dynamic Malware Analysis – Analysis tools – Sandbox tools and techniques

UnitII - Static Analysis and Dynamic Analysis **12Hrs**

Identifying file type using manual method, using tools – Hashing – Multiple antivirus scanning – String extraction – File obfuscation – Inspecting PE header information – Comparing and classifying the malware
Monitoring system and networks – dynamic analysis tools: Monitoring with process monitor, viewing processes with process explorer, Comparing registry snapshots with Regshot, Packet sniffing with Wireshark - Dynamic Analysis steps

Unit III- Scanning and Analyzing Malware **12Hrs**

Scanning files with virus total, Jotti, NovirusThanks – Multi-Antivirus Scanner Comparison - Analyzing malware with threat expert, CW sandbox, Anubis - Identifying malware passwords - Bypassing authentication - Advanced malware analysis Virus, Trojan.

Unit IV - Domain and IP addresses research **12Hrs**

Researching domains - WHOIS with Sysinternals on Windows – Resolving DNS hostnames on Windows – Researching IP addresses - Researching with Passive DNS and Other Tools – Performing a reverse IP search with domain tools – Brute force attack – Reverse Brute Force attack

Unit V - Malware Challenges **12Hrs**

Antimalware – Anti malware strategy – Anti malware engine – Common challenges – Scanning approaches - Virtual environment - Live internet connection - Real, fake, and virtual services -Anti-debug

Total Hrs: 60

Text Books:

1. Monnappa K A, “Learning Malware Analysis”, Packt Publishing, 2018, ISBN 978-1-78839-250-1.

Reference Books:

1. Michael Hale Ligh, Steven Adair,BlakeHartstein, Matthew Richard, “Malware Analyst’s Cookbook and DVD: Tools and Techniques for Fighting Malicious Code”, by Wiley Publishing, 2011, ISBN: 978-0-470-61303.
2. Cameron H. Malin, Eoghan Casey, James M. Aquilina, Curtis W . Rose, “Malware Forensics Field Guide for Windows Systems”, Elsevier, 2012, ISBN: 978-1-59749-472.
3. M. Sikorski and A. Honig, “Practical Malware Analysis: The Hands-on Guide to Dissecting Malicious Software”, San Francisco: No Starch Press San Francisco, CA, 2012, ISBN No: 978-1-59-327290-6.
4. Gerard Johansen, “Digital Forensics and Incident Response”, Packt Publishing, 2017, ISBN 978-1-78728-868-3.
5. Victor Marak, “Windows Malware Analysis Essentials”, Packt Publishing, 2015, ISBN 978-1-78528-151-8.
6. MihaiChristodorescuSomeshJha, DouglasMaughan, Dawn Song, Cliff Wang, “Malware Detection”, Springer, 2007¸ISBN-13: 978-0-387-32720-4.

Subject Code: **HMCF22008**	Subject Name : **CYBER CRIMINOLOGY AND LAW ENFORCEMENT**	**Ty/Lb/ETL**	**L**	**T/S.Lr**	**P/R**	**C**
	Prerequisite: NIL	Ty	3	0/0	0/0	3

L : Lecture T : Tutorial S.Lr : Supervised Learning P : Project R : Research C: Credits
Ty/Lb/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVES :

This paper will provide a detailed knowledge on:

- Cyber Crime behaviour and the concepts of Cyber Crime
- Forms of Cyber Crime
- Cyber Crime modus operandi

COURSE OUTCOMES (COs) : (3- 5)At the end of this course the students would be able to

CO1	Introduces Cyber Crime and Cyber Criminology
CO2	Explains different forms of Cyber Crimes
CO3	Describe the theories of Cyber Crime
CO4	Describe Cyber Crime Behaviour
CO5	Maintain public order and safety enforce the law, and prevent, detect, and investigate criminal activities.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3	--	--	--	2	--	--	--	--
CO2	3	--	--	--	2	--	--	--	--
CO3	3	--	--	--	2	2	--	--	1
CO4	3	--	--	--	2	2	--	--	1
CO5	-	3	2	1	2	3	--	--	--

Mapping of Course Outcomes with Program Specific Outcomes (PSOs)

COs/PSOs	PSO1	PSO2	PSO3	PSO4
CO1	3	1	1	--
CO2	3	1	1	--
CO3	3	2	1	--
CO4	3	2	1	--
CO5	3	--	3	--

3/2/1 indicates Strength of Correlation 3- High, 2- Medium, 1-Low

Category	**Program Core**	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary / Allied	Skill Component	Practical / Project / Internship	Others			
	✓											

Subject Code: HMCF22008	Subject Name	Ty/Lb/ETL	L	T/S.Lr	P/R	C
	CYBER CRIMINOLOGY AND LAW ENFORCEMENT	Ty	3	0/0	0/0	3

Unit I – Introduction **8Hrs**

Understanding Crime and Concepts of Crime: Definitions of Crime, Cyber Crime, Cyber Criminology, Tort, Misdemeanour, Felony, Elements of Crime – Actus Reus and Mens Rea, Cyber Security, Cyber Forensics, Information Security Auditing, Governance Risk and Compliances, Embedded Security Systems, Uniqueness of Cyber Crimes.

Unit II -Types and Classification of Crimes **11Hrs**

Classification from Indian Penal Code: Crimes Against Persons, Crimes Against Properties, Crimes Against the Nation – Theft, Robbery, Dacoity, Burglary, Criminal Misappropriation, Criminal Breach of Trust, Arson, Vandalism, Chain Snatching, Pick Pocketing, Murder, Rape, Hurt, Grievous Hurt, Culpable Homicide Not Amounting to Murder, Terrorism, Nuisance, Offences Against Public Tranquillity, Unlawful Assembly., Special Crimes – Child and Woman Trafficking, Organized Crimes, Terrorism, Corruption, Money Laundering, Economic Offences, Media Crimes, White Collar Crimes.

Unit III – Theories of Crime **9 Hrs**

Cyber Criminal Behaviour – Types of Cyber Criminals – Theories relating to Cyber Criminal Behaviour – Sociological Theories: Sutherland's Differential Association Theory, Broken Window Theory, Rational Choice Theory, Routine Activity Theory, Opportunity Structure Theory, Travis Hirschi's Social Bond Theory, Law of Imitation Theory by Gabriel Tarde, Social Learning Theory of Albert Bandura, Techniques of Neutralization Theory by David Matza.

Unit IV - Cyber Criminal Behaviour **8Hrs**

Psychological Theories – Motivation: Maslow's Theory of Hierarchy, Frustration, Personality theories – Sigmund Freud's Theory, Erickson's Theory, Theories of Intelligence, IQ, EQ and its relationship with cybercrimes, Understanding Emotions and Types of Emotions, Criminal Psychology.

Unit V - Law Enforcement **9 Hrs**

Understanding Law Enforcement – Three Pillars of Criminal Justice System – Police, Judiciary, Correctional Agencies – Police: Definition, Functions and Duties of Police, Hierarchy of Police – State and Central, Powers of Police, Police and Investigation, Records maintained In a Police Station – FIR, Charge Sheet, Cyber Crime Police Stations, Judiciary – Courts, Hierarchy of Courts, Functions of Courts, Special Courts, Cyber Appellate Tribunals, Trial, Examination and Cross Examination in the Courts, Functionaries in a Court.

Total Hrs: 45

Text Books:

1. Prof .V Paranjape, "Criminology, Penology and Victimology", Central Law Publication, Paperback, 2017
2. Ram Ahuja, "Criminology", Rawat Publication, Reprinted 2015
3. Mohamed Chawki, Ashraf Darwish, Mohammad Ayoub Khan, SapnaTyagi, "Cybercrime, Digital Forensics and Jurisdiction" Springer; 2015 edition (23 March 2015), ISBN-13**:** 978-3319151496
4. Chuck Easttom, "Computer Crime, Investigation, and the Law", Paperack Edition Delmar Cengage Learning, 2010

Reference Books:

1. *Burke, Roger Hopkins, "Introduction to Criminological Theory", Willan Publishing; 4th New edition, 2013*
2. *Srivastava S S, "Criminology and Criminal Administration", Central Law Agency, New Delhi, Paperback, 2017*

Subject Code: **HMCF22009**	Subject Name : **APPLICATION SECURITY**	**Ty/Lb/ETL**	**L**	**T/S.Lr**	**P/R**	**C**
	Prerequisite: NIL	Ty	3	0/0	0/0	3

L : Lecture T : Tutorial S.Lr : Supervised Learning P : Project R : Research C: Credits
Ty/Lb/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVES :

- Understand hacking methods
- Learn various biometric and payment modes
- Implement mobile application
- Handle logs

COURSE OUTCOMES (COs) : (3- 5)At the end of this course the students would be able to	
CO1	Understands various hacking methods and countermeasures.
CO2	Identify the security technologies for securing application
CO3	Design security policy for survival of applications
CO4	Design secured mobile applications
CO5	Use tools and software to analyse issues and report

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	3	1	1	--	1	--	--	--	2
CO2	--	1	2	2	2	2	--	--	--
CO3	--	3	1	--	--	3	3	--	--
CO4	--	3	1	--	--	3	3	--	--
CO5	1	1	3	--	--	2	--	--	1

Mapping of Course Outcomes (COs) with Program Specific Outcomes (PSOs)

COs/PSOs	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	1	1	1
CO2	--	3	3	2
CO3	--	2	3	--
CO4	--	2	3	--
CO5	1	1	--	3

3/2/1 indicates Strength of Correlation 3- High, 2- Medium, 1-Low

Category	**Program Core**	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary / Allied	Skill Component	Practical / Project / Internship	Others			
	✓											

Subject Code: HMCF22009	Subject Name	Ty/Lb/ETL	L	T/S.Lr	P/R	C
	APPLICATION SECURITY	Ty	3	0/0	0/0	3

Unit I– Application Hacking and Countermeasures **12Hrs**

Session hacking and countermeasures – Introduction to Hacking Web Servers – Sources of Security Vulnerabilities in Web Servers – Web Site Defacement – Attacks against Internet Information Services – IIS 7 Components – Patch Management – Vulnerability Scanners – Web Application Hacking Tools – Web-Based Password Cracking Techniques – Authentication Techniques - Password Cracking – Tools – Introduction to Hacking Web Browsers – Working of Web Browsers – Hacking Firefox –Firefox Security – Hacking Internet Explorer – Internet Explorer Security – Hacking Opera – Opera Security and Privacy Features – Hacking Safari – Securing Safari – Hacking Database Systems – Attacking Oracle – Breaking into an Oracle Database – Hacking an SQL Server – Security Tools – Security Checklist

Unit II - Securing Point of Sale **8Hrs**

Processing Payment Transactions – Payment Application Architecture – PCI – Plastic Cards – Penetrating Security Free Zones – Breaking into PCI-protected area – Protecting Cardholder Data – Securing Application Code

Unit III- Biometric Applications Security **8Hrs**

Overview of Biometric Technologies – Biometric Measurements – Applications of Biometrics – Securing Biometric Applications – Critical Evaluation and Discussion

Unit IV - Mobile Application Security **9 Hrs**

Top Issues Facing Mobile Devices – Secure Mobile Application Development – Android Security – Apple iPhone – Blackberry Security – SymbianOS Security – WebOS Security – WAP and Mobile HTML Security – Bluetooth Security – SMS Security

UnitV - Log Management **8Hrs**

Issues in Log Analysis – IDS Reporting – Firewall Reporting – Creating a Reporting Infrastructure – Managing Log Files with Log Parser – Managing Intrusions with Log Parser – Managing Snort Alerts with Microsoft Log Parser

Total Hrs: 45

Text Books:

1. EC-Council,"Ethical Hacking & Countermeasures: Web Applications & Data Servers", EC-Council Press Series, ISBN: 978-1435483620.
2. SlavaGomzin, "Hacking Point of Sale: Payment Application Secrets, Threats and Solutions", Wiley.
3. Charles A. Shoniregun, Stephen Crosier, "Securing Biometrics Applications", Springer, 2008, ISBN-13: 978-0-387-69932-5.
4. HimanshuDwivedi, Chris Clark, Davie Thiel, "Mobile Application Security", The McGraw-Hill Companies, 2010, ISBN: 978-0-07-163357-4.

Reference Books:

1. Jacob Babbin, Dave Kleimann, Dr. Everett FCarter, Jr Mark Burnett, Esteban Gutierrez, "Security Log Management: Identifying Patterns in the Chaos", Syngress Publishing, Inc., 2006, ISBN: 1-59749-042-3.
2. Leon Shklar, Rich Rosen, " Web Application Architecture: Principles, Protocols and Practices"

Subject Code: **HMCF22010**	Subject Name : **EMAIL SECURITY AND FORENSICS**	**Ty/Lb/ETL**	**L**	**T/S.Lr**	**P/R**	**C**
	Prerequisite: NIL	Ty	3	0/0	0/0	3

L : Lecture T : Tutorial S.Lr : Supervised Learning P : Project R : Research C: Credits
Ty/Lb/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVES :

This paper will help a student to understand:

- The Email infrastructure and its components.
- The Email etiquette, Corporate practices and policies.
- The Email security, attacks and email related crimes.
- The Email Forensics and email header analysis.

COURSE OUTCOMES (COs) : (3- 5)At the end of this course the students would be able to

CO1	To guide students in leveraging the unique features and functionality of Email Security to implement breach prevention against a broad spectrum of cyber threats that use email as a vector.
CO2	Learn the role of email security in the workplace as well as why it's important and how to keep staff and the organisation protected
CO3	Assess email security detection capabilities and benefits of Email Security
CO4	Review common email frauds, crimes and attack methods
CO5	Demonstrate knowledge of the email analysis process

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	3	--	--	--	2	--	1	--	--
CO2	3	--	1	--	--	3	--	--	1
CO3	--	2	1	--	--	--	--	--	--
CO4	--	2	2	--	--	--	--	--	--
CO5	3	1	3	--	--	--	--	--	--

Mapping of Course Outcomes (COs) with Program Specific Outcomes (PSOs)

COs/PSOs	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	--	3	--
CO2	3	1	--	--
CO3	--	3	2	2
CO4	2	3	1	2
CO5	3	1	--	3

3/2/1 indicates Strength of Correlation 3- High, 2- Medium, 1-Low

Category	**Program Core**	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary / Allied	Skill Component	Practical / Project / Internship	Others			
	✓											

Subject Code: HMCF22010	Subject Name	Ty/Lb/ETL	L	T/S.Lr	P/R	C
	EMAIL SECURITY AND FORENSICS	Ty	3	0/0	0/0	3

UnitI - Introduction to Email **9 Hrs**

Evolution of Communication System – Postal Communication System – Analogy of Email System - How email system works? – The role of Mail User Agent, Mail Delivery Agent, Mail Transfer Agent, and DNS Servers - An overview of various protocols SMTP, POP, IMAP - involved in a typical email infrastructure – Characteristics of an Email - Advantages of Email communication system.

Unit II - Email Etiquette and Corporate Practices **10 Hrs**

Significance of Email etiquette – Standard fonts and formatting – Subject Line – Professional email address – Greetings message – Introduction – Culture – Reply All options – Use of sentence case – Email attachments – Proof read – Be positive – Revert as soon as possible – Professional tone – Recipient ID validation – Beware of Malicious and shorten URLs – Configuring email signatures, Out of Office – Auto replies – Email Policies and corporate practices – Personal Use – Misuse of email infrastructure – DLP – Data Leak Prevention / Data Loss Prevention Policy – Email Archive.

Unit III - E-mail Security **11 Hrs**

A brief introduction to security issues relevant to emails as well as the typical email infrastructure - Entities in an Email infrastructure - Risks to an Email infrastructure – Threats, Vulnerabilities, Exploits and Impact with respect to Email Users, Mail clients, Mail Server, Email Protocols - SMTP, IMAP4 and POP3 - How to secure the email infrastructure – Management Controls, Operational Controls, Technical Controls with suitable examples for Confidentiality, Integrity and Availability – Implementation of controls to secure the email infrastructure – Information asset classification and handling – Physical protection – Securing email server applications. Transmission and supporting operating environment.

Unit IV - Email Frauds and Crimes **7 Hrs**

Email related crimes – Email Spoofing – Email Phishing and Countermeasures – Email Bombing – Spam Emails – Email Frauds – Email Hacking – Spreading malicious codes through Emails and Countermeasures – Nigerian Fraud – Defamatory emails – Threatening Emails – Case studies.

Unit V - Email Forensics **8 Hrs**

IP address management - IANA – WHOIS.com – Regional Internet Registries - Understanding message headers – Email Header Analysis – Online Email tracer tool – MX Tool Box Email Header analysis – SPF – DKIM – DMARC – How to identify spoofed emails – Origin hostname, IP address trace and validation – Email traversal path analysis – Date and time stamp analysis – Email attachment analysis - Email Investigation – Case studies – The Offer of Money – The Alert – Phishing Email – The Inside Scoop – The Masked Email – The Big Lie – The Little Lie.

Total Hrs: 45

Text Books:

1. Tony Bradley and Harlan Carvey, “Essential Computer Security: Everyone’s Guide to E-Mail, Internet and Wireless Security”,Syngress,2006, ISBN:1-59749-114-4.
2. Bill Nelson, Amelia Phillips and Chris Steuart, “Guide to Computer Forensics and Investigations”, 5th Edition, Cengage Learning, 2016, ISBN:978-1-285-06003-3.

Subject Code: **HMOL22IE1**	Subject Name : **OPEN ELECTIVE (SELF STUDY PAPER) – SWAYAM / NPTEL / ANY MOOC**	**Ty/Lb/ETL**	**L**	**T/S.Lr**	**P/R**	**C**
	Prerequisite: NIL	IE	3	0/0	0/0	3
L : Lecture T : Tutorial S.Lr : Supervised Learning P : Project R : Research C: Credits Ty/Lb/ETL : Theory/Lab/Embedded Theory and Lab						

Open Elective (On Line Course through NPTEL/SWAYAM/Any MOOC)

Students should register for the online course with a minimum course duration of 8 weeks through the online portals such as NPTEL/SWAYAM/Any MOOC in the beginning of the semester. The course can be core/interdisciplinary in such a way that the same course is not repeated during the course of study.

Students are expected to attend the online classes regularly and submit the weekly assignments before the due dates. Students should appear for the online examination and submit the certificate at the end of the semester. Internal examination will be conducted by the examiners duly appointed by the head of the department.

Subject Code: **HMCF22I02**	Subject Name : **PROJECT PHASE 1**	**Ty/Lb/ETL**	**L**	**T/S.Lr**	**P/R**	**C**
	Prerequisite: NIL	IE	0	0/0	4/0	2
L : Lecture T : Tutorial S.Lr : Supervised Learning P : Project R : Research C: Credits Ty/Lb/ETL : Theory/Lab/Embedded Theory and Lab						

Students are expected to do the Project individually. They should identify the area/topic of the Project and should collect the literatures related to the project. Students intending to do Industrial projects will approach the industries with the support of the university, identify the industrial problem and finalize the project. In case of Industrial projects apart from Industry guide, an internal guide has to be appointed by the department. At the end of the Semester the students should submit their Project Phase - I report to the Department and Viva -Voce examination will be conducted by the examiners duly appointed by the Head of the department.

SEMESTER – IV

Subject Code: **HMCF22L05**	Subject Name : **PROJECT PHASE 1I**	**Ty/Lb/ETL**	**L**	**T/S.Lr**	**P/R**	**C**
	Prerequisite: NIL	Lb	0	0/0	18/0	9
L : Lecture T : Tutorial S.Lr : Supervised Learning P : Project R : Research C: Credits Ty/Lb/ETL : Theory/Lab/Embedded Theory and Lab						

MAJOR PROJECT

To make the students to make use of the knowledge and skill developed during their four years of study and to apply them for making an innovative product/process for the development of society and industries.

Students are expected to do a Project work either in an Industry or at the University in the field of relevant field /inter-disciplinary /multi-disciplinary area . The work to be carried out in Phase II should be continuation of Phase I. Each student will be allotted a guide based on the area of Project work. In case of industrial Project external guide has to be allotted from Industry. Inter disciplinary/multi-disciplinary project can be done with guidance of relevant department. Monthly reviews will be conducted during the semester to monitor the progress of the project by the project review committee. Students have to submit the Project thesis at the end of the semester and appear for the Project Viva-Voce examination conducted by the examiners duly appointed by the Controller of Examination. In case of industrial project certificate in proof has to be included in the report along with the bonafide certificate.

Subject Code: **HMCF22I03**	Subject Name : **RESEARCH PUBLICATION**	**Ty/Lb/ETL**	**L**	**T/S.Lr**	**P/R**	**C**
	Prerequisite: NIL	IE	0	0/0	4/0	2
L : Lecture T : Tutorial S.Lr : Supervised Learning P : Project R : Research C: Credits Ty/Lb/ETL : Theory/Lab/Embedded Theory and Lab						

Students are supposed to prepare and publish the article based on either his term paper or area of research in peer reviewed referred journal. Code of research publication ethics should be followed. After publishing the article students should present a seminar in presence of department faculties and PG students. At the end of semester viva examination will be conducted by the examiners appointed by the Head of the department.

ELECTIVE I

Subject Code: **HMCF22E01**	Subject Name : **FORENSIC SCIENCE AND CRIME INVESTIGATION**	**Ty/Lb/ETL**	**L**	**T/S.Lr**	**P/R**	**C**
	Prerequisite: NIL	Ty	3	0/0	0/0	3

L : Lecture T : Tutorial S.Lr : Supervised Learning P : Project R : Research C: Credits
Ty/Lb/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVES :

1. To understand the history and development of forensic science.
2. To understand the roles of different types of professionals involved in evaluating a crime scene, analysis of crime exhibits and expert witness.
3. To understand the methodology to collect, preserve and present evidence in a professional (courtroom) setting.

COURSE OUTCOMES (COs) : (3- 5)

CO1	Understand the history of the forensic sciences and the aspects of the justice system followed.
CO2	Assess a crime scene and collecting the evidence
CO3	Learn the methodology of collecting sample, interpreting data, avoiding contamination, and preservation of chain of custody
CO4	Define the importance pertaining to forensic examination
CO5	Present evidence in a professional (courtroom) setting

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	3	--	1	--	--	--	--	--	1
CO2	--	--	3	--	2	2	2	--	1
CO3	3	--	1	--	--	--	--	--	1
CO4	--	--	--	--	--	--	--	--	--
CO5	--	2	--	2	3	2	3	--	--

Mapping of Course Outcomes (COs) with Program Specific Outcomes (PSOs)

COs/PSOs	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	1	--	--
CO2	--	3	2	2
CO3	3	--	3	1
CO4	--	--	--	--
CO5	--	--	1	--

3/2/1 indicates Strength of Correlation 3- High, 2- Medium, 1-Low

Category	**Program Core**	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary / Allied	Skill Component	Practical / Project / Internship	Others			
	✓											

Subject Code: HMCF22E01	Subject Name	Ty/Lb/ETL	L	T/S.Lr	P/R	C
	FORENSIC SCIENCE AND CRIME INVESTIGATION	Ty	3	0/0	0/0	3

Unit I - Introduction to Forensic Science **9 Hrs**

History and Development of Forensic Science - Functions of the Forensic Scientist –Divisions of Forensic Science – Forensic Setup in India - Evolving Forensic Science Services- Role of forensic expert in the court of law - Aspects of the Criminal Justice System - Aspects of Trials.

Unit II- Crime Scene Investigation **9 Hrs**

:Concepts – Nature and type of crime scene – Crime scene search methods: Recovery and packaging of evidences – Crime scene documentation - Preservation of evidences – National and International scenario on crime scene investigation – Physical evidences

Unit III - Crime Scene Reconstruction (CSR) **10 Hrs**

Nature and importance of CSR– Basic principles and stages involved – Types and classification of reconstruction – Pattern evidence and shooting scene reconstruction – Manual and computer -assisted reconstruction of BPA – Role of logic in CSR – Writing a reconstruction report – Correlation of crime scene analysis with behavioural analysis – Cases of special importance pertaining to forensic examination

Unit IV- Forensic Analysis **7 Hrs**

Basics of Forensic Biology – Forensic Serology – DNA Typing – Forensic Chemistry – Forensic Toxicology – Forensic Medicine.

Unit V- Cyber Crime & Computer Forensics **10 Hrs**

How Does the Computer Work - How Data Is Stored -Processing the Electronic Crime Scene - Evidentiary Data– Cyber Crimes –Computer Crime Scene Investigation – Computer Forensic Analysis – - Voice identification – Forensic Psychology –Polygraph - Narco - analysis – Brain fingerprinting – Criminal profiling and their legal status in India

Total Hrs: 45

Text Books:

1. Stuart H. James and Jon J. Nordby, Suzanne Bell "Forensic Science: An Introduction to Scientific and Investigative Techniques", 4th Edition, CRC Press, ISBN-13: 978-1439853832, 4 September 2015

Reference Books:

1. Safarstein R, "Criminalistics – An Introduction to Forensic Science", Pearson, 11thEdition,26 June 2014, ISBN-13: 978-1292062020.
2. Jaising P. Modi, Justice K Kannan, "A text book of medical jurisprudence and toxicology", LexiNexis; 26th Edition, 10 April 2018, ISBN-13: 978-9386515438.
3. Albert J. Marcellaa and Robert S. Greenfiled, "Cyber Forensics, A Field Manual for collecting, examining and preserving evidence of computer crimes", 2nd Edition, 19 December 2010, Auerbach publications.
4. Peter Stephenson, Keith Gilbert, "Investigating Computer-Related Crime", 2nd Edition, Routledge, 5 June 2013, ISBN-13: 978-0849319730.
5. Stuart James, "Studyguide for Forensic Science: An Introduction to Scientific and Investigative Techniques", Cram101, 2013, ISBN-13: 978-1490278629.

Subject Code: **HMCF22E02**	Subject Name : **BANK FRAUDS AND COUNTERMEASURES**	**Ty/Lb/ETL**	**L**	**T/S.Lr**	**P/R**	**C**
	Prerequisite: NIL	Ty	3	0/0	0/0	3

L : Lecture T : Tutorial S.Lr : Supervised Learning P : Project R : Research C: Credits
Ty/Lb/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVES :

- To educate the various causes responsible for banks frauds.
- To spread awareness of fraud and risks that could cause great harm and losses to financial organizations.
- To build confidently in students to accept higher roles and responsibilities requiring close supervision of end-to-end operations to prevent fraud

COURSE OUTCOMES (COs) : (3- 5)

CO1	Understand how bank frauds, Credit frauds and Money laundering are organised
CO2	Examines the issue of frauds from the perspective of banking industry, credit frauds and money laundering methods in existing application
CO3	Identify suitable countermeasures for Bank frauds
CO4	Secure Mobile Application
CO5	Design security system to protect bank accounts and assets

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	3	1	1	1	1	--	--	--	2
CO2	2	--	--	2	1	--	--	1	2
CO3	--	--	3	2	2	--	--	--	2
CO4	--	3	3	3	3	3	--	--	--
CO5	1	3	3	3	3	3	3	--	--

Mapping of Course Outcomes (COs) with Program Specific Outcomes (PSOs)

COs/PSOs	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	1	1	1
CO2	--	--	1	3
CO3	--	3	2	2
CO4	--	2	3	2
CO5	--	2	3	2

3/2/1 indicates Strength of Correlation 3- High, 2- Medium, 1-Low

Category	Program Core	**Program Elective**	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary / Allied	Skill Component	Practical / Project / Internship	Others			
		✓										

Subject Code: HMCF22E02	Subject Name	Ty/Lb/ETL	L	T/S.Lr	P/R	C
	BANK FRAUDS AND COUNTERMEASURES	Ty	3	0/0	0/0	3

Unit I –Bank Frauds **9 Hrs**

Bank Fraud - Bank Document Frauds – Material Alteration in Bank Frauds – Cheque Frauds – Paper Currency Frauds - Credit Fraud – Application Fraud – Car Not Present Fraud - Compromised Credit Card Fraud – Financial Trojans - Phishing – Pretexting Dumpster Diving – Threats against Financial Institutes – Phishing, Spamming and Scamming to Steal Data and Money – Malware Plague – Vulnerabilities and Exploits - Vulnerable Networks and Services

Unit II –Credit Card Fraud **9 Hrs**

Protection for a Customer or Client – Protection for Merchant or Service Provider –Fraud Prevention Techniques: Address Verification Services – Advanced Address Verification – Age Verification – Authorization – Biometrics – Card Security Schemes – Charge Verification – Consumer Authentication – Credit Check – Deposit Check – Denied Party Cheek – Fraud Scoring – Geolocation - Velocity of Use – Velocity of Change

Unit III –Money Laundering **9 Hrs**

Money Laundering – Process of Money Laundering - Money Laundering Methods – Management and Money Laundering Deterrence - Money Laundering Detection Methods – Suspicious Transaction Types – Unusual Transactions - Organizations Dealing with Money Laundering – Risk - Measures for Preventing Money Laundering – Investigating Suspicions –Ongoing Monitoring – Recording Keeping – Money Laundering Deterrence Software

Unit IV - Mobile Banking Fraud **9 Hrs**

Mobile Commerce – Mobile Technology and Security - Mobile Payment – Mobile Money Ecosystem - Mobile Device Security – Architectures and Models for Mobile Payment Systems – Security in Mobile Payment Systems – Building Trust into Mobile Payments – Designing Successful Payment Interactions – Adding Value with Peripheral Services

Unit V –Bank Fraud Countermeasures **9 Hrs**

Securing the Perimeter and Protecting the Assets – Threat and Vulnerability Management – Audit, Risk Management, and Incident Handling - Encryption and Cryptography for Protecting Data and Services - Block chain – AI and Cyber security – Digital Identification – Privacy Protecting Techniques – Privacy Protecting Technologies – Web Server Security – Host Security for Servers – SSL Server Certificates – Client Side Digital Certificates

Total Hours: 45

Text Books

1. ErdalOzkaya, MiladAslander, “Hands-on Cybersecurity for Finance”, Packt Publishing, 2019, ISBN: 9781788836296
2. JesúsTéllez, SheraliZeadally, “Mobile Payment Systems: Secure Network Architectures and Protocols (Computer Communications and Networks)”, 2017, ISBN-13 : 978-3319794440
3. Jen Grondahl Lee, Gini Graham Scot , “Preventing Credit Card Fraud: A Complete Guide for Everyone from Merchants to Consumers,” Rowman and Littlefield, 2017, ISBN-13: 978-1442267992
4. Dennis Cox, “Handbook of Anti-Money Laundering,” Wiley, 2014, ISBN: 9780470065747

Reference Books

1. Skip Allums, “Designing Mobile Payment Experiences,” O’Reilly Media, Inc., 2014, ISBN: 9781449366193
2. SimsonGarfinkel, “Web Security, Privacy & Commerce 2E: Security for Users, Administrators and ISPs,” O’Reilly Media. Inc., 2001, ISBN:9780596000455

3. Milan Frankl, AyseEbruKurcer, "Money Laundering and Terrorist Financing Activities," Business Expert Press, 2016, ISBN: 9781631575945
4. David A. Montague, "Fraud Prevention Techniques for Credit Card Fraud," 2004, ISBN-13 : 978-1412014601

Subject Code: **HMCF22E03**	Subject Name : **WEB APPLICATION SECURITY**	**Ty/Lb/ETL**	**L**	**T/S.Lr**	**P/R**	**C**
	Prerequisite: NIL	Ty	3	0/0	0/0	3

L : Lecture T : Tutorial S.Lr : Supervised Learning P : Project R : Research C: Credits
Ty/Lb/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVES :

- To explain the fundamental techniques adopted in developing secure web based applications.
- To identify the vulnerabilities of web based applications and to protect those applications from attacks
- To understand security-related issues in Web-based systems and applications.

COURSE OUTCOMES (COs) : (3- 5)

CO1	Understand the fundamentals of web application, web security vulnerabilities and principlesand also learn some popular methods of classifying threats and prioritizing them on risk factors.
CO2	Students will learn and be able to apply computer security concepts to designing a web application which is robust to known and unknown attacks.
CO3	Students detect all underlying flaws, such as functional disparities, security breaches, vulnerability assessment, and authentication and authorization management.
CO4	Develop a security strategy and solution for securing web-based applications.
CO5	Integrate application security tools into application development environment and make this process and workflow simpler and more effective.

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3	1	1	1	1	--	--	--	1
CO2	3	3	2	--	1	--	--	--	1
CO3	--	--	3	1	2	3	--	--	2
CO4	--	--	3	3	3	3	3	--	--
CO5	--	3	2	3	3	3	2	3	2

Mapping of Course Outcomes (COs) with Program Specific Outcomes (PSOs)

COs/PSOs	PSO1	PSO2	PSO3	PSO4
CO1	3	1	1	1
CO2	3	--	2	--
CO3	--	3	2	--
CO4	--	--	3	2
CO5	--	--	3	3

3/2/1 indicates Strength of Correlation 3- High, 2- Medium, 1-Low

Category	Program Core	**Program Elective**	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary / Allied	Skill Component	Practical / Project / Internship	Others			
		✓										

Subject Code: **HMCF22E03**	**Subject Name**	**Ty/Lb/ETL**	**L**	**T/S.Lr**	**P/R**	**C**
	WEB APPLICATION SECURITY	Ty	3	0/0	0/0	3

Unit I - Introduction to Web application Security **6 Hrs**

Introduction – Web Application Architecture – **Methodology of Web Hacking:** Profiling - Hacking Web Servers – Surveying the Application

Unit II - Methodology of Web Hacking **9 Hrs**

Authentication – Authorisation – Attacking Session Management – Input Validation Attacks– Attacking Web Data stores –Attacking Web Services – Hacking Web Application Management – Web Client Hacking

Unit III – Understanding Risk Factors **12 Hrs**

Web Application Security Terminology – Risk Calculating Models – DREAD – Sources of Web Application Security Vulnerability Information – Testing Process –Vulnerability Assessment – Fully Automated Testing –Manual Testing – Securing Authentication – Penetration Testing – Postremediation Testing – **Understanding the risk due to:** Lack of Sufficient Authentication– Weak Session Management – Submitting information using GET Method – Weak Access Control – Cookies roles –Weak Input Validation at the Application Level – Injection Flaws – Unauthorized View of Data – Cross-site scripting Attacks – Denial of Service Attack – Storage of Data at Rest – Storage of Account List – Password Storage –

Unit IV- Securing Web Application **9 Hrs**

Security in SLDC – Framework for Secure Web Application Code – Web Application Security Testing – Static Code Analysis – Dynamic Code Analysis – Defending Authentication – Defending Session State – Preventing Application Attacks – Preventing Client Attacks – Defending File Uploads – Enforcing Access Rate and Application Flows

Unit V – Security Enabled Web Application **9 Hrs**

Developing Security enabled Applications – Working Security – Web Security Tools – Application Fortification- Vulnerability Identification and Remediation - Request Data Analysis - Response Data Analysis

Total Hrs: 45

TEXT BOOKS:

1. Joel Scambray Mike Shema, “Hacking Exposed Web Applications”, McGraw-Hill/Osborne, 2002
2. Ron Lepofsky, “The Manager’s Guide to Web Application Security” Apress, ISBN 0-07-222438-X,
3. Ryan Barnett, “The Web Application Defender’s Cookbook: Battling Hackers and Protecting Users”, John Wiley & Sons, Inc., ISBN: 978-1-118-36218-1, 2013

REFERENCE BOOKS:

1. Mike Shema, “Web Application Security for Dummies”, John Wiley & Sons, Ltd, ISBN: 978-1-119-99487-9.
2. B. Sullivan, V. Liu, and M. Howard, “Web Application Security”, McGraw-Hill Education, 2012. ISBN No.: 978-0-07-177612-7.
3. Wade Alcorn, Christian Frichot, “The Browser Hacker′s Handbook”, John Wiley & Sons, Inc, ISBN-13: 978-1118662090.
4. Gene Spafford and SimsonGarfinkel, “Web Security, Privacy &Commerc”, O'Reilly Media, Inc., 2001, ISBN-13: 978-0596000455.
5. Andrew Hoffman, “Web Application Security”, O'Reilly Media, Inc., ISBN**:** 9781492053101, 2020
6. DafyddStuttard, Marcus Pinto, “The Web Application Hacker's Handbook: Finding and Exploiting Security Flaw”s, 2nd Edition, ISBN-13: 978-81265334042011

ELECTIVE II

Subject Code: **HMCF22E04**	Subject Name : **VIGILANCE AND SECURITY MANAGEMENT**	**Ty/Lb/ETL**	**L**	**T/S.Lr**	**P/R**	**C**
	Prerequisite: NIL	Ty	3	0/0	0/0	3

L : Lecture T : Tutorial S.Lr : Supervised Learning P : Project R : Research C: Credits
Ty/Lb/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVES :

- To develop the knowledge and skills required to effectively lead and facilitate investigations.
- To train and develop the security professionals to handle the issues related to vigilance and investigation.
- To provide basic conceptual understanding of disaster management theory, policy and practice

COURSE OUTCOMES (COs) : (3- 5)

CO1	Understand the fundamentals of investigation and its types and effectively plan an investigation strategy.
CO2	Acquire solid grounding in assessing all key aspects of vigilance
CO3	Understand the common physical security measures, threats, risk reduction and good practices.
CO4	State security and safety practices
CO5	Use various methods and techniques for appropriate and timely preparation and mitigation of disasters

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	3	1	--	--	--	--	1	--	1
CO2	--	1	--	--	--	--	2	--	1
CO3	3	1	--	--	--	--	1	--	1
CO4	1	1	1	--	--	2	1	--	1
CO5	--	3	3	3	2	3	3	--	--

Mapping of Course Outcomes (COs) with Program Specific Outcomes (PSOs)

COs/PSOs	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	1	1	--
CO2	--	3	1	--
CO3	3	1	1	--
CO4	1	--	3	--
CO5	--	--	3	--

3/2/1 indicates Strength of Correlation 3- High, 2- Medium, 1-Low

Category	Program Core	**Program Elective**	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary / Allied	Skill Component	Practical / Project / Internship	Others			
		✓										

Subject Code: **HMCF22E04**	**Subject Name**	**Ty/Lb/ETL**	**L**	**T/S.Lr**	**P/R**	**C**
	VIGILANCE AND SECURITY MANAGEMENT	Ty	3	0/0	0/0	3

Unit I- Investigation **9 Hrs**

Definitions - Key concepts - Private investigation - Historical background of private security – Security threats –Types of investigation – Espionage –Surveillance – Survey – Verification –First aid - Security survey/audit – Private Security Agencies (Regulation) Act, 2005

Unit II- Vigilance Information and Intelligence **9 Hrs**

Collection, collation and timely reporting - Confidential enquiries – Classifying assets – Official Secrets Act, 1923

Unit III - Physical Security Devices **9 Hrs**

Access control system - Computer security systems – Security alarm systems – Fire Exposure – Water Damage – Air conditioning – Electric – Emergency preparedness plan – Security guards – Segregation of Duties and responsibilities –

Unit IV - Security and safety practices **9 Hrs**

Financial institutions - Industrial organizations and commercial establishments – Dealing with trespass/intrusion – Terrorists movement and hideouts – Emergency procedures –Security Ethics

Unit V -Disaster Management **9 Hrs**

Definitions - Types of disasters: Man-Made Disasters: Fires - Bombings/Explosions - Acts of Terrorism - Power Outages - Other Utility and Infrastructure Failures - Hardware/Software Failures – Strikes - Theft/Vandalism- Natural disasters: Earthquakes – Floods – Storms – Fires - Other Regional Events

Total Hrs: 45

Text Books:

1. Paul R. Baker, Daniel J. Benny, “The Complete Guide to Physical Security”, CRC Press,2016, ISBN: 9781420099645, 1420099647.
2. Copeland, W. D., “Private investigation: How to be Successful”,Phoenix, AZ:Absolutely Zero Loss Inc, 2001.
3. R. Subramaniam, “Disaster Management”, Vikas Publishing House, 2005, ISBN: 9789352718702, 9352718704
4. V.S.K. Rao, “ Handbook for Vigilance Officers”, AdhyyanBookd, 2020, ASIN : B083QMKHR

Reference Books:

1. Sinha, R. K,“Crimes affecting state security- problems and recent trends”,New Delhi: Deep & Deep Publications.
2. Woodhull A,“Private investigation: Strategies and techniques”, Texas: Thomas Investigations Publications.

Subject Code: **HMCF22E05**	Subject Name : **ARTIFICIAL INTELLIGENCE SERUCITY AND FORENSICS**	**Ty/Lb/ETL**	**L**	**T/S.Lr**	**P/R**	**C**
	Prerequisite: NIL	Ty	3	0/0	0/0	3

L : Lecture T : Tutorial S.Lr : Supervised Learning P : Project R : Research C: Credits
Ty/Lb/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVES :

- Build strong foundations in core areas of Artificial Intelligence and Machine Learning
- Develop professionals with high competency in recent tools and techniques related to Artificial Intelligence and Machine learning.
- To teach students the key AI techniques that are being used to track cybercriminals.

COURSE OUTCOMES (COs) : (3- 5)

CO1	Gain strong theoretical foundations and practical skillsets in core areas of Artificial Intelligence to facilitate research, innovation, and product development
CO2	Analyze the applicability of AI strategies for different search methods
CO3	Understand application of ML techniques to solve real world problems from various domains such
CO4	Use AI strategies for improving applications and network security problems.
CO5	Develop interactive Artificial Intelligence systems to support digital forensics and automate the decision-making process to enable fast and reliable

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3	1	--	1	--	--	1	--	1
CO2	--	--	2	--	--	3	1	2	1
CO3	3	1	--	1	--	--	1	2	1
CO4	--	3	2	2	--	3	2	--	--
CO5	--	3	2	3	3	3	2	--	--

Mapping of Course Outcomes (COs) with Program Specific Outcomes (PSOs)

COs/PSOs	PSO1	PSO2	PSO3	PSO4
CO1	3	1	1	1
CO2	--	--	2	3
CO3	3	1	1	1
CO4	--	3	2	--
CO5	--	2	3	--

3/2/1 indicates Strength of Correlation 3- High, 2- Medium, 1-Low

Category	Program Core	**Program Elective**	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary / Allied	Skill Component	Practical / Project / Internship	Others			
		✓										

Subject Code: HMCF22E05	Subject Name	Ty/Lb/ETL	L	T/S.Lr	P/R	C
	ARTIFICIAL INTELLIGENCE SECURITY AND FORENSICS	Ty	3	0/0	0/0	3

Unit I - Introduction to Artificial Intelligence **9Hrs**

Brief History of Artificial Intelligence – Uses of AI in society – Software Based AI Applications – AI in Hardware Applications – Future of AI - Search Spaces – Search Trees – Goal Trees

Unit II – Search Methods **9Hrs**

Goal-Driven Search – Generate and Test – Depth-First Search – Breadth-First Search – Heuristics Search: Informed and Uninformed Methods – 8-Puzzle – Hill Climbing – Identifying Optimal Paths – Local Search and Metaheuristics – Simulated Annealing Parallel Search

Unit III – Machine Learning & Neural Network **9Hrs**

Machine Learning: Data Analysis – Perceptron –Nearest Neighbor Method – Decision Tree Learning – Cross – Validation and Over fitting – Bayesian Networks – Naïve Bayes Classifier – Clustering
Neural Network: Hopefield Networks – Linear Network – Back propagation Algorithm – Support Vector Machines –

Unit IV- Artificial Intelligence in Security **9Hrs**

OWL Ontologies in Cyber security – Identifying Targeted Software Vulnerabilities – Applying AI to detect Network Attack - Machine Learning Algorithms for Network Intrusion Detection – Android Application Analysis using Machine Learning Techniques

Unit V – Artificial Intelligence in Forensics **9Hrs**

AI in Pathology – AI in Anthropology– AI in Entomology – AI in DNA Analysis – AI detect illicit drug – AI in analysing footprint impression – AI in forensic biological hair analysis –AI in analysing Gait - AI for footwear impression analysis - Weapon detection using AI

Total Hrs: 45

Text Books:

1. John Paul Mueller and Luca Massaron, "Artificial Intelligence For Dummies", John Wiley & Sons, Inc, 2018, ISBN:978-1-119-46765-6.
2. Ben Coppin, " Artificial Intelligence Illuminated", Jones and Bartlett Publishers, 2004, ISBN 0-7637-3230-3.
3. Wolfgang Ertel, "Introduction to Artificial Intelligence", Springer International Publishing, 2017, ISBN 978-3-319-58486-7.
4. Leslie F. Sikos, "AI in Cybersecurity", Springer Nature Switzerland AG, 2019, ISBN 978-3-319-98841-2.

Reference Books:

1. Alessandro Parisi, "Hands-On Artificial Intelligence for Cybersecurity", Packt Publishing Ltd, 2019, ISBN: 978-1-78980-402-7.
2. Roman V. Yampolskiy, "Artificial Intelligence Safety and Security" CRC Press, 2019, ISBN-13: 978-1-138-32084.
3. Ravi Das, "Practical AI for Cybersecurity", CRC Press, 2021, ISBN:978-0-367-70859
4. IshaaniPriyadarshini, Rohit Sharma, " Artificial Intelligence and Cybtersecurity: Advances and Innovations", CRC Press, 2022, ISBN: 9780367466664

Subject Code: **HMCF22E06**	Subject Name : **BUSINESS CONTINUITY PLANNING AND DISASTER MANAGEMENT**	**Ty/Lb/ETL**	**L**	**T/S.Lr**	**P/R**	**C**
	Prerequisite: NIL	Ty	3	0/0	0/0	3

L : Lecture T : Tutorial S.Lr : Supervised Learning P : Project R : Research C: Credits
Ty/Lb/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVES :

- Provide students the fundamentals of crisis management, cyber security and business continuity management
- Ensuring Timely response to manage business continuity
- Ensuring a smooth flow of the business operations

COURSE OUTCOMES (COs) : (3- 5)

CO1	Students gain an understanding of business continuity strategies, business impact analysis, recovery point objectives (RTO and RPO), planning techniques and also how to recover from disasters.
CO2	Students analyze common organizational risks and threats to business system continuity
CO3	Apply business continuity and disaster recovery principles to enhance a business continuity plan.
CO4	Provides the necessary skills to develop a multidimensional approach for Business Continuity Plan testing and auditing.
CO5	Assess disaster recovery strategies and different standby systems and relate to recovery time

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3	1	1	1	--	--	--	--	1
CO2	--	1	3		--	--	--	--	--
CO3	--	3	--	3	2	3	--	--	--
CO4	3	1	--	3	2	3	2	--	1
CO5	--	2	2	--	--	3	--	--	--

Mapping of Course Outcomes (COs) with Program Specific Outcomes (PSOs)

COs/PSOs	PSO1	PSO2	PSO3	PSO4
CO1	3	1	1	1
CO2	--	2	1	2
CO3	--	--	2	--
CO4	3	--	3	1
CO5	--	3	1	1

3/2/1 indicates Strength of Correlation 3- High, 2- Medium, 1-Low

Category	Program Core	**Program Elective**	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary / Allied	Skill Component	Practical / Project / Internship	Others			
		✓										

Subject Code: HMCF22E06	Subject Name	Ty/Lb/ETL	L	T/S.Lr	P/R	C
	BUSINESS CONTINUITY PLANNING AND DISASTER MANAGEMENT	Ty	3	0/0	0/0	3

Unit I - Introduction **9Hrs**

Business Continuity Planning – BCP Standards and Guidelines - Elements of Project Success – Project Plan Components – Project Organization – Project Planning – Project Implementation – Project Tracking – Key Contributors and Responsibilities - Business Continuity and Disaster Recovery (BC/DR) – Components of Business – The Cost of Planning versus the Cost of Failure – Types of Disasters – BC/DR Planning Basics – Key Concepts —Business Requirements – Functional Requirements – Technical Requirements – BC/DR Project Plan – Business Continuity Management (BCM) – Developing a BCM strategy in line with Business Strategy – Role of Business Strategy in BCP – Business Continuity and Ethics

Unit II – Risk Management **9Hrs**

Risk Management Basics –Elements of Risk Management – IT Specific Risk Management – Risk Assessment Components – Threat Assessment Methodology – Vulnerability Assessment – Type of Risk Mitigation Strategies – The Risk Mitigation Process – Developing Risk Mitigation Strategy – IT Risk Mitigation – Backup and Recovery Considerations –Assessing Risk: Determining Threats-Risk Management – Risk Manager – Risk Assessment – Emergency Incident Assessment – Business Risk Assessment – Business Impact Analysis – Information Security, IT, and Communication - Operational Risk Assessment- Practical Guidelines for Risk Assessment - Statistical Applications in Risk Management – Risk and Decision Modelling - Risk Management Checklist

Unit III– BCP Maintenance **9Hrs**

Guidelines to maintain BCP – BCP Maintenance – BCP Distribution Issues – Awareness and Training Programs – Monitor and Review – Roles and Responsibilities for Maintaining the BCP Plan – BC/DR Plan Change Management – Introduction toDisaster Management – Disaster Preparedness and Management – Preplanning for a Disaster – Developing an Action Plan – Effective Communication – Selecting the Right People – Training for success – Disaster Preparedness Assessment - Business Continuity Planning Tools

Unit IV – Testing and Auditing **9Hrs**

Testing the Business Recovery Process – Security Testing - Monitoring and Updating – Hardening Systems – Audit Objective - Auditing Fundamentals – Individual Audit Approach - Auditor's Role in Developing Security Policies – Audit Planning – Audit Deployment – BCM Audit Areas - Auditing Standards and Groups – Audit Oversight Committee- Auditing and Assessment Strategies – Basic Audit Methods and Tools – General Information Systems Audit Process – Using Nmap – Mapping the Network with Nmap – Analysing Nmap Scan Results – Penetration Testing Using Nessus – Training Staff for Business Recovery Process - Business Continuity Plan Audits - Business Continuity Checklist

Unit V – Disaster Recovery **9Hrs**

Business Disaster – Need of Disaster Plan – Seven steps in implementing Business Continuity Cycle – Phases of BC/DR– Defining BC/DR Teams and Key Personnel – Defining Tasks and Assigning Resources – Communications Plans – Event Logs, Change Control and Appendices - IT Disaster Prevention and Recovery – Special Disaster Issues

Total Hrs: 45

Text Books:

1. John W. Rittinghouse, James F. Ransome, "Business Continuity and Disaster Recovery for InfoSec Managers", Elsevier Digital Press, 2011, ISBN 13: 978-1-55558-339-2
2. Jennifer H. Elder, Samuel F. Elder, "Faster Disaster Recovery: The Business Owner's Guide to Developing a Business Continuity Plan", Wiley & Sons Publications, 2nd Edition 29 June 2019, ISBN: 978-1-119-57102-5.

Reference Books:

1. Susan Snedaker, Chris Rima, "Business Continuity and Disaster Recovery Planning for IT Professionals", Newnes., 2ndEdition, 2013, ISBN: 0124114512, 9780124114517.
2. Kufl J. Engemann, Douglas M. Henderson, "Business Continuity and Risk Management: Essentials of Organizational Resilience", Rothstein Publishing, 2011, ISBN: 1931332541, 9781931332545
3. Andrew Hiles, "The Definitive Handbook of Business Continuity Management", John Wiley and Sons, 2010, ISBN: 0470710799, 9780470710791

ELECTIVE III

Subject Code: **HMCF22E07**	Subject Name : **IoT SECURITY**	**Ty/Lb/ETL**	**L**	**T/S.Lr**	**P/R**	**C**
	Prerequisite: NIL	Ty	3	0/0	0/0	3

L : Lecture T : Tutorial S.Lr : Supervised Learning P : Project R : Research C: Credits
Ty/Lb/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVES :

- To discuss in detail the IoT technology and its applications.
- To transfer the expertise knowledge needed to design security policies for IoT.
- To provide leaners with the required knowledge to design IoT systems.

COURSE OUTCOMES (COs) : (3- 5)

CO1	Demonstrate the knowledge of different layers IoT
CO2	Learns different architectures and driving forces
CO3	Find solutions to attack vectors on smart systems
CO4	Analyse system and apply appropriate security enabling technologies
CO5	Develop IoT applications

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3	1	1	--	1	--	--	--	1
CO2	3	1	1	2	1	--	--	--	1
CO3	--	--	3	1	--	--	--	--	1
CO4	--	3	3	2	2	--	--	2	--
CO5	--	2	3	3	3	3	3	--	--

Mapping of Course Outcomes (COs) with Program Specific Outcomes (PSOs)

COs/PSOs	PSO1	PSO2	PSO3	PSO4
CO1	3	--	--	--
CO2	3	1	1	1
CO3	--	3	1	2
CO4	--	1	2	3
CO5	--	--	3	--

3/2/1 indicates Strength of Correlation 3- High, 2- Medium, 1-Low

Category	Program Core	**Program Elective**	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary / Allied	Skill Component	Practical / Project / Internship	Others			
		✓										

Subject Code: HMCF22E07	Subject Name	Ty/Lb/ETL	L	T/S.Lr	P/R	C
	IoT SECURITY	Ty	3	0/0	0/0	3

Unit I – Introduction **9 Hrs**

Introduction – SWOT Analysis of IoT – New Trends in IoT – Sensors – Actuators – IoT Hardware Platform – IoT Software and Programming – IoT Protocol Stack – IoT Network and Link Layer wired and wireless – IoT Internet Layer – IoT Application Layer – IoT Case Studies

Unit II – Architecture and Methodologies **9 Hrs**

IoT Architecture – IoT Devices – Event Driven System Analysis – IoT Network Model – IoT Event Analysis – Industrial IoT - Security and Safety – Security testing of IoT Systems

Unit III – Security and Privacy **9 Hrs**

IoT as Interconnection of Threats – Sybil Attack Detection in Vehicular Networks – Solution to Attack Vectors on Smart Home System – Privacy Prevention for IoT used in Smart Buildings – Exploiting Mobility Social Features for Location Privacy Enhancement in Internet of Vehicles – Authentication in IoT – Secure Path Generation for Real Time Green Internet of Things – A User Centric Decentralised Governance Framework for Privacy and Trust in IoT

Unit IV – Securing IoT **9 Hrs**

Securing the Internet of Things - Security Architecture in the Internet of Things - Security and Vulnerability in the Internet of Things - IoT Node Authentication - Security Requirements in IoT Architecture - Security in Enabling Technologies – Blockchain Based Security for IoT Security

Unit V –IoT Applications **9 Hrs**

IoT for Smart Cities - IoT for Connected Homes - IoT for Renewable Energy - IoT in Health Care - IoT in Smart Ambulance and Emergency Medicine - IoT for Agriculture

Total Hrs: 45

Text Books:

1. Khaled Salah Mohamed, "The Era of Internet of Things Towards a Smart World", Springer Nature Switzerland AG, 2019, ISBN 978-3-030-18132-1.
2. Dimitrios Serpanos, Marilyn Wolf, "Internet-of-Things (IoT) Systems Architectures, Algorithms, Methodologies", Springer Nature Switzerland AG, 2018, ISBN 978-3-319-69714-7.
3. FeiHu,"Security and Privacy in Internet of Things (IoTs) Models, Algorithms, and Implementations", CRC Press Taylor & Francis Group, 2016, ISBN 978-1-4987-2319-0.
4. Shancang Li Li Da Xu, "Securing the Internet of Things", Syngress, 2017, ISBN: 978-0-12-804458-2.
5. Qusay F. Hassan , "Internet of Things A to Z Technologies and Applications", y John Wiley & Sons, 2018, ISBN: 978-1-111-945674-2.

Reference Books:

1. Aditya Gupta ¸"The IoT Hacker's Handbook", Apress Media LLC, 2019, ISBN-13: 978-1-4842-4299-5.
2. Neil Wilkins, "Internet of Things: What You Need to Know About IoT, Big Data, Predictive Analytics, Artificial Intelligence, Machine Learning, Cybersecurity, Business Intelligence, Augmented Reality and Our Future", Amazon.com Services LLC, 2019, ASIN: B07PG317XS.

3. AmithaKapoor, "Hands-On Artificial Intelligence for IoT: Expert machine learning and deep learning techniques for developing smarter IoT systems", Packt Publishing, 1st Edition 2019, ASIN: B07C5YMBZT.
4. Andrew Minteer, "Analytics for the Internet of Things (IoT)", Packt Publishing, 2017, ISBN-13: 978-1787120730.
5. Qusay F. Hassan, Atta urRehman Khan, Sajjad A. Madani, "Internet of Things Challenges, Advances, and Applications", Chapman and Hall/CRC,2018, ISBN 9780367111878.
6. NavveenBalani, Rajeev Hathi, "Enterprise IoT: A Definitive Handbook" 4th edition, CreateSpace Independent Publishing Platform, 2016, ISBN-13: 978-1535505642.

Subject Code: **HMCF22E08**	Subject Name : **TELECOM FRAUDS**	**Ty/Lb/ETL**	**L**	**T/S.Lr**	**P/R**	**C**
	Prerequisite: NIL	Ty	3	0/0	0/0	3

L : Lecture T : Tutorial S.Lr : Supervised Learning P : Project R : Research C: Credits
Ty/Lb/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVES :

- To cover all aspects of telecommunication frauds
- To increase the knowledge regarding new techniques used by the cyber criminals
- To master the skills and knowledge investigate and prevent telecom frauds

COURSE OUTCOMES (COs) : (3- 5)

CO1	Learns basics of cellular architecture, online frauds and financial frauds
CO2	Design systems with controls to prevent internet fraud, EFT fraud and VoIP fraud
CO3	Perform Technology assessment and identify a technology to design fraud detection and preventing mechanism
CO4	Learns to handle fraud detection software and tools
CO5	Analyse internal control mechanisms and issue of frauds from the perspective of Telecom industry.

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	3	--	--	1	1	--	--	--	1
CO2	--	3	3	3	3	3	3	--	--
CO3	--	1	3	1	1	3	2	2	2
CO4	3	1	3	1	2	3	--	--	2
CO5	--	1	3	1	1	3	2	1	--

Mapping of Course Outcomes (COs) with Program Specific Outcomes (PSOs)

COs/PSOs	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	1	1	1
CO2	--	--	3	--
CO3	--	3	2	1
CO4	3	1	1	--
CO5	--	2	2	3

3/2/1 indicates Strength of Correlation 3- High, 2- Medium, 1-Low

Category	Program Core	**Program Elective**	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary / Allied	Skill Component	Practical / Project / Internship	Others			
		✓										

Subject Code: **HMCF22E08**	**Subject Name**	**Ty/Lb/ETL**	**L**	**T/S.Lr**	**P/R**	**C**
	TELECOM FRAUDS	Ty	3	0/0	0/0	3

Unit I –Introduction **9 Hrs**

Cellular Architecture – Vulnerabilities in Telephony – Vulnerabilities in SMS - Vulnerabilities in Cellular Network - Vulnerabilities in Voiceover IP - Telecom Fraud – Types of Telecom frauds – Categories of Telecom Frauds – Fraud Methods - Telecom Fraud Preventing –Hadoop Based Fraud Technology

Unit II –Electronic Fund Transfer Fraud (EFT) **9 Hrs**

Introduction – EFT Technologies and Services – Fundamentals of EFT Process - EFT Types - Competitive and Regulatory Environment of EFT – Privacy in EFT – Security in EFT – Equity in EFT – EFT Crimes – Analysis of EFT Crimes

Unit III –Internet Fraud **9 Hrs**

Introduction to Internet Scams and Frauds – Identity Theft – Internet Scams vs Internet Fraud – Working of Internet Fraud – Lottery Scams – Preventing Internet Fraud – Work-at-home scams – Work from Home Frauds – Anti Internet Fraud Agencies – Social Media Advertising – Net Banking Frauds –Online Payment Frauds

Unit IV–Ecommerce Fraud **9 Hrs**

Introduction – Types of Ecommerce Frauds - Fraud Basics for Online Business companies – Fraud Management concepts – Identifying Ecommerce Fraud - Fraud Prevention Techniques: Identity Proofing – Guaranteed Payments – Operational Management – Analytics – Technology –Ecommerce Fraud Detection Software and Tools

Unit V–VoIP Fraud **9 Hrs**

Introduction – Types of VoIP Frauds – Techniques for fighting VoIP Fraud –Hacking VoIP: Footprinting a VoIP Network – Scanning a VoIP Network – Enumerating a VoIP Network – VoIP Network Infrastructure DoS – VoIP Network Eavesdropping – VoIP Interception and Modification – VoIP Fuzzing – Flood-based Disruption of Service – Signalling and Media Manipulation – SPAM over Internet Telephony – Voice Phising

Total hours : 45

Text Books

1. Patrick Traynor, Patrick McDaniel, Thomas La Porta,"Security for Telecommunications Networks", Springer Science & Business Media, 2008, ISBN: 0387724427, 9780387724423.
2. "Selected Electronic Funds Transfer Issues: Privacy, Security, and Equity", Congress of the U.S., Office of Technology Assessment, Volume 14, Issue 6.
3. Dueep J. Singh, John Davidson, "Introduction to Internet Scams and Fraud - Credit Card Theft, Work-At-Home Scams and Lottery Scams," JD-Biz Corp Publishing , 2014.
4. David Endler, Mark Collier, "Hacking Exposed VoIP", Tata McGraw Hill Education, 1 January 2007, ISBN-13: 978-0070647657.
5. David A. Montague,"Essentials of Online payment Security and Fraud Prevention", Wiley, 1st Edition, 2010, ASIN: B004BDOZHQ.

Reference Books

1. Revathi Subramanian, "Bank Fraud: Using Technology to Combat Losses", Wiley, 2014, ISBN: 9780470494394.
2. Nina Godbole, "Cyber Threats in Healthcare: Understanding Risks and Mitigation," Wiley, ISBN: 9788126560127.
3. "Computer Crime: Electronic Fund Transfer Systems and Crime", U.S. Department of Justice, Bureau of Justice Statistics.
4. Ian Howells, VolkmarScharf-Kaz, Padraig Stapleton, "Telecom Fraud 101 eBook"
5. Peter N. Grabosky, Russell G. Smith, "Crime in the Digital Age: Controlling Telecommunications and Cyberspace Illegalities", Transaction Publishers, ISBN: 1412820626, 9781412820622

Subject Code: **HMCF22E09**	Subject Name : **MOBILE SECURITY AND FORENSICS**	**Ty/Lb/ETL**	**L**	**T/S.Lr**	**P/R**	**C**
	Prerequisite: NIL	Ty	3	0/0	0/0	3

L : Lecture T : Tutorial S.Lr : Supervised Learning P : Project R : Research C: Credits
Ty/Lb/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVES :

This paper deals with:

- The threats associated with mobile devices
- Architectural layers of mobile devices
- Mobile evidence types and evidence acquisition types
- Various mobile forensic tools for investigation

COURSE OUTCOMES (COs) : (3- 5)

CO1	Understands Junit in Android and various android testing techniques
CO2	Analyze the security of mobile applications running on major platforms to identify various vulnerabilities that may exists in these applications
CO3	Use modern mobile testing tools and techniques to conduct a structured investigation process to determine the nature of the crime and to produce results that are useful in criminal proceedings
CO4	Present the evidence and conclusions of an investigation in a report format.
CO5	Provide exposure to well-known and novel forensic methods using command-line and graphical open-source mobile forensics tools for examining a wide range of mobile device targets and artifacts

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	3	2	2	1	1	--	--	--	2
CO2	--	--	3	1	2	3	2	1	2
CO3	--	--	2	2	3	3	2	--	2
CO4	--	--	--	3	--	3	3	2	2
CO5	3	2	2	--	2	--	--	--	2

Mapping of Course Outcomes (COs) with Program Specific Outcomes (PSOs)

COs/PSOs	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	1	1	1
CO2	--	3	--	3
CO3	--	2	2	3
CO4	--	--	3	--
CO5	3	2	1	2

3/2/1 indicates Strength of Correlation 3- High, 2- Medium, 1-Low

Category	Program Core	**Program Elective**	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary / Allied	Skill Component	Practical / Project / Internship	Others			
		✓										

Subject Code: HMCF22E09	Subject Name	Ty/Lb/ETL	L	T/S.Lr	P/R	C
	MOBILE SECURITY AND FPRENSICS	Ty	3	0/0	0/0	3

Unit I – Introduction **9 Hrs**

JUnit: JUnit Test Framework, Features of JUnit Test Framework, Testing Fundamentals-TestCase, TestSuite, TestRunners, JUnit classes, JUnit in Android, Android Testing Framework, Test Projects-Directory Structure, Android Testing API, Mock Objects, Activity Testing, what to Test, ContentProvider Testing, service Testing, choosing devices to test, Testing tools

Unit II – Mobile Apps Testing **9 Hrs**

Need of testing, Mobile applications testing landscape, Common types of testing, UI and functional testing strategies of mobile applications, compatibility testing need and methods, non-functional testing methods of mobile applications - Performance, security, types of operations testing for mobile applications - Installation, un-installation, upgrade, methods of testing the mobile application integration with phone

Unit III – Mobile Testing Tools **9 Hrs**

Testing lifecycle of mobile applications, alternatives of testing environments for mobile apps testing, Differentiate between testing on physical devices, cloud devices and emulators, different test automation tools for mobile applications, key features of monkey talk tool, installation and use of monkeytalk tool for a mobile application on emulator, installation and use of monkeytalk tool for a mobile application on PC connected device, installation and use of monkeytalk tool for a mobile web, installation and use of monkeytalk tool for a mobile application for cloud device

Unit IV – Evidences **9 Hrs**

Type of Data present in Mobile Phones - Digital Evidences found in Mobile Phones - Storage Media Available (RAM, ROM, USB, External memory Card) – different Software's and Applications used in Smart Phones

Unit IV – Forensics Procedure and Analysis **9 Hrs**

Forensic Methodology for Mobile Forensics - Best Practices while handling Mobile Devices from a Crime Scene - Seizure and Acquisition of Mobile Phones – Handling of Devices with Passcode for Mobile and Applications
Imaging Process - Mobile Device Analysis Tools and their features - Where to look for Evidence - Analysis Phase – Documentation

Total Hrs: 45

Text Books:

1. Diego Torres Milano, "Android Application Testing Guide", 2010.
2. Julian Harty, MahadevSatyanarayanan,"A Practical Guide to Testing Wireless Smartphone Applications", 2011.
3. Iosif I. Androulidakis, "Mobile phone security and forensics: A practical approach",Springer publications, 2012.

Reference Books:

1. Hung Q. Nguyen, Bob Johnson, Michael Hackett, "Testing Applications on the Web: Test Planning for Mobile and Internet-Based Systems", 2012.
2. Andrew Hoog, "Android Forensics: Investigation, Analysis and Mobile Security for Google Android", Elsevier publications, 2011.
3. EamonP.Doherty, "Digital Forensics for Handhelh Devices", CRC Press, 2012.

AUDIT COURSE							
Sl.No	**Course Code**	**Course Name**	**Ty/Lb / ETL /IE**	**Teaching Scheme**			
				L	**T/S.Lr**	**P/R**	**C**
1	HMAC22I01	English for Research paper Writing	Ty	2	0/0	0/0	0
2	HMAC22I02	Disaster Management	Ty	2	0/0	0/0	0
3	HMAC22I03	Sanskrit for Technical Knowledge	Ty	2	0/0	0/0	0
4	HMAC22I04	Value Education	Ty	2	0/0	0/0	0
5	HMAC22I05	Constitution of India	Ty	2	0/0	0/0	0
6	HMAC22I06	Pedagogy Studies	Ty	2	0/0	0/0	0
7	HMAC22I07	Stress Management by Yoga	Ty	2	0/0	0/0	0
8	HMAC22I08	Personality Development through Life Enlightenment Skills	Ty	2	0/0	0/0	0
9	HMAC22I09	Life skill	Ty	2	0/0	0/0	0

Subject Code: **HMAC22I01**	Subject Name : **ENGLISH FOR RESEARCHPAPER WRITING**	**Ty/Lb/ETL**	**L**	**T/S.Lr**	**P/R**	**C**
	Prerequisite: NIL	Ty	2	0/0	0/0	0

L : Lecture T : Tutorial S.Lr : Supervised Learning P : Project R : Research C: Credits
Ty/Lb/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVES :

This paper deals with:

- To know the art of writing the research paper and thesis .
- To Ensure the good quality of paper at very first-time submission

COURSE OUTCOMES (COs) : (3- 5) : At the end of this course the students would be able to

CO1	Understand that how to improve your writing skills and level of readability
CO2	Learn about what to write in each section
CO3	Understand the skills needed when writing a Title

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	1	1	1	1	1	3	1	1	1
CO2	1	1	1	1	1	3	1	1	1
CO3	1	1	1	1	1	3	1	1	1

Mapping of Course Outcomes (COs) with Program Specific Outcomes (PSOs)

COs/PSOs	PSO1	PSO2	PSO3
CO1	1	1	1
CO2	1	1	1
CO3	1	1	1

3/2/1 indicates Strength of Correlation 3- High, 2- Medium, 1-Low

Category	Program Core	Program Elective	**Humanities and Social Science**	Open Elective	Skill Enhancing Elective	Inter Disciplinary / Allied	Skill Component	Practical / Project / Internship	Others			
			✓									

Subject Code: **HMAC22I01**	**Subject Name**	**Ty/Lb/ETL**	**L**	**T/S.Lr**	**P/R**	**C**
	ENGLISH FOR RESEARCH PAPER WRITING	Ty	2	0/0	0/0	0

Unit I **5 Hrs**

Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness

Unit II **5 Hrs**

Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticising, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction

Unit III **5 Hrs**

Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check

Unit IV **5 Hrs**

Key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills NN are needed when writing an Introduction, skills needed when writing a Review of the Literature

Unit V **5 Hrs**

Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions

Unit VI **5 Hrs**

Useful phrases, how to ensure paper is as good as it could possibly be the first- time submission

Total Hrs: 30

Suggested Studies:

1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman'sbook.
4. Adrian Wallwork, English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 20

Subject Code: **HMAC22I02**	Subject Name : **DISASTER MANAGEMENT**	**Ty/Lb/ETL**	**L**	**T/S.Lr**	**P/R**	**C**
	Prerequisite: NIL	Ty	2	0/0	0/0	0

L : Lecture T : Tutorial S.Lr : Supervised Learning P : Project R : Research C: Credits
Ty/Lb/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVES :

Students will be able to:

- Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.
- Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
- Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
- Critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries ,particularly their home country or the countries they work in.

COURSE OUTCOMES (COs) : (3- 5) : At the end of this course the students would be able to

CO1	Evaluate disaster risk reduction and humanitarian response policy and practice from Multiple perspectives
CO2	Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
CO3	Understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries they work in.

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	1	1	1	1	1	3	1	1	1
CO2	1	1	1	1	1	3	1	1	1
CO3	1	1	1	1	1	3	1	1	1

Mapping of Course Outcomes (COs) with Program Specific Outcomes (PSOs)

COs/PSOs	**PSO1**	**PSO2**	**PSO3**
CO1	1	1	1
CO2	1	1	1
CO3	1	1	1

3/2/1 indicates Strength of Correlation 3- High, 2- Medium, 1-Low

Category	Program Core	Program Elective	**Humanities and Social Science**	Open Elective	Skill Enhancing Elective	Inter Disciplinary / Allied	Skill Component	Practical / Project / Internship	Others	
			✓							

Subject Code: HMAC22I02	Subject Name	Ty/Lb/ETL	L	T/S.Lr	P/R	C
	DISASTER MANAGEMENT	Ty	2	0/0	0/0	0

Unit I – Introduction **5 Hrs**

Disaster: Definition, Factors and Significance; Difference between Hazard and Disaster; Natural and Man made Disasters: Difference, Nature, Types and Magnitude

Unit II – Repercussions Of Disasters And Hazards **5 Hrs**

Economic Damage ,Loss of Human and Animal Life, Destruction of Ecosystem.
Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts and Famines, Landslides and Avalanches, Man-made disaster: Nuclear Reactor Melt down, Industrial Accidents, Oil Slicks and Spills, Outbreak so f Disease and Epidemics, War and Conflicts

Unit III – Disaster Prone Areas in India **5 Hrs**

Study of Seismic Zones, Areas Prone To Floods and Droughts ,Landslides and Avalanches, Areas Prone To Cyclonic and Coastal Hazards with Special Reference to Tsunami, Post-Disaster Diseases and Epidemics

Unit IV – Disaster Preparedness and Management **5 Hrs**

Preparedness: Monitoring of Phenomena Triggeringa Disaster or Hazard, Evaluation of Risk, Application of Remote Sensing, Data from Meteorological and other Agencies, Media Reports: Governmental and community preparedness.

Unit V – Risk Assessment **5 Hrs**

Disaster Risk: Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques of Risk Assessment, Global Co-Operation in Risk Assessment and Warning ,People's Participation in Risk Assessment. Strategies for Survival

Unit VI – Disaster Mitigation **5 Hrs**

Meaning, Concept and Strategies of Disaster Mitigation, Emerging Trends in Mitigation. Structural Mitigation and Non-Structural Mitigation, Programs of Disaster Mitigation in India

Total Hrs: 30

Suggested Readings:

1. R.Nishith,SinghAK,"DisasterManagementinIndia:Perspectives,issuesandstrategies"'NewRoyalbookCompany.
2. Sahni,PardeepEt.Al.(Eds.),"DisasterMitigationExperiencesAndReflections",PrenticeHallOfIndia,NewDelhi.
3. GoelS.L.,DisasterAdministrationAndManagementTextAndCaseStudies",Deep&DeepPublication Pvt.Ltd.,New Delhi.

Subject Code: **HMAC22I03**	Subject Name : **SANSKRIT FOR TECHNICAL KNOWLEDGE**	**Ty/Lb/ETL**	**L**	**T/S.Lr**	**P/R**	**C**
	Prerequisite: NIL	Ty	2	0/0	0/0	0

L : Lecture T : Tutorial S.Lr : Supervised Learning P : Project R : Research C: Credits
Ty/Lb/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVES :

- To get a working knowledge in illustrious Sanskrit,the scientific language in the world
- Learning of Sanskrit to improve brain functioning
- Learning of Sanskrit to develop the logic in mathematics ,science & other subjects
- Enhancing them emorypower
- The engineering scholar sequipped with Sanskrit will be able to explore the
- Huge knowledge from ancient literature

COURSE OUTCOMES (COs) : (3- 5) : At the end of this course the students would be able to

CO1	Understanding basic Sanskrit language
CO2	Understanding ancient Sanskrit literature about science & technology
CO3	Develop logic in students being a logical language.

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	1	1	1	1	1	3	1	1	1
CO2	1	1	1	1	1	3	1	1	1
CO3	1	1	1	1	1	3	1	1	1

Mapping of Course Outcomes (COs) with Program Specific Outcomes (PSOs)

COs/PSOs	**PSO1**	**PSO2**	**PSO3**
CO1	1	1	1
CO2	1	1	1
CO3	1	1	1

3/2/1 indicates Strength of Correlation 3- High, 2- Medium, 1-Low

Category	Program Core	Program Elective	**Humanities and Social Science**	Open Elective	Skill Enhancing Elective	Inter Disciplinary / Allied	Skill Component	Practical / Project / Internship	Others			
			✓									

Subject Code:	Subject Name	Ty/Lb/ETL	L	T/S.Lr	P/R	C
HMAC22I03	**SANSKRIT FOR TECHNICAL KNOWLEDGE**	Ty	2	0/0	0/0	0

Unit I **10 Hrs**

- Alphabetsin Sanskrit,
- Past/Present/Future Tense,
- Simple Sentences.

Unit II **10 Hrs**

- Order
- Introduction of roots
- Technical information about Sanskrit Literature

Unit III **10 Hrs**

Technical concepts of Engineering-Electrical, Mechanical ,Architecture, Mathematics

Total Hrs: 30

Suggested reading

1. "Abhyaspustakam"–Dr.Vishwas,Samskrita-BhartiPublication,NewDelhi
2. "TeachYourselfSanskrit"PrathamaDeeksha-VempatiKutumbshastri,RashtriyaSanskritSansthanam,NewDelhi Publication
3. "India'sGloriousScientificTradition"SureshSoni,Oceanbooks(P)Ltd.,NewDelhi.

Subject Code: **HMAC22I04**	Subject Name : **VALUE EDUCATION**	**Ty/Lb/ETL**	**L**	**T/S.Lr**	**P/R**	**C**
	Prerequisite: NIL	Ty	2	0/0	0/0	0

L : Lecture T : Tutorial S.Lr : Supervised Learning P : Project R : Research C: Credits
Ty/Lb/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVES :

Students will be able to

- Understand value of education and self-development
- Imbibe good values in students
- Let the should know about the importance of character

COURSE OUTCOMES (COs) : (3- 5) : At the end of this course the students would be able to

CO1	Knowledge of self-development
CO2	Learn the importance of Human values
CO3	Developing the overall personality

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	1	1	1	1	1	3	1	1	1
CO2	1	1	1	1	1	3	1	1	1
CO3	1	1	1	1	1	3	1	1	1

Mapping of Course Outcomes (COs) with Program Specific Outcomes (PSOs)

COs/PSOs	**PSO1**	**PSO2**	**PSO3**
CO1	1	1	1
CO2	1	1	1
CO3	1	1	1

3/2/1 indicates Strength of Correlation 3- High, 2- Medium, 1-Low

Category	Program Core	Program Elective	**Humanities and Social Science**	Open Elective	Skill Enhancing Elective	Inter Disciplinary / Allied	Skill Component	Practical / Project / Internship	Others			
			✓									

Subject Code: HMAC22I04	Subject Name	Ty/Lb/ETL	L	T/S.Lr	P/R	C
	VALUE EDUCATION	Ty	2	0/0	0/0	0

Unit I **6 Hrs**

- Valuesandself-development–Socialvaluesandindividualattitudes.Workethics,Indianvision of humanism.
- Moral and non- moral valuation. Standards and principles
- Value judgements

Unit II **8Hrs**

- Importance of cultivation of values.
- Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness.
- Honesty, Humanity. Power of faith, National Unity.
- Patriotism. Love for nature, Discipline

Unit III **8 Hrs**

- PersonalityandBehaviorDevelopment-SoulandScientificattitude.PositiveThinking.Integrityand discipline.
- Punctuality, Love and Kindness.
- Avoid fault Thinking.
- Free from anger, Dignity of labour.
- Universal brotherhood and religious tolerance.
- True friendship.
- Happiness Vs suffering, love for truth.
- Aware of self-destructive habits.
- Association and Cooperation
- Doing best for saving nature

Unit IV **8 Hrs**

- Character and Competence–Holybook svsBlind faith.
- Self-management and Good health.
- Science of reincarnation.
- Equality ,Nonviolence, Humility, Role of Women.
- All religions and same message.
- Mind your Mind ,Self-control.
- Honesty,Studying effectively

Total Hrs: 30

Suggested reading

1. Chakroborty,S.K.“ValuesandEthicsfororganizationsTheoryandpractice”,OxfordUniversityPress,NewDelhi

Subject Code: **HMAC22I05**	Subject Name : **CONSTITUTION OF INDIA**	**Ty/Lb/ETL**	**L**	**T/S.Lr**	**P/R**	**C**
	Prerequisite: NIL	Ty	2	0/0	0/0	0

L : Lecture T : Tutorial S.Lr : Supervised Learning P : Project R : Research C: Credits
Ty/Lb/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVES :

Students will be able to:

- Understand the premises informing the twin themes of liberty and freedom from a civilrights perspective.
- ToaddressthegrowthofIndianopinionregardingmodernIndianintellectuals'constitutionalroleandentitlementtocivilandeconomicrightsaswellastheemergenceofnationhoodin the early years of Indian nationalism.
- ToaddresstheroleofsocialisminIndiaafterthecommencementoftheBolshevik
- Revolutionin1917and its impact on the initial drafting of the Indian Constitution.

COURSE OUTCOMES (COs) : (3- 5) : At the end of this course the students would be able to

CO1	Understand and explain the significance of Indian Constitution as the fundamental law of the land
CO2	Exercise his fundamental rights in proper sense at the same time identifies his responsibilities in national building
CO3	Analyze the Indian political system, the powers and functions of the Union, State and Local Governments in detail
CO4	Understand Electoral Process, Emergency provisions and Amendment procedure.

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	1	1	1	1	1	3	1	1	1
CO2	1	1	1	1	1	3	1	1	1
CO3	1	1	1	1	1	3	1	1	1
CO4	1	1	1	1	1	3	1	1	1

Mapping of Course Outcomes (COs) with Program Specific Outcomes (PSOs)

COs/PSOs	PSO1	PSO2	PSO3
CO1	1	1	1
CO2	1	1	1
CO3	1	1	1
CO4	1	1	1

3/2/1 indicates Strength of Correlation 3- High, 2- Medium, 1-Low

Category	Program Core	Program Elective	**Humanities and Social Science**	Open Elective	Skill Enhancing Elective	Inter Disciplinary / Allied	Skill Component	Practical / Project / Internship	Others			
			✓									

Subject Code: **HMAC22I05**	**Subject Name**	**Ty/Lb/ETL**	**L**	**T/S.Lr**	**P/R**	**C**
	CONSTITUTION OF INDIA	Ty	2	0/0	0/0	0

Unit I **3 Hrs**

- History of Making of the Indian Constitution:
- History, Drafting Committee,
- Composition & (Working)

Unit II **3 Hrs**

- Philosophy of the Indian Constitution:
- Preamble Salient Features

Unit III **6Hrs**

Contours of Constitutional Rights & Duties:

- Fundamental Rights
- Right to Equality
- Right to Freedom
- Right against Exploitation
- Right to Freedom of Religion
- Cultural and Educational Rights
- Right to Constitutional Remedies
- Directive Principles of State Policy
- Fundamental Duties.

Unit IV **6 Hrs**

Organs of Governance:

- Parliament
- Composition
- Qualifications and Disqualifications
- Powers and Functions

Executive:

- President
- Governor
- Council of Ministers
- Judiciary, Appointment and Transfer of Judges, Qualifications
- Powers and Functions

Unit V **6 Hrs**

Local Administration:

- District's Administration head: Role and Importance,
- Municipalities: Introduction, Mayor and role of Elected

Representative CEO of Municipal Corporation.

- Pachayati raj: Introduction, PRI: ZilaPachayat.
- Elected officials and their roles, CEO ZilaPachayat: Position and role
- Block level: Organizational Hierarchy (Different departments),
- Village level: Role of Elected and Appointed officials,
- Importance of grass root democracy

Unit VI **6 Hrs**

- Election Commission:
- Election Commission: Role and Functioning.
- Chief Election Commissioner and Election Commissioners.
- State Election Commission: Role and Functioning.
- Institute and Bodies for the welfare of SC/ST/OBC and women

Total Hrs: 30

Suggested reading

1. The Constitution ofIndia,1950(BareAct),Government Publication.
2. Dr.S.N.Busi,Dr.B.R.AmbedkarframingofIndian Constitution,1st Edition,2015
3. M.P.Jain,IndianConstitutionLaw,7thEdn.,LexisNexis,2014.
4. D.D.Basu,IntroductiontotheConstitutionofIndia,LexisNexis,2015

Subject Code: **HMAC22I06**	Subject Name : **PEDAGOGY STUDIES**	**Ty/Lb/ETL**	**L**	**T/S.Lr**	**P/R**	**C**
	Prerequisite: NIL	Ty	2	0/0	0/0	0

L : Lecture T : Tutorial S.Lr : Supervised Learning P : Project R : Research C: Credits
Ty/Lb/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVES :

Students will be able to:

- Review existing evidence on the review to pic to inform programme design and policymaking undertaken by the DfID, other agencies and researchers.
- Identify critical evidence gaps to guide the development.

COURSE OUTCOMES (COs) : (3- 5) : At the end of this course the students would be able to

CO1	What pedagogical practices are being used by teachers informal and informal classrooms in developing countries?
CO2	What is the evidence on the effectiveness of the sepedagogical practices, in what conditions, And with what population of learners?
CO3	How can teacher education(curriculum and practicum) and the school curriculum and Guidance materials best support effective pedagogy?

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	1	1	1	1	1	3	1	1	1
CO2	1	1	1	1	1	3	1	1	1
CO3	1	1	1	1	1	3	1	1	1

Mapping of Course Outcomes (COs) with Program Specific Outcomes (PSOs)

COs/PSOs	**PSO1**	**PSO2**	**PSO3**
CO1	1	1	1
CO2	1	1	1
CO3	1	1	1

3/2/1 indicates Strength of Correlation 3- High, 2- Medium, 1-Low

Category	Program Core	Program Elective	**Humanities and Social Science**	Open Elective	Skill Enhancing Elective	Inter Disciplinary / Allied	Skill Component	Practical / Project / Internship	Others			
			✓									

Subject Code: HMAC22I06	Subject Name	Ty/Lb/ETL	L	T/S.Lr	P/R	C
	PEDAGOGY STUDIES	Ty	2	0/0	0/0	0

Unit I **6 Hrs**

Introduction and Methodology:

- Aims and rationale, Policy background, Conceptual framework and terminology
- Theories of learning, Curriculum, Teacher education
- Conceptual framework, Research questions
- Overview of methodology and Searching

Unit II **6 Hrs**

- Thematic overview: Pedagogical practices are being used by teachers informal and informal classrooms in developing countries
- Curriculum, Teacher education

Unit III **6 Hrs**

- Evidence on the effectiveness of pedagogical practices
- Methodology for the indepthstage: quality assessment of included studies.
- How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?
- Theory of change.
- Strength and nature of the body of evidence for effective pedagogical practices
- Pedagogic theory and pedagogical approaches
- Teachers' attitudes and beliefs and Pedagogic strategies

Unit IV **6 Hrs**

- Professional development: alignment with classroom practices and follow-up support
- Peer support
- Support from the head teacher and the community
- Curriculum and assessment
- Barriers to learning: limited resources and large class sizes

Unit V **6 Hrs**

Research gaps and future directions

- Research design
- Contexts

- Pedagogy
- Teacher education
- Curriculum and assessment
- Dissemination and research impact.

Total Hrs: 30

Suggested reading

1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2):245-261.
2. AgrawalM(2004)Curricularreforminschools:Theimportanceofevaluation,JournalofCurriculumStudies,36(3):361-379.
3. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project(MUSTER)country report1.London: DFID.
4. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basicmaths and reading in Africa: Does teacher preparation count? International Journal EducationalDevelopment,33(3):272–282.
5. AlexanderRJ(2001)Cultureandpedagogy:Internationalcomparisonsinprimaryeducation.OxfordandBoston:Blackwell.
6. ChavanM(2003)ReadIndia:Amassscale,rapid,'learningtoread'campaign.
7. www.pratham.org/images/resource%20working%20paper%202.pdf.

Subject Code: **HMAC22I07**	Subject Name : **STRESS MANAGEMENT BY YOGA**	**Ty/Lb/ETL**	**L**	**T/S.Lr**	**P/R**	**C**
	Prerequisite: NIL	Ty	2	0/0	0/0	0

L : Lecture T : Tutorial S.Lr : Supervised Learning P : Project R : Research C: Credits
Ty/Lb/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVES :

- To introduce health psychology and arrive at the introduction to the philosophy and practice of yoga.

COURSE OUTCOMES (COs) : (3- 5) : At the end of this course the students would be able to

CO1	Compile the models of health and the psychological component of health
CO2	Classify healthy behavior and health compromising behavior
CO3	Deduce the impact of stress on health and apply effective stress management strategies
CO4	Extrapolate the role of yoga in health care

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	3	3	--	--	--	--	--	3	3
CO2	3	3	2	--	--	--	--	3	3
CO3	3	3	2	--	--	--	1	3	3
CO4	3	3	2	--	--	--	1	3	3

Mapping of Course Outcomes (COs) with Program Specific Outcomes (PSOs)

COs/PSOs	**PSO1**	**PSO2**	**PSO3**
CO1	1	3	2
CO2	3	3	1
CO3	1	3	2
CO4	1	3	1

3/2/1 indicates Strength of Correlation 3- High, 2- Medium, 1-Low

Category	Program Core	Program Elective	**Humanities and Social Science**	Open Elective	Skill Enhancing Elective	Inter Disciplinary / Allied	Skill Component	Practical / Project / Internship	Others			
			✓									

Subject Code : HMAC22I07	Subject Name : STRESS MANAGEMENT BY YOGA	Ty/Lb/ETL	L	T/SLr	P/R	C
	Prerequisite : None	Ty	2	0/0	0/0	0

Unit 1 **6 Hrs**

Understanding Stress: Stress and lifestyle disorders: Meaning and definition, development of stress; nature of stressors: Frustration, pressure; Factors predisposing stress: life events and daily hassles; Burnout. Coping with stress: Problem oriented and emotion oriented. Stress management: Meaning and definition; Changing thoughts, behavior and physiological responses.

Unit 2 **10 Hrs**

Yoga Philosophy: Introduction to Yoga and Yogic Practices – Definition, History, Aim and Objectives, Four Paths of Yoga and Principles of Yoga, Hatha Yoga – Distinction between Yoga and Non Yogic Practices, Concept of Yogic diet, Purpose and Utility of Asanas in Hatha Yoga , Introduction to Patanjali,

Unit 3 **14 Hrs**

Yoga in Health Care: Yoga for specific lifestyle disorders: Asthma, Sleeplessness, Diabetes, Blood pressure and Heart Diseases. Research evidence on the impact of yoga intervention on lifestyle disorders.Halasana and Matsyasana for Thyroid, Dhanurasana and Bhujangasana for Polycystic Ovarian Syndrome Disease, Shishuasana and Adho Mukha Svanasana for Arthritis, SuptaMatsyendrasana and Vrikshasana for Lower back pain, ArdhaMatsyendrasana and Chakrasana for Diabetes, Apanasana and Paschimottanasana for Indigestion and Stomach Disorder, Padmasana and Sirsasana for Migraine, BaddhaKonasana and Sukhasana for Depression, Balasana and Shavasana for Sleeplessness. Evaluation of the applications of psychological knowledge in the area of health and identification of gaps.

Total Hrs: 30

Reference Books

1. Taylor, S.E (2006). Health Psychology. New Delhi: Tata McGraw Hill
2. Serafini, E.P & Smith T.W. (2012). Health Psychology: Bio psychosocial Interventions. New Delhi: Wiley
3. Hatha Yoga Pradipika by Swami Svatmarama.
4. BKS Iyengar (2013). YOGA - The Path to Holistic Health

Subject Code: **HMAC22I08**	**Subject Name** **PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS**	**Ty/Lb/ETL**	**L**	**T/S.Lr**	**P/R**	**C**
	Pre requisite :Nil	Ty	2	0/0	0/0	0

L : Lecture T : Tutorial S.Lr : Supervised Learning P : Project R : Research C: Credits
Ty/Lb/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVES :

- To learn to achieve the highest goal happily,
- To become a person with stable mind, pleasing Personality and determination.
- To awaken wisdom in student

COURSE OUTCOMES (COs) : (3- 5) : At the end of this course the students would be able to

CO1	Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life
CO2	The person who has studied Geeta will lead the nation and mankind to peace and prosperity
CO3	Study of Neetishatakam will help in developing versatile personality of students.

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	1	1	1	1	1	3	1	1	1
CO2	1	1	1	1	1	3	1	1	1
CO3	1	1	1	1	1	3	1	1	1

Mapping of Course Outcomes (COs) with Program Specific Outcomes (PSOs)

COs/PSOs	**PSO1**	**PSO2**	**PSO3**
CO1	1	1	1
CO2	1	1	1
CO3	1	1	1

3/2/1 indicates Strength of Correlation 3- High, 2- Medium, 1-Low

Category	Program Core	Program Elective	**Humanities and Social Science**	Open Elective	Skill Enhancing Elective	Inter Disciplinary / Allied	Skill Component	Practical / Project / Internship	Others			
			✓									

Subject Code: HMAC22I08	Subject Name : PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS	Ty/Lb/ETL	L	T/SLr	P/R	C
	Prerequisite : None	Ty	2	0/0	0/0	0

Unit 1 **10 Hrs**

Neetisatakam- Holistic development of personality

- Verses-19,20,21,22(wisdom)
- Verses- 29,31,32 (pride&heroism)
- Verses-26,28,63,65(virtue)
- Verses-52,53,59(dont's)
- Verses-71,73,75,78(do's)

Unit I1 **10 Hrs**

- Approach to day to day work and uties.
- Shrimad Bhagwad Geeta:Chapter 2-Verses41,47,48,
- Chapter 3-Verses13,21,27,35
- Chapter6-Verses5,13,17,23,35,
- Chapter18-Verses45,46,48

Unit II1 **10 Hrs**

- Statements of basic knowledge.
- ShrimadBhagwadGeeta:Chapter2-Verses56,62,68
- Chapter 12 -Verses13,14,15,16,17,18
- Personality of Role model. Shrimad Bhagwad Geeta
- Chapter2-Verses17
- Chapter3-Verses36,37,42,
- Chapter 4-Verses18,38,39
- Chapter18–Verses37,38,63

Total Hrs:30

Suggested reading

1. Srimad Bhagavad Gita"by SwamiSwarupan and a Advaita Ashram (Publication
2. Department), Kolkata
3. Bhartrihari'sThree Satakam (Niti-sringar-vairagya) byP.Gopinath,
4. Rashtriya Sanskrit Sansthanam, NewDelhi.

Subject Code : HMAC22I09	Subject Name : LIFE SKILLS	Ty/Lb/ETL	L	T/SLr	P/R	C
	Prerequisite : None	Ty	2	0/0	0/0	0

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES :

- Understand the positive effect of being open to experiences
- Be familiar with impulse control and pro social behaviour
- Describe emotional intelligence, social intelligence, and integrative thinking for effective Leadership
- Describe basic managerial skills. And self-management skills.

COURSE OUTCOMES (Cos) : (3 – 5)
Students completing the course were able to

CO1	Develop the tendency to accept self and others unconditionally
CO2	Regulate their emotional impulsivity and demonstrate pro social behaviour
CO3	Inculcate emotional and social intelligence and integrative thinking for effective Leadership.
CO4	Demonstrate a set of practical skills such as time management, self-management, handling conflicts, and team leadership.
CO5	Create and maintain an effective and motivated team to work for the society

Mapping of Course Outcomes with Program Outcomes (POs)

Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	--	--	1	--	3	2	2	--	--	1	--	3
CO2	--	--	1	--	3	2	1	--	1	1	1	1
CO3	--	2	1	--	3	3	1	--	2	1	2	1
CO4	2	2	1	--	3	3	2	--	3	3	2	1
CO5	1	2	1	--	3	3	2	--	2	1	--	3

3/2/1 indicates Strength of Correlation 3- High, 2- Medium, 1-Low

Category	Program Core	Program Elective	**Humanities and Social Science**	Open Elective	Skill Enhancing Elective	Inter Disciplinary / Allied	Skill Component	Practical / Project / Internship		
			✓							

Subject Code : HMAC22I09	Subject Name : LIFE SKILLS	Ty/Lb/ETL	L	T/SLr	P/R	C
	Prerequisite : None	Ty	2	0/0	0/0	0

Unit 1 **6 Hrs**

Openness to experience: developing the tendency to accept and appreciate self and others, the Insights, ideas, values, feelings, and behaviors, cultivate willingness to try new things as well as engage in imaginative and intellectual activities, and creative thinking "thinking outside of the box." Skills.

UnitII **6 Hrs**

Conscientiousness- developing the ability to regulate their impulse control in order to engage in goal-directed behaviors, managing negative emotions such as anger, worry, and sadness and Developing organized and structured approach

Unit III **6 Hrs**

Pro social behavior: developing trust, altruism, kindness, affection, empathetic understanding, Sharing, comforting and cooperating, Assertiveness, emotional expressiveness and social interaction.

Unit IV **6 Hrs**

Innovative leadership Understanding: Concept of emotional and social intelligence, the persona of a leader for deriving holistic inspiration, Drawing insights for leadership, leadership qualities essential to sail through difficult situations, Importance of ethics, Ethical decision-making, Personal and professional moral codes of conduct, Creating a harmonious life.

Unit V **6 Hrs**

Management Skills: Basic Managerial Skills - Planning for Effective Management, Organize Teams, Delegation of Tasks, Time Management, Conflict and Stress Management, Self-management Skills - Understanding Self-concept, Developing Self-awareness, Self-examination, Self-reflection and introspection, Self-regulation.

Total Hrs:30

References and Suggested Readings

1. A.Pervin& O. P. John (Eds.), Handbook of personality: Theory and research (Vol. 2, pp. 102–138). New York: Guilford Press.
2. Harry Beilin (1982) The Development of Prosocial Behavior, Academic Press
3. Ashokan, M. S. 2015. Karmayogi: A Biography of E. Sreedharan. London: Penguin.
4. O'Toole, J. 2019. The Enlightened Capitalists: Cautionary Tales of Business Pioneers Who Tried to Do Well by Doing Good. New York Harper Collins
5. Brown, T. 2012. Change by Design. Harper Business, New , New York
6. Lynn A.B. 2015. The Emotional Intelligence Activity Book: 50 Activities for Promoting EQ at Work, Gildan Media Corporation, New York
7. Kelly T., and Kelly D. 2014. Creative Confidence: Unleashing the Creative Potential Within Us All. William Collins Harper Collins Publishers India
8. Kurien, V., and Salve, G. 2012. I Too Had a Dream. Roli Books Private Limited New Delhi
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10. Collins Jim. 2001. Good to Great. New York: Harper Business, 136 Life Skills (JeevanKaushal) Facilitators' Manual 2022
11. Covey, Stephen R. 2020. 30th ed. The 7 Habits of Highly Effective People. New Delhi: Simon & Schuster.

12. Dawkins E.R. 2016. 52 Weeks of Self Reflection—Your Guided Journal of Self Reflection. A B Johnson Publishing, United States
13. Drucker, Peter F. 2006. The Effective Executive. New York: Harper Business.
14. Goleman D. 1995. Emotional Intelligence. New Delhi: Bloomsbury Publishing India Private Limited.
15. Robbins S. P., Coulter M., and Fernandez A. 2019. Management. 14th edition. Noida, India: Pearson Education.