

<b>ADVANCES IN OPERATING SYSTEMS</b>			
Course Code	<b>MSCS201</b>	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	3
<b>Course Learning objectives:</b>			
<ul style="list-style-type: none"> <li>Analyze the characteristics of operating systems for multiprocessor and multicomputer architectures.</li> <li>Understand and address the challenges related to designing operating systems.</li> <li>Explore the latest trends in developing mobile operating systems.</li> <li>Evaluate the implications of these trends on performance and user experience.</li> </ul>			
<b>Module-1</b>			
Multiprocessor Operating Systems: System Architectures- Structures of OS – OS design issues – Process synchronization – Process Scheduling and Allocation- Memory Management.			
<b>Teaching- Learning Process</b>	Chalk and talk and PPT		
<b>Module-2</b>			
Distributed Operating Systems: System Architectures- Design issues – Communication models – clock synchronization – mutual exclusion – election algorithms- Distributed Deadlock detection.			
<b>Teaching- Learning Process</b>	Chalk and talk and PPT		
<b>Module-3</b>			
Distributed scheduling - Distributed shared memory - Distributed File system – Multimedia file systems - File placement – Caching.			
<b>Teaching- Learning Process</b>	Chalk and talk and PPT		
<b>Module-4</b>			
Database Operating Systems: Requirements of Database OS – Transaction process model – Synchronization primitives - Concurrency control algorithms.			
<b>Teaching- Learning Process</b>	Chalk and talk and PPT		
<b>Module-5</b>			
Mobile Operating Systems: ARM and Intel architectures - Power Management - Mobile OS Architectures - Underlying OS - Kernel structure and native level programming - Runtime issues- Approaches to power management.			

<b>Teaching- Learning Process</b>	Chalk and talk and PPT
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### Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

#### Continuous Internal Evaluation:

- Two Unit Tests each of **25 Marks**
- Two assignments each of **25 Marks or one-skill Development Activity of 50 marks**

to attain the COs and POs

The sum of two tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

**CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

#### Semester-End Examination:

1. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
2. The question paper will have ten full questions carrying equal marks.
3. Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.
4. Each full question will have a sub-question covering all the topics under a module.
5. The students will have to answer five full questions, selecting one full question from each module

#### Suggested Learning Resources:

##### Text Books

1. M Singhal and NG Shivaratri , Advanced Concepts in Operating Systems, Tata McGraw Hill Inc, 2001

##### Reference Books

1. A S Tanenbaum, Distributed Operating Systems, Pearson Education Asia, 2001
2. Source Wikipedia, Mobile Operating Systems, General Books LLC, 2010

#### Skill Development Activities Suggested

- The students with the help of the course teacher can take up relevant technical-activities which will enhance their skill. The prepared report shall be evaluated for CIE marks.

#### Course outcome (Course Skill Set)

At the end of the course the student will be able to :

Sl.No.	Description	BloomsLevel
CO1	Analyze the characteristics of operating systems for multiprocessor and multicomputer architectures.	L2
CO2	Understand and address the challenges related to designing operating systems and their implications.	L3
CO3	Explore the latest trends in developing mobile operating systems and evaluate their impact on performance.	L4

**Mapping of COS and POs:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	x		x									
CO2	x	x		x	x		x					
CO3	x		x	x								

**Program Outcome of this course :**

Sl. No.	Description	POs
1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and computer science and business systems to the solution of complex engineering and societal problems.	PO1
2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering and business problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	PO2
3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	PO3
4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	PO4
5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations	PO5
6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering and business practices.	PO6
7	Environment and sustainability: Understand the impact of the professional engineering solutions in business societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	PO7
8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering and business practices.	PO8
9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	PO9
10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	PO10
11	Project management and finance: Demonstrate knowledge and understanding of the engineering, business and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.	PO11
12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.	PO12

<b>ETHICAL HACKING</b>			
Course Code	<b>MSFC202</b>	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	3:0:1	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	04	Exam Hours	03
<p><b>Course Learning objectives:</b></p> <ul style="list-style-type: none"> <li>● Describe about the foot printing and Enumeration techniques.</li> <li>● Demonstrate the encrypting file system and folder permission.</li> <li>● Identify the hacking and different type of hacking.</li> <li>● Discuss the types of attacks and services.</li> </ul>			
<b>Module-1</b>			
<p><b>Introduction to ethical hacking:</b> Fundamentals of computer networking. TCP/IP protocol stacks. Casing the Establishment: What is foot printing, Internet Foot printing, Scanning, Enumeration, basic banner grabbing, Enumerating Common Network services. Case study: Network Security Monitoring.</p>			
<b>Teaching-Learning Process</b>	Chalk and talk and PPT		
<b>Module-2</b>			
<p><b>Securing permission:</b> Securing file and folder permission, Using the encrypting file system, Securing registry permissions. Securing service: Managing service permission, Default services in windows 2000. Unix: The Quest for Root, Remote Access vs Local access, Remote access, Local access, After hacking root.</p>			
<b>Teaching-Learning Process</b>	Chalk and talk/ Power point presentation/Web resources, Give an assignment for write an article about file and folder permission & encryption.		
<b>Module-3</b>			
<p>VPN hacking, VoIP Spoofing, GPS Spoofing, Brute-Force Scripting, Voice mail hacking, VPN hacking, Network Devices: Discovery Autonomous System Lookup, Social Media, Service Detection, Network Vulnerability, Detecting Layer 2 Media.</p>			
<b>Teaching-Learning Process</b>	Chalk and talk and PPT		
<b>Module-4</b>			
<p><b>Wireless Hacking:</b> Wireless Foot printing, Wireless Scanning and Enumeration, Gaining Access, Tools that exploiting WEP Weakness, Denial of Services Attacks, Firewalls: Firewalls landscape, Firewall Identification Scanning Through firewalls, packet Filtering, Application Proxy Vulnerabilities, Denial of Service Attacks, Motivation of Dos Attackers, Types of DoS attacks, Generic Dos Attacks, UNIX and Windows DoS, DDoS.</p>			

<b>Teaching-Learning Process</b>	Chalk and talk and PPT
<b>Module-5</b>	
<p><b>Remote Control Insecurities:</b> Discovering Remote Control Software, Connection, Weakness.VNC, Microsoft Terminal Server and Citrix ICA, Advanced Techniques Session Hijacking, Back Doors, Trojans, Cryptography, Subverting the systems Environment, Social Engineering, Web Hacking, Web server hacking web application hacking, Hacking the internet Use, Malicious Mobile code, SSL fraud, E-mail Hacking, IRC hacking, Global countermeasures to Internet User Hacking. APT case study</p>	
<b>Teaching-Learning Process</b>	Chalk and talk and PPT
<p><b>Assessment Details (both CIE and SEE)</b>  The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.</p> <p><b>Continuous Internal Evaluation:</b></p> <ul style="list-style-type: none"> <li>● Two Unit Tests each of <b>25 Marks</b></li> <li>● Two assignments each of <b>25 Marks or one-skill Development Activity of 50 marks</b> to attain the COs and POs</li> </ul> <p>The sum of two tests, two assignments/skill Development Activities, will be <b>scaled down to 50 marks</b></p> <p><b>CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.</b></p> <p><b>Semester End Examination:</b></p> <ol style="list-style-type: none"> <li>1. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.</li> <li>2. The question paper will have ten full questions carrying equal marks.</li> <li>3. Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.</li> <li>4. Each full question will have a sub-question covering all the topics under a module.</li> </ol> <p>The students will have to answer five full questions, selecting one full question from each module <b>Suggested Learning Resources:</b></p> <p><b>Text Books</b></p> <ol style="list-style-type: none"> <li>1. Stuart McClure, Joel Scambray and Goerge Kurtz , Hacking Exposed 7: Network Security Secrets &amp; Solutions, Tata McGraw Hill Publishers, 2012</li> <li>2. Kit Bensmith, and Brian Komer ,Microsoft Windows Security Resource Prentice Hall of India</li> </ol> <p><b>Reference Books</b></p> <ol style="list-style-type: none"> <li>1. Gray Hat Hacking The Ethical Hackers Handbook Allen Harper, Shon Harris, Jonathan Ness, Chris Eagle McGraw-Hill Osborne Media paperback 3rd Edition.2011</li> </ol> <p><b>Web links and Video Lectures (e-Resources):</b></p>	

- [https://www.simplilearn.com/cyber-security/ceh-certification?utm\\_source=google&utm\\_medium=cpc&utm\\_term=&utm\\_content=1632205197-79872225071-377654317159&utm\\_device=c&utm\\_campaign=Search-TechCluster-Cyber-OthersNew-IN-Main-AllDevice-adgroup-DSA-Category-Page&gclid=CjwKCAjwg5uZBhATEiwAhhRLHpJKcI-8Jzytg1p9ByQBrSs1Pe5R0GcklMm-sGq3foLJah3xJ0z3lhoCSPMQAvD\\_BwE](https://www.simplilearn.com/cyber-security/ceh-certification?utm_source=google&utm_medium=cpc&utm_term=&utm_content=1632205197-79872225071-377654317159&utm_device=c&utm_campaign=Search-TechCluster-Cyber-OthersNew-IN-Main-AllDevice-adgroup-DSA-Category-Page&gclid=CjwKCAjwg5uZBhATEiwAhhRLHpJKcI-8Jzytg1p9ByQBrSs1Pe5R0GcklMm-sGq3foLJah3xJ0z3lhoCSPMQAvD_BwE).

- <https://hackr.io/blog/best-ethical-hacking-courses>

- <https://www.udemy.com/topic/ethical-hacking>

[https://onlinecourses.nptel.ac.in/noc19\\_cs68/preview](https://onlinecourses.nptel.ac.in/noc19_cs68/preview)

### Course outcome (Course Skill Set)

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	Explain aspects of security, importance of data gathering, foot printing and system hacking.	L2
CO2	Recall and list the Default services in windows 2000 .	L1
CO3	Use the encrypting file system, Securing file and folder permission.	L3
CO4	Apply hacking technique and detect the different types of attacks.	L3

### Mapping of COs and Pos

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	x											
CO2				x								
CO3												
CO4	x		x									

### Program Outcome of this course :

Sl. No.	Description	POs
1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and computer science and business systems to the solution of complex engineering and societal problems.	PO1
2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering and business problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	PO2
3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	PO3
4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	PO4
5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations	PO5
6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering and business practices.	PO6

7	Environment and sustainability: Understand the impact of the professional engineering solutions in business societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	PO7
8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering and business practices.	PO8
9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	PO9
10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	PO10
11	Project management and finance: Demonstrate knowledge and understanding of the engineering, business and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.	PO11
12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.	PO12

## BLOCKCHAIN TECHNOLOGY

Course Code	MSFC203	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

### Course Learning objectives:

1. To explore the driving force behind the cryptocurrency Bitcoin. Along with the Decentralization,

#### Module-1

Blockchain 101: Distributed systems, History of blockchain, Introduction to blockchain, Types of blockchain, CAP theorem and blockchain, Benefits and limitations of blockchain.

<b>Teaching Learning Process</b>	Chalk and talk and PPT
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#### Module-2

Decentralization and Cryptography: Decentralization using blockchain, Methods of decentralization, Routes to decentralization, Decentralized organizations. Cryptography and Technical Foundations: Cryptographic primitives, Asymmetric cryptography, Public and private keys

<b>Teaching- Learning Process</b>	Chalk and talk and PPT
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#### Module-3

Bitcoin and Alternative Coins A: Bitcoin, Transactions, Blockchain, Bitcoin payments B: Alternative Coins, Theoretical foundations, Bitcoin limitations, Namecoin, Litecoin, Primecoin, Zcash

<b>Teaching Learning Process</b>	Chalk and talk and PPT
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#### Module-4

Smart Contracts and Ethereum 101: Smart Contracts: Definition, Ricardian contracts. Ethereum 101: Introduction, Ethereum blockchain, Elements of the Ethereum blockchain, Precompiled contracts.

<b>Teaching Learning Process</b>	Chalk and talk and PPT
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#### Module-5

Alternative Blockchains: Blockchains Blockchain-Outside of Currencies: Internet of Things, Government, Health, Finance, Media

<b>Teaching- Learning Process</b>	Chalk and talk and PPT
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### Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

#### Continuous Internal Evaluation:

- Two Unit Tests each of **25 Marks**
- Two assignments each of **25 Marks or one-skill Development Activity of 50 marks** to attain the COs and POs

The sum of two tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

**CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

#### Semester End Examination:

5. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
6. The question paper will have ten full questions carrying equal marks.
7. Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.
8. Each full question will have a sub-question covering all the topics under a module.
9. The students will have to answer five full questions, selecting one full question from each module

#### Suggested Learning Resources:

##### Text Books:

1. *Bitcoin and Cryptocurrency Technologies*, Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, Steven Goldfeder, Princeton University, 2016

##### Reference Books:

1. *Blockchain Basics: A Non-Technical Introduction in 25 Steps*, Daniel Drescher, Apress, First Edition, 2017
2. *Mastering Bitcoin: Unlocking Digital Cryptocurrencies*, Andreas M. Antonopoulos, O'Reilly Media, First Edition, 2014

#### Web links and Video Lectures (e-Resources):

- <https://nptel.ac.in/courses/106105184>
- [https://ocw.mit.edu/courses/15-s12-blockchain-and-money-fall-2018/video\\_galleries/video-lectures/](https://ocw.mit.edu/courses/15-s12-blockchain-and-money-fall-2018/video_galleries/video-lectures/)

#### Skill Development Activities Suggested

The students with the help of the course teacher can take up relevant technical –activities which will enhance their skill. The prepared report shall be evaluated for CIE marks.

#### Course outcome (Course Skill Set)

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	Interpret the types, benefits and limitation of blockchain.	L1
CO2	Explore the blockchain decentralization and cryptography concepts.	L2
CO3	Enumerate the Bitcoin features and its alternative options.	L1

Mapping of COS and POs												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		x		x			x					
CO2	x			x								
CO3		x								x		

  

Program Outcome of this course		
Sl. No.	Description	POs
1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and computer science and business systems to the solution of complex engineering and societal problems.	PO1
2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering and business problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	PO2
3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	PO3
4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	PO4
5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations	PO5
6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering and business practices.	PO6
7	Environment and sustainability: Understand the impact of the professional engineering solutions in business societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	PO7
8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering and business practices.	PO8
9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	PO9
10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	PO10
11	Project management and finance: Demonstrate knowledge and understanding of the engineering, business and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.	PO11
12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.	PO12

## FILE SYSTEM FORENSIC ANALYSIS

Course Code	<b>MSFC214A</b>	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

### Course Learning objectives:

- Explore Volume analysis.
- Illustrate the File system analysis.
- Define NTFS Concepts and Ext2 & Ext3.
- Illustrate the working of UFS2 & UFS2.

### Module-1

Computer foundations: Data organizations, booting process, Hard disk technology, Hard disk data acquisition- introduction, reading the source data, writing the output data. Volume Analysis: Introduction, Background, Analysis Basics, Summary. PC-based Partitions: DOS Partitions, Analysis Considerations, Apple Partitions, Removable Media. Server-based Partitions: BSD Partitions, Sun Solaris Slices, GPT Partitions

<b>Teaching-Learning Process</b>	Chalk and talk and PPT
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### Module-2

File System Analysis: What Is a File System?, File System Category, Content Category, Metadata Category, File Name Category, Application Category, Application-level Search Techniques, Specific File Systems FAT Concepts and Analysis: Introduction, File System Category, Content Category, Metadata Category, File Name Category, The Big Picture.

<b>Teaching-Learning Process</b>	Chalk and talk and PPT
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### Module-3

NTFS Concepts: Introduction, Everything is a File, MFT Concepts, MFT Entry Attribute Concepts, Other Attribute Concepts, Indexes, Analysis Tools. NTFS Analysis: File System Category, Content Category, Metadata Category, File Name Category, Application Category, The Big Picture. NTFS Data Structures: Basic Concepts, Standard File Attributes, Index Attributes and Data Structures.

<b>Teaching-Learning Process</b>	Chalk and talk and PPT
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### Module-4

Ext2 and Ext3 Concepts and Analysis: Introduction, File System Category, Content Category, Metadata Category, File Name Category, Application Category. The Big Picture. Ext2 and Ext3 Data Structures: Superblock, Group Descriptor Tables, Block Bitmap, Inodes, Extended Attributes.

<b>Teaching-Learning Process</b>	Chalk and talk and PPT
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### Module-5

UFS1 and UFS2 Concepts and Analysis: Introduction, File System Category, Content Category, Metadata Category, File Name Category, The Big Picture. UFS1 and UFS2 Data Structures: UFS1 Superblock, UFS2 Superblock, Cylinder Group Summary, UFS1 Group Descriptor, UFS2 Group Descriptor.

**Teaching-Learning Process**

Chalk and talk and PPT

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation:**

- Two Unit Tests each of **25 Marks**
- Two assignments each of **25 Marks or one skill Development Activity of 50 marks** to attain the COs and POs

The sum of two tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

**CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

**Semester End Examination:**

1. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
2. The question paper will have ten full questions carrying equal marks.
3. Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.
4. Each full question will have a sub-question covering all the topics under a module.
5. The students will have to answer five full questions, selecting one full question from each module

**Suggested Learning Resources:**

**Text Books**

1. *File System Forensic*, Brian Carrier, Pearson Education, 2005
2. *Digital Evidence and Computer Crime*, Casey Eoghan, Academic Press, Edition 3, 2011.

**Reference Books**

1. Introduction to Linux A Hands-On Guide, MachteltGarrels, Fultus CorporationPublisher, Third Edition 2010.
2. Computer Forensics, Warren and Jay Heiser, Kruse, Addison Wesley, 2002.
3. Guide to Computer Forensics and Investigations, Bill Nelson, Amelia Phillips, Frank Enfinger, Chris Steuart, Thomson Course Technology, 2004
4. Forensic Discovery, Dan Farmer & WietseVenema, Addison Wesley, 2005

**Web links and Video Lectures (e-Resources):**

- <https://www.youtube.com/watch?v=2ESqwX3qb94>

**Skill Development Activities Suggested**

The students with the help of the course teacher can take up relevant technical –activities which will enhance their skill. The prepared report shall be evaluated for CIE marks.

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	Explain the foundation of digital investigation and methods of data analysis	L2
CO2	Illustrate the role of computer forensics in the business and private world	L2
CO3	Identify some of the current techniques and tools for forensic examinations	L2
CO4	Familiarize the NTFS file systems	L2

**Mapping of COS and POs**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1				X								X
CO2		X			x				X			
CO3	X											X

**Program Outcome of this course**

Sl. No.	Description	POs
1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and computer science and business systems to the solution of complex engineering and societal problems.	Po1
2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering and business problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	PO2
3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	PO3
4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	PO4
5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations	PO5
6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering and business practices.	PO6
7	Environment and sustainability: Understand the impact of the professional engineering solutions in business societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	PO7
8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering and business practices.	PO8
9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	PO9

10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	PO10
11	Project management and finance: Demonstrate knowledge and understanding of the engineering, business and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.	PO11
12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.	PO12

<b>CYBER THREAT SIMULATION MANAGEMENT</b>			
Course Code	<b>MSFC214B</b>	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
<b>Course Learning objectives:</b>			
<ul style="list-style-type: none"> <li>● To identify different types of threats for management.</li> <li>● To recognize the vulnerability in the digital society. <ul style="list-style-type: none"> <li>● To use trends and identifying the risk councils and worst occurs.</li> </ul> </li> </ul>			
<b>Module-1</b>			
<p><b>The Cyber Threat to the Corporate Brand:</b> The Rise of Cyber Organized Crime and Its Global Impact, Is Nothing Sacred? The Liberty Reserve Case: Money Laundering in the Digital Age, The Corruption Factor, Information Threat, Physical Threat, The Emergence of the Cyber Nation-State and Technology Espionage, A Case of Cyber Espionage Conspiracy? According to the Select Committee</p>			
<b>Teaching- Learning Process</b>	Chalk and talk and PPT		
Module-2			
<p><b>Corporate Vulnerabilities in the Digital Society:</b> What Is the True Cost of a Cyber Attack? Cyber Attack Detection Sometimes Takes Years, One of the First Questions: “How Much Will This Cost?” A Few Common Cost Factors, What About Unreported Breaches? Cyber Attacks Result in a Wider Impact: The Community, U.S. Cyber Public Policy, No Guarantees with this Executive Order, Government-Industry Cooperation: No Silver Bullet, The Challenge of Defining Cyber Public Policy, Cold War II: The Cyber Chapter, Is There a Silver Lining in an Attack?</p>			
<b>Teaching- Learning Process</b>	Chalk and talk and PPT		
Module -3			
<p><b>Four Trends Driving Cyber Breaches and Increasing Corporate Risk:</b> Technology Trend, Loss of Situational Awareness: Distraction, Culture, Technology is a Double-Edged Sword, Social Media and Digital Protest, Social Media: A Tool for Disruption, a Model for Change, The Hacker Group Anonymous, Anarchaos: In the Image of Anonymous.</p>			
<b>Teaching- Learning Process</b>	Chalk and talk and PPT		
Module -4			
<p><b>Managing the Brand When the Worst Occurs:</b> Be Prepared, Managing the Big Risk, Background Investigation Suggestions to Improve Process, Risk-Reinforced Service Level Agreements, Clouds Fill the Horizon.</p>			
<b>Teaching- Learning Process</b>	Chalk and talk and PPT		
Module -5			
<p><b>Creating Executive Cyber Risk Councils:</b> The Goal of the Executive Cyber Risk Council, Who Should be Included in the Executive Risk Council? Early Warnings, Technical Signals Are There—But You've Got to Look, Know Who's Inside the Enterprise, What a Web we Weave... When Surfing.</p>			
<b>Teaching- Learning Process</b>	Chalk and talk and PPT		

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation:**

- Two Unit Tests each of **25 Marks**
- Two assignments each of **25 Marks or one skill Development Activity of 50 marks** to attain the COs and POs

The sum of two tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

**CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

**Semester End Examination:**

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
- The question paper will have ten full questions carrying equal marks.
- Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.
- Each full question will have a sub-question covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module

**Suggested Learning Resources:****TextBook:**

1. Cyber Threat!: How to Manage the Growing Risk of Cyber Attacks by MacDonnell Ulsch, Wiley, 2014

**Reference Book:**

1. Jerry M. Couretas , An Introduction to Cyber Modeling and Simulation, Wiley, 2018

**Web links and Video Lectures (e-Resources):**

- <https://www.tonex.com/training-courses/cyber-threat-simulation-training/>
- <https://www.youtube.com/watch?v=7Y6o8-0U7Mk>
- [https://www.youtube.com/watch?v=YoXgTC\\_yMH4](https://www.youtube.com/watch?v=YoXgTC_yMH4)

**Skill Development Activities Suggested**

- The students with the help of the course teacher can take up relevant technical activities which will enhance their skill. The prepared report shall be evaluated for CIE marks.



### Course outcome (Course Skill Set)

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	Describe the different types of threats for management.	L2
CO2	Recognize the vulnerability in the digital society.	L1
CO3	Use trends and identifying the risk councils and worst occurs	L3

### Mapping of COS and POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	x											
CO2			x			X						
CO3				x								

### Program Outcome of this course

Sl. No.	Description	POs
1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and computer science and business systems to the solution of complex engineering and societal problems.	Po1
2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering and business problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	PO2
3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	PO3
4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	PO4
5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations	PO5
6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering and business practices.	PO6
7	Environment and sustainability: Understand the impact of the professional engineering solutions in business societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	PO7
8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering and business practices.	PO8
9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	PO9
10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	PO10

11	Project management and finance: Demonstrate knowledge and understanding of the engineering, business and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.	PO11
12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.	PO12

## SECURED PROGRAMMING

Course Code	<b>MSFC214C</b>	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

### Course Learning objectives:

- Study the Pre processor and Declaration of Variables.
- Define the Expression, Integer and floating point number representation.
- Demonstrate the Arrays, Strings and memory management concepts.
- Explain Signal and Error handling concepts.

### Module-1

Pre-processor, Declarations and Initializations: universal character name through concatenation, arguments to unsafe macros, invocations of function-like macros. Declare objects with appropriate storage durations, Identifier declaration with conflict linkage classifications, Using correct syntax for declaring flexible array member, Avoiding information leakage in structure padding, Incompatible declarations of same function or object

<b>Teaching-Learning Process</b>	Chalk and talk and PPT
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### Module-2

Expressions and Integer : Dependence on evaluation order for side effects: Reading uninitialized memory and dereferencing null pointers, Modifying objects with temporary lifetime, Accessing variable through (pointer) incompatible type, Modifying constant objects and comparing padding data. Wrapping of unsigned integers, Integer conversions and misrepresented data, Integer overflow and divide by zero errors, Shifting of negative numbers, Using correct integer precisions, Pointer conversion to integer and vice versa.

<b>Teaching-Learning Process</b>	Chalk and talk and PPT
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### Module-3

Floating Point, Arrays and Strings: Floating point values for counters: Domain and range errors in math functions, Floating point conversions and preserving precision. Out of bounds subscripts and valid length arrays, Comparing array pointers, Pointer arithmetic for non-array object, scaled integer. Modifying string literals, Space allocation for strings (Null terminator), Casting large integers as unsigned chars, Narrow and wide character strings and functions.

<b>Teaching-Learning Process</b>	Chalk and talk and PPT
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### Module-4

Memory Management , I/O:Accessing freed memory: Freeing dynamically allocated memory, Computing memory allocation for an object, Copying structures containing flexible array members, Modifying object alignment by using realloc. User input and format strings, Opening an pre-opened file, Performing device operations appropriate for files, Dealing with EOF, WEOF, Copying FILE object, Careful use of fgets, fgets, getc, putc, putwc. Use of fsetops and fgetops, Accessing closed files.

<b>Teaching-Learning</b>	Chalk and talk and PPT
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**Module-5**

Environment ,Signals and Error Handling: environment pointer following an operation, system(),pointers returned by certain functions.Using asynchronous safe functions and signal handlers: Shared objects and signal handlers, Using signal() within interruptible signal handlers, Returning computation exception signal handler. Using errno: check and set, Depending upon indeterminate values of errno, Handling standard library errors.

<b>Teaching-Learning Process</b>	Chalk and talk and PPT
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**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation:**

- Two Unit Tests each of **25 Marks**
- Two assignments each of **25 Marks or one skill Development Activity of 50 marks** to attain the COs and POs

The sum of two tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

**CIE methods /question paper is designed to attain the different levels of Bloom’s taxonomy as per the outcome defined for the course.**

**outcome defined for the course.**

**Semester End Examination:**

1. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
2. The question paper will have ten full questions carrying equal marks.
3. Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.
4. Each full question will have a sub-question covering all the topics under a module.
5. The students will have to answer five full questions, selecting one full question from each module

**Suggested Learning Resources:****Text Books**

1. *The CERT® C Coding Standard: 98 Rules for Developing Safe, Reliable, and Secure Systems*, Robert C. Seacord, Addison, Wesley Professional, Second Edition, 2014

**Reference Books**

1. *Secure Programming for Linux and Unix HowTo* David Wheeler Linux Documentation project 2004.
2. *Secure Programming Cookbook for C and C++*, John Viega, Matt Messier, O'Reilly Media, 2003

**Web links and Video Lectures (e-Resources):**

- <https://youtu.be/s01A-yqOby8>

**Skill Development Activities Suggested**

The students with the help of the course teacher can take up relevant technical –activities which will enhance their skill. The prepared report shall be evaluated for CIE marks.

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	How to respond to security alerts which identifies software issues	L2
CO2	Identify possible security programming errors	L2
CO3	Define methodology for security testing and use appropriate tools in its implementation	L2
CO4	Apply new security-enhanced programming models and tools (can be attained through assignment or CIE)	L3

**Mapping of COS and POs**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												X
CO2					X					X		
CO3				X			X					X
CO4			X									X

**Program Outcome of this course**

Sl. No.	Description	POs
1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and computer science and business systems to the solution of complex engineering and societal problems.	PO1

2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering and business problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	PO2
3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	PO3
4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	PO4
5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations	PO5
6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering and business practices.	PO6
7	Environment and sustainability: Understand the impact of the professional engineering solutions in business societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	PO7
8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering and business practices.	PO8
9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	PO9
10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	PO10
11	Project management and finance: Demonstrate knowledge and understanding of the engineering, business and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.	PO11
12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.	PO12

## Steganography and Digital Watermarking

Course Code	<b>MSFC214D</b>	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

### Course Learning objectives:

- Define Information hiding and Steganography systems.
- Interpret Steganalysis techniques
- Explore watermarking techniques

### Module-1

Introduction to Information hiding: Brief history and applications of information hiding, Principles of Steganography, Frameworks for secret communication, Security of Steganography systems, Information hiding in noisy data, Adaptive versus non adaptive algorithms, Laplace filtering, Using cover models, Active and malicious attackers, Information hiding in written text, Examples of invisible communications.

<b>Teaching-Learning Process</b>	Chalk and talk and PPT
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### Module-2

Survey of steganographic techniques: Substitution system and bit plane tools, Transform domain techniques, Spread spectrum and information hiding, Statistical Steganography, Distortion and code generation techniques, Automated generation of English text.

<b>Teaching-Learning Process</b>	Chalk and talk and PPT
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### Module-3

Steganalysis: Detecting hidden information, Extracting hidden information, Disabling hidden information, Watermarking techniques, History, Basic Principles, applications, Requirements of algorithmic design issues, Evaluation and benchmarking of watermarking system.

<b>Teaching-Learning Process</b>	Chalk and talk and PPT
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### Module-4

Survey of current watermarking techniques: Cryptographic and psycho visual aspects, Choice of a workspace, binary image, audio, video. Formatting the watermark beds: Digital watermarking schemes, Spread Spectrum, DCT (Discrete Cosine Transform), Domain and Quantization schemes, Watermarking with side information, Robustness to temporal and geometric distortions.

<b>Teaching-Learning Process</b>	Chalk and talk and PPT
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### Module-5

Data Right Management: DRM Products and Laws, Fingerprints, Examples, Protocols and Codes, BonehShaw finger printing Scheme, Steganography and watermarking applications, Military, Digital copyright protection and protection of intellectual property.

<b>Teaching-Learning Process</b>	Chalk and talk and PPT
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### Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

#### Continuous Internal Evaluation:

- Two Unit Tests each of **25 Marks**
- Two assignments each of **25 Marks or one skill Development Activity of 50 marks** to attain the COs and POs

The sum of two tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

**CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

#### Semester End Examination:

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
- The question paper will have ten full questions carrying equal marks.
- Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.
- Each full question will have a sub-question covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module

#### Suggested Learning Resources:

##### Books

- Information hiding techniques for Steganography and Digital Watermarking Stefan Katzenbelsser and Fabien A. P. Petitcolas ARTECH House
- Digital Water Marking and Steganography I.J. Cox, M.L. Miller, J.Fridrich and T.Kalker Morgan Kauffman 2nd
- Information Hiding: Steganography and Watermarking -Attacks and Countermeasures Johnson, Neil F. / Duric, Zoran / Jajodia, Sushil G Advances in Information Security

##### Reference Book

1. Disappearing Cryptography: Information Hiding, Steganography and Watermarking Peter Wayner Elsevier

#### Web links and Video Lectures (e-Resources):

- <https://youtu.be/habrsC934-4>  
<https://youtu.be/habrsC934-4>



**Course outcome (Course Skill Set)**

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	Distinguish steganography & Digital watermarking from other related fields	L3
CO2	Knowledge of how to use steganography techniques in conjunction with encryption systems to protect data.	L3
CO3	Explain different types of watermarking applications and watermarking frameworks.	L2
Co4	Explore Cryptographic and psycho visual aspects	L2
CO5	Explain Data Right Management concept.	L2

**Mapping of COs and POs**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	x										x	
CO2												
CO3		x										
CO4												x
CO5												

Program Outcome of this course : x

Sl. No.	Description	POs
1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and computer science and business systems to the solution of complex engineering and societal problems.	PO1
2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering and business problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	PO2
3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	PO3
4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	PO4
5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations	PO5
6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering and business practices.	PO6
7	Environment and sustainability: Understand the impact of the professional engineering solutions in business societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	PO7
8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering and business practices.	PO8
9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	PO9

10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	PO10
11	Project management and finance: Demonstrate knowledge and understanding of the engineering, business and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.	PO11
12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.	PO12

<b>BIOMETRIC SECURITY</b>			
Course Code	<b>MSFC215A</b>	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
<b>Course Learning objectives:</b>			
<ul style="list-style-type: none"> <li>• Explain Physiological Biometric Technologies and Iris scan.</li> <li>• Able to demonstrate Handprint Biometrics, DNA Biometrics</li> <li>• Define Multi biometrics and multi factor biometrics</li> </ul>			
<b>Module-1</b>			
Biometrics: Introduction, benefits of biometrics over traditional authentication systems, benefits of biometrics in identification systems, selecting a biometric for a system, Applications, Key biometric terms and processes, biometric matching methods, Accuracy in biometric systems.			
<b>Teaching-Learning Process</b>	Chalk and talk and PPT		
<b>Module-2</b>			
Physiological Biometric Technologies: Fingerprints: Technical description, characteristics, Competing technologies, strengths, weaknesses, deployment. Facial scan: Technical description, characteristics, weaknesses, deployment. Iris scan: Technical description, characteristics, strengths, weaknesses, deployment. Retina vascular pattern: Technical description, characteristics, strengths, weaknesses, deployment. Hand scan: Technical description, characteristics, strengths, weaknesses, deployment , DNA biometrics.			
<b>Teaching-Learning Process</b>	Chalk and talk and PPT		
<b>Module-3</b>			
Behavioural Biometric Technologies: Handprint Biometrics, DNA Biometrics, signature and handwriting technology, Technical description, classification, keyboard / keystroke Dynamics, Voice, data acquisition, feature extraction, characteristics, strengths, weaknesses deployment.			
<b>Teaching-Learning Process</b>	Chalk and talk and PPT		
<b>Module-4</b>			
Multi biometrics: Multi biometrics and multi factor biometrics, two-factor authentication with passwords, tickets and tokens, executive decision, implementation plan.			
<b>Teaching-Learning Process</b>	Chalk and talk and PPT		
<b>Module-5</b>			
Case studies on Physiological, Behavioural and multifactor biometrics in identification systems.			
<b>Teaching-Learning Process</b>	Chalk and talk and PPT		

### Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

#### Continuous Internal Evaluation:

- Two Unit Tests each of **25 Marks**
- Two assignments each of **25 Marks** or **one Skill Development Activity of 50 marks** to attain the COs and POs

The sum of two tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

**CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

#### Semester End Examination:

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
- The question paper will have ten full questions carrying equal marks.
- Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.
- Each full question will have a sub-question covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module

#### Suggested Learning Resources:

##### Books

1. Data Protection: Governance, Risk Management, and Compliance, By David G. Hill,2019

##### Reference Book

2. Data Privacy and Security ,David Salomon, Spring.2003

#### Web links and Video Lectures (e-Resources):

<https://youtu.be/Abta0j826Bk>

<https://youtu.be/fQ3ESFfvchg?list=PLUtfVcb-iqn834VGI9faVXGIGSDXZMGp8>

#### Course outcome (Course Skill Set)

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	Illustrate the basics of Data protection	L2
CO2	Define GRC Puzzle	L2
CO3	Explain the risk management and compliance and data protection objectives.	L2
CO4	Explore the relationship between Data Protection and data security	L2
CO5	Demonstrate the Data protection Cloud	L2

#### Mapping COs and POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2	x											
CO3		x			x					x		
CO4												
CO5	x				x							x

<b>Sl. No.</b>	<b>Description</b>	<b>POs</b>
1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and computer science and business systems to the solution of complex engineering and societal problems.	Po1
2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering and business problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	PO2
3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	PO3
4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	PO4
5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations	PO5
6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering and business practices.	PO6
7	Environment and sustainability: Understand the impact of the professional engineering solutions in business societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	PO7
8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering and business practices.	PO8
9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	PO9
10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	PO10
11	Project management and finance: Demonstrate knowledge and understanding of the engineering, business and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.	PO11
12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.	PO12

<b>Defensive Security</b>				
Course Code	<b>MSFC215B</b>		CIE Marks	50
Teaching Hours/Week (L:P:SDA)	3:0:0		SEE Marks	50
Total Hours of Pedagogy	40		Total Marks	100
Credits	03		Exam Hours	03
<p>Course objectives:</p> <ul style="list-style-type: none"> <li>• To develop a foundational set of guidelines, standards, and practices</li> <li>• To explore automated process and tools for vulnerability management</li> <li>• To securely develop code to reduce exploitable errors</li> </ul>				
<b>MODULE-1</b>				
<p>Defense Logistics: The Military Contract Service Model, Critical Review and Intervention Measures, Contract service model, Incentive scheme, Recruitment Retention, Reintegration. A Maritime Vision for Geopolitics: Geopolitics, Maritime interests. Maritime Security and Safety: Comprehensive Security in Artisanal Fisheries, Comprehensive security, Artisan fishing, State, Society, Artisan fishermen. Offshore Wind Farms – Support or Threat to the Defence of Polish Sea Areas: Offshore planning, Offshore wind farms, Opto-electronic head, Surveillance radar, Acoustic barrier.</p>				
Teaching-Learning Process	Chalk and talk and PPT			
<b>MODULE-2</b>				
<p>Naval and Military Engineering: Horseshoe Vortex Suppression- Strake, Horseshoe vortex, Junction vortex. Hybrid Joint Between Steel Deck and Fiberglass Superstructure- Hybrid joint, Composite panel, Composite superstructure.</p>				
Teaching-Learning Process	Chalk and talk and PPT			
<b>MODULE-3</b>				
<p>Security in the Storage of Ammunitions and Explosives in Ecuador: Storage of ammunitions, Explosives, Physical security. Engineering Analysis and Signal Processing: Interference of Biological Noise in Sonar Detection- Sonar, Noise, Noise mapping, Information system, Data Mining.</p>				
Teaching-Learning Process	Chalk and talk and PPT			
<b>MODULE-4</b>				
<p>Creating a Security Program and Asset Management and Documentation: Assess Threats and Risks , Information Classification Asset Management Implementation Steps, Standards and Procedures. Incident Response, Processes, Tools and Technology. Disaster Recovery: Recovery Strategies.</p>				

Teaching-Learning Process	Chalk and talk and PPT
<b>MODULE-5</b>	
Physical Security: Physical, Operational. Password Management and Multifactor Authentication: Password Management Software, Password Resets, Password Breaches, Encryption, Hashing, and Salting. Password Storage Locations and Methods, Password Security Objects: Setting a Fine-Grained Password Policy.	
Teaching-Learning Process	Chalk and talk and PPT
<p><b>Assessment Details (both CIE and SEE)</b></p> <p>The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.</p> <p><b>Continuous Internal Evaluation:</b></p> <ul style="list-style-type: none"> <li>● Two Unit Tests each of <b>25 Marks</b></li> <li>● Two assignments each of <b>25 Marks</b> or <b>one Skill Development Activity of 50 marks</b> to attain the COs and POs</li> </ul> <p>The sum of two tests, two assignments/skill Development Activities, will be <b>scaled down to 50 marks</b></p> <p><b>CIE methods /question paper is designed to attain the different levels of Bloom’s taxonomy as per the outcome defined for the course.</b></p> <p><b>Semester End Examination:</b></p> <ol style="list-style-type: none"> <li>1. The question paper will be set for 100 marks and marks scored will be scaled down proportionately to 50 marks.</li> <li>2. The question paper will have ten questions. Each question is set for 20 marks.</li> <li>3. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.</li> <li>4. The students have to answer 5 full questions, selecting one full question from each module</li> </ol> <p>Suggested Learning Resources:</p> <p>Books</p> <ol style="list-style-type: none"> <li>1. “Developments and Advances in Defense and Security”, <a href="#">Alvaro Rocha</a>, <a href="#">Teresa Guarda</a>, Springer 1<sup>st</sup> edition, 2018.</li> </ol> <p style="text-align: center;">“Defensive Security Handbook”, Lee Brotherston, Amanda Berlin, O'Reilly Media, 2017</p> <p>Web links and Video Lectures (e-Resources):</p> <ol style="list-style-type: none"> <li>1. <a href="https://www.youtube.com/watch?v=ZHz-Lj7m-8s">https://www.youtube.com/watch?v=ZHz-Lj7m-8s</a></li> <li>2. <a href="https://www.youtube.com/watch?v=25GL3T-pLxs">https://www.youtube.com/watch?v=25GL3T-pLxs</a></li> </ol>	

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	Create a base set of policies, standards, and procedures	L2
CO2	Investigate automated techniques and tools for managing vulnerabilities	L4
CO3	Write code to minimise exploitable flaws.	L4,L5

Mapping of COS and POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	X	X										
CO2		X			X							
CO3												
CO4			X	X								

Program outcomes

Sl. No.	Description	POs
1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and computer science and business systems to the solution of complex engineering and societal problems.	Po1
2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering and business problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	PO2
3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	PO3
4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	PO4
5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations	PO5
6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering and business practices.	PO6
7	Environment and sustainability: Understand the impact of the professional engineering solutions in business societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	PO7
8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering and business practices.	PO8
9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	PO9
10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	PO10



11	Project management and finance: Demonstrate knowledge and understanding of the engineering, business and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.	PO11
12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.	PO12

**MALWARE ANALYSIS AND REVERSE ENGINEERING**

Course Code	<b>MSFC215C</b>	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

**Course Learning objectives:**

- To recognize commonly used file formats.
- To identify conditional execution constructs in disassembled files.
- To Use a debugger to monitor program execution.
- To analyze malware samples packed using common packing techniques in GHIDRA/IDA.

**Module-1**

**BASIC ANALYSIS:** Basic Static Techniques, Malware Analysis in Virtual Machines, Basic Dynamic Analysis

<b>Teaching-Learning Process</b>	Chalk and talk and PPT
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**Module-2**

**ADVANCED STATIC ANALYSIS:** : A Crash Course in x86 Disassembly, IDA Pro, Recognizing C Code Constructs in Assembly

<b>Teaching-Learning Process</b>	Chalk and talk and PPT
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**Module-3**

**ADVANCED DYNAMIC ANALYSIS:** Analyzing Malicious Windows Programs, Debugging, OllyDbg.

<b>Teaching-Learning Process</b>	Chalk and talk and PPT
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**Module-4**

**MALWARE FUNCTIONALITY:** Malware Behavior, Covert Malware Launching, Data Encoding

<b>Teaching-Learning Process</b>	Chalk and talk and PPT
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**Module-5**

**ANTI-REVERSE-ENGINEERING:** Anti-Disassembly, Anti-Debugging, Anti-Virtual Machine Techniques

<b>Teaching-Learning Process</b>	Chalk and talk and PPT
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### **Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

#### **Continuous Internal Evaluation:**

- Two Unit Tests each of **25 Marks**
- Two assignments each of **25 Marks or one skill Development Activity of 50 marks**

to attain the COs and POs

The sum of two tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

**CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

#### **Semester End Examination:**

1. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
2. The question paper will have ten full questions carrying equal marks.
3. Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.
4. Each full question will have a sub-question covering all the topics under a module.
5. The students will have to answer five full questions, selecting one full question from each module

#### **Suggested Learning Resources:**

##### **Text Book:**

1. Practical Malware Analysis: The Hands-on Guide to Dissecting Malicious Software” by Michael Sikorski and Andrew Honig (published by No Starch Press, 2012)

##### **Reference Book:**

1. The IDA PRO Book: The Unofficial Guide to the World's Most Popular Disassembler, 2nd Edition” by Chris Eagle (published by No Starch Press, 2011).

#### **Web links and Video Lectures (e-Resources):**

- <https://www.udemy.com/course/malware-analysis-and-reverse-engineering/>
- <https://ringzer0.training/advanced-malware-analysis.html>
- <https://www.youtube.com/watch?v=f-fMdnUW4X4>
- extension://elhekieabhbkmcefcobjddigjcaadp/https://doc.lagout.org/security/Malware%20%26%20Forensics/Practical%20Malware%20Analysis.pdf (Textbook)

**Skill Development Activities Suggested**

- The students with the help of the course teacher can take up relevant technical activities which will enhance their skill. The prepared report shall be evaluated for CIE marks.

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	Recognize commonly used file formats.	L1
CO2	Identify conditional execution constructs in disassembled files.	L1
CO3	Use a debugger to monitor program execution.	L3

**Mapping of COS and POs**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	x											
CO2			x									
CO3				x								

**Program Outcome of this course**

Sl. No.	Description	POs
1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and computer science and business systems to the solution of complex engineering and societal problems.	PO1
2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering and business problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	PO2
3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	PO3
4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	PO4
5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations	PO5
6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering and business practices.	PO6

7	Environment and sustainability: Understand the impact of the professional engineering solutions in business societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	PO7
8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering and business practices.	PO8
9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	PO9
10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	PO10
11	Project management and finance: Demonstrate knowledge and understanding of the engineering, business and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.	PO11
12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.	PO12

<b>NETWORK AND CLOUD SECURITY</b>			
Course Code	<b>MSFC215D</b>	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
<b>Course Learning objectives:</b>			
<ul style="list-style-type: none"> <li>• To define the Security associated with computer networks.</li> <li>• To describe various communications networks and their main components.</li> <li>• To identify the benefits and characteristics of cloud computing.</li> <li>• To describe the various virtualization techniques and vulnerabilities.</li> </ul>			
<b>Module-1</b>			
<p><b>Wireless Network security:</b> Wireless security, Wireless network threats, Wireless network measures, mobile device security, security threats, mobile device security strategy, IEEE 802.11 Wireless LAN overview, the Wi-Fi alliance, IEEE 802 protocol architecture. Security, IEEE 802.11i services, IEEE 802.11i phases of operation, discovery phase, Authentication phase, key management phase, and protected data transfer phase, the IEEE 802.11i pseudorandom function. Web Security Considerations: Web Security Threats, Web Traffic Security Approaches. Secure Sockets Layer: SSL Architecture, SSL Record Protocol, Change Cipher Spec Protocol, Alert Protocol, and shake Protocol, Cryptographic Computations. Transport Layer Security: Version Number, Message Authentication Code, Pseudorandom Functions, Alert Codes, Cipher Suites, Client Certificate Types, Certificate Verify and Finished Messages.</p>			
<b>Teaching-Learning Process</b>	Chalk and talk and PPT		
<b>Module-2</b>			
<p><b>Electronic Mail Security:</b> Pretty good privacy, notation, operational; description, S/MIME, RFC5322, Multipurpose internet mail extensions, S/MIME functionality, S/MIME messages, S/MIME certificate processing, enhanced security services, Domain keys identified mail, internet mail architecture, E-Mail threats, DKIM strategy, DKIM functional flow. IP Security: IP Security overview, applications of IPsec, benefits of IPsec, Routing applications, IPsec documents, IPsec services, transport and tunnel modes, IP Security policy, Security associations, Security associations database, Security policy database, IP traffic processing, Encapsulating Security payload, ESP format, encryption and authentication algorithms, Padding, Anti replay service, transport and tunnel modes, combining security associations, authentication plus confidentiality, basic combinations of security associations, internet key exchange, key determinations protocol, header and payload formats, cryptographic suits.</p>			
<b>Teaching-Learning Process</b>	Chalk and talk and PPT		
<b>Module-3</b>			
<p><b>Cloud Computing Architectural Framework:</b> Cloud Benefits, Business scenarios, Cloud Computing Evolution, cloud vocabulary, Essential Characteristics of Cloud Computing, Cloud deployment models, Cloud Service Models, Multi- Tenancy, Approaches to create a barrier between the Tenants, cloud computing vendors, Cloud Computing threats, Cloud Reference Model, The Cloud Cube Model, Security for Cloud Computing, How Security Gets Integrated</p>			
<b>Teaching- Learning Process</b>	Chalk and talk and PPT		

<b>Module-4</b>	
<p><b>Compliance and Audit:</b> Cloud customer responsibilities, Compliance and Audit Security Recommendations. Portability and Interoperability: Changing providers reasons, Changing providers expectations, Recommendations all cloud solutions, IaaS Cloud Solutions, PaaS Cloud Solutions, SaaS Cloud Solutions.</p>	
<b>Teaching- Learning Process</b>	Chalk and talk and PPT
<b>Module-5</b>	
<p><b>Identity and Access Management:</b> Identity and Access Management in the cloud, Identity and Access Management functions, Identity and Access Management (IAM) Model, Identity Federation, Identity Provisioning Recommendations, Authentication for SaaS and Paas customers, Authentication for IaaS customers, Introducing Identity Services, Enterprise Architecture with IDaaS , IDaaS Security Recommendations. Virtualization: Hardware Virtualization, Software Virtualization, Memory Virtualization, Storage Virtualization, Data Virtualization, Network Virtualization, Virtualization Security Recommendations.</p>	
<b>Teaching- Learning Process</b>	Chalk and talk and PPT
<p><b>Assessment Details (both CIE and SEE)</b>            The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.</p> <p><b>Continuous Internal Evaluation:</b></p> <ul style="list-style-type: none"> <li>● Two Unit Tests each of <b>25 Marks</b></li> <li>● Two assignments each of <b>25 Marks</b> or <b>one-skill Development Activity of 50 marks</b> to attain the COs and POs</li> </ul> <p>The sum of two tests, two assignments/skill Development Activities, will be <b>scaled down to 50 marks</b></p> <p><b>CIE methods /question paper is designed to attain the different levels of Bloom’s taxonomy as per the outcome defined for the course.</b></p> <p><b>Semester End Examination:</b></p> <ul style="list-style-type: none"> <li>• The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.</li> <li>• The question paper will have ten full questions carrying equal marks.</li> <li>• Each full question is for 20 marks. There will be two full questions (with a maximum of four sub- questions) from each module.</li> <li>• Each full question will have a sub-question covering all the topics under a module.</li> <li>• The students will have to answer five full questions, selecting one full question from each module</li> </ul>	

**Suggested Learning Resources Text Books:**

1. William Stallings, Cryptography and Network Security Principles and security, Pearson 7th edition, 2017.
2. Tim Mather, Subra Kumaraswamy, Shahed Latif, Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, Oreilly Media.2009.

**Reference Books:**

3. J. R. Vic Winkler, Securing the Cloud, Cloud Computer Security Techniques and Tactics, Syngress, 2014

**Web links and Video Lectures (e-Resources):**

- <https://wiki.apnictraining.net/netsec20220505-online>
- <https://wiki.apnictraining.net/netsec20190923-mo>
- <https://www.udemy.com/courses/it-and-software/network-and-security>
- <https://www.netacad.com/courses/cybersecurity/network-security>
- [https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwiOgoXW7p36AhUi2DgGHR3RAoUQwqsBegQIKRAB&url=https%3A%2F%2Fwww.youtube.com%2Fwatch%3Fv%3Dyr1Psapupsc&usq=AOvVaw1NnvArKyDjDU\\_XgkKthS\\_vL](https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwiOgoXW7p36AhUi2DgGHR3RAoUQwqsBegQIKRAB&url=https%3A%2F%2Fwww.youtube.com%2Fwatch%3Fv%3Dyr1Psapupsc&usq=AOvVaw1NnvArKyDjDU_XgkKthS_vL)
- <https://www.coursera.org/courses?query=cloud%20security>
- <https://www.youtube.com/watch?v=Ijkvx1u0w6o>

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to :

Sl. No.	Description	Blooms L
CO1	Identify the security issues in the network and resolve it.	L1
CO2	Illustrate the different types of cloud solutions among IaaS, PaaS, SaaS.	L3
CO3	Define the recommendations for using and managing the customer's identity and choose the type of virtualization to be used	L1
CO4	Analyze the vulnerabilities in any computing system and hence be able to choose a security solution.	L4(through Assignment)

**Mapping of COS and POs**

CO1	X		X										
CO2													
CO3					X								
CO4	X												

**Program Outcome of this course**

Sl. No.	Description	POs
1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and computer science and business systems to the solution of complex engineering and societal problems.	PO1
2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering and business problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	PO2
3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	PO3



4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	PO4
5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities	PO5
	with an understanding of the limitations	
6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering and business practices.	PO6
7	Environment and sustainability: Understand the impact of the professional engineering solutions in business societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	PO7
8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering and business practices.	PO8
9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	PO9
10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	PO10
11	Project management and finance: Demonstrate knowledge and understanding of the engineering, business and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.	PO11
12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.	PO12

## ETHICAL HACKING LABORATORY

Course Code	<b>MSFCL207</b>	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	0:2:0	SEE Marks	50
Credits	02	Exam Hours	03

### Course objectives:

- To practice and Evaluate modern tools.
- To analyze packet capturing in network.
- To define forensic analysis.
- To identify and provide the Security in various web applications.

Sl. NO	Experiments
1	Wireshark: Experiment to monitor live network capturing packets and analyzing over the live network.
2	LOIC: DoS attack using LOIC
3	FTK: Bit level forensic analysis of evidential image and reporting the same
4	Darkcomet : Develop a malware using Remote Access Tool Darkcomet to take a remote access over network.
5	HTTrack: Website mirroring using Htrack and hosting on a local network
6	XSS: Inject a client side script to a web application.
7	Email tracker pro: Email analysis involving header check, tracing the route. Also perform a check on a spam mail and non-spam mail.
<b>Demonstration Experiments ( For CIE ) if any</b>	
9	Detect ARP spoofing using open source tool ARPWATCH.
10	Use the Nessus tool to scan the network for vulnerabilities.
11	Implement a code to simulate buffer overflow attack

### Course outcomes (Course Skill Set):

At the end of the course the student will be able to:

- Select modern tools for identify the hacking.
- Analyze packet capturing in network
- Identify forensic, hacking and security crime.
- Provide Security in various web applications

### Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course. The student has to secure not less than 40% of maximum marks in the semester-end examination(SEE). In total of CIE and SEE student has to secure 50% maximum marks of the course.

#### Continuous Internal Evaluation (CIE):

CIE marks for the practical course is **50 Marks**.

The split-up of CIE marks for record/ journal and test are in the ratio **60:40**.

- Each experiment to be evaluated for conduction with observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments designed by the faculty who is handling the laboratory session and is made known to students at the beginning of the practical session.

- Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.
- Total marks scored by the students are scaled down to 30 marks (60% of maximum marks).
- Weightage to be given for neatness and submission of record/write-up on time.
- Department shall conduct 02 tests for 100 marks, the first test shall be conducted after the 8<sup>th</sup> week of the semester and the second test shall be conducted after the 14<sup>th</sup> week of the semester.
- In each test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce.
- The suitable rubrics can be designed to evaluate each student's performance and learning ability.
- The average of 02 tests is scaled down to **20 marks** (40% of the maximum marks).  
The Sum of **scaled-down** marks scored in the report write-up/journal and average marks of two tests is the total CIE marks scored by the student.

### **Semester End Evaluation (SEE):**

SEE marks for the practical course is 50 Marks.

SEE shall be conducted jointly by the two examiners of the same institute, examiners are appointed by the University.

All laboratory experiments are to be included for practical examination.

(Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners. **OR** based on the course requirement evaluation rubrics shall be decided jointly by examiners.

Students can pick one question (experiment) from the questions lot prepared by the internal /external examiners jointly.

Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.

General rubrics suggested for SEE are mentioned here, writeup-20%, Conduction procedure and result in - 60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)

Change of experiment is allowed only once and 10% Marks allotted to the procedure part to be made zero. The duration of SEE is 03 hours

### **Suggested Learning Resources:**

- <https://www.udemy.com/topic/ethical-hacking/>
- <https://hackr.io/blog/best-ethical-hacking-courses>
- <https://youtu.be/dz7Ntp7KQGA>
- <https://youtu.be/6wKONaS1t2Q>
- <https://youtu.be/CSqa9JrzU>

### Mini Project with Seminar

Course Code	MSFC206	CIE Marks	50
Number of Contact Hours/Week	3	SEE Marks	50
Credits	03	Exam Hours	03

**Course objectives:**

- To support independent learning and innovative attitude.
- To guide to select and utilize adequate information from varied resources upholding ethics.
- To guide to organize the work in the appropriate manner and present information (acknowledging the sources) clearly.
- To develop interactive, communication, organization, time management, and presentation skills.
- To impart flexibility and adaptability.
- To inspire independent and team working.
- To expand intellectual capacity, credibility, judgement, intuition.
- To adhere to punctuality, setting and meeting deadlines.
- To instill responsibilities to oneself and others.
- To train students to present the topic of project work in a seminar without any fear, face audience confidently, enhance communication skill, involve in group discussion to present and exchange ideas.

Mini-Project: Each student of the project batch shall involve in carrying out the project work jointly in constant consultation with internal guide, co-guide, and external guide and prepare the project report as per the norms avoiding plagiarism.

**Course outcomes:**

At the end of the course the student will be able to:

- Present the mini-project and be able to defend it.
- Make links across different areas of knowledge and to generate, develop and evaluate ideas and information so as to apply these skills to the project task.
- Habituated to critical thinking and use problem solving skills.
- Communicate effectively and to present ideas clearly and coherently in both the written and oral forms.
- Work in a team to achieve common goal.
- Learn on their own, reflect on their learning and take appropriate actions to improve it.

**CIE procedure for Mini - Project:**

The CIE marks awarded for Mini - Project, shall be based on the evaluation of Mini - Project Report, Project Presentation skill and Question and Answer session in the ratio 50:25:25. The marks awarded for Mini - Project report shall be the same for all the batch mates.

**Semester End Examination**

SEE marks for the mini-project shall be awarded based on the evaluation of Mini-Project Report, Presentation skill and Question and Answer session in the ratio 50:25:25 by the examiners appointed by the University.

## SKILL ENHANCEMENT FOR RESEARCH EXCELLENCE-1

Course Code	MSCS258	CIE Marks	50
Number of contact Hours/Week	2	SEE Marks	50
Credits	01	Exam Hours/Batch	03

The M.Tech Research Skills Development program equips students with essential skills for successful research and publication, including understanding research fundamentals, conducting literature reviews, selecting appropriate methodologies, writing proposals and papers, analyzing data, presenting findings, adhering to ethical standards, and engaging in networking and collaboration, culminating in the effective publication of only 1 research article to Scopus-indexed conferences.

### Course objectives:

- **To** produce high-quality research papers that meet the standards of international conferences or peer-reviewed journals.
- **To** effectively identify suitable journals for publication based on the scope and impact of research findings.
- **To** demonstrate proficiency in writing and structuring research papers according to academic conventions.
- **To** engage in the peer review process, providing and receiving constructive feedback to enhance research quality.
- **To** develop skills for presenting research at conferences, including crafting effective abstracts and posters.
- **To** cultivate a strong understanding of ethical considerations in research and publication practices.
- **To** utilize citation management tools to organize references and ensure proper attribution in publications.
- **To** enhance collaboration skills for co-authoring papers and working within research teams.
- **To** stay informed about current trends and advancements in the field to ensure relevance in publications.
- **To** refine the ability to respond to reviewer comments and revise manuscripts effectively.
- **To** understand the importance of open access and alternative publication models in disseminating research.
- **To** build a professional network that supports research collaborations and publication opportunities.

**Guidelines for Research paper preparation:** Each student in a group of two members shall actively participate in carrying out the research work jointly, in constant consultation with the internal guide, mentors or co-guide, and external guide. They must prepare the project report as per the prescribed norms while ensuring plagiarism is avoided. A research group can have a maximum of two members.

### 1. Understanding Research Fundamentals

- **Definition of Research:** Understand what constitutes research and its significance in technology and engineering.
- **Types of Research:**

**Basic Research:** Focused on gaining comprehensive knowledge without immediate applications.

**Applied Research:** Aimed at solving specific problems.

#### Literature Review

- **Conducting a Literature Survey:**  
Identify relevant academic papers, journals, and conference proceedings.  
Summarize key findings and methodologies from existing literature.
- **Critical Analysis:**  
Evaluate the strengths and weaknesses of existing research.  
Identify gaps in the literature that your research can address.

### 2. Research Methodology

- **Selecting a Research Topic:**  
Choose a topic that aligns with your interests and current trends in technology.
- **Research Design:**  
Decide on qualitative, quantitative, or mixed methods based on your research objectives.
- **Data Collection Techniques:**  
Surveys, interviews, experiments, and simulations.

### 3. Writing Research Proposals

- **Structure of a Proposal:**  
Introduction, Literature Review, Methodology, Expected Outcomes, and References.
- **Proposal Presentation:**  
Practice presenting your proposal to peers and faculty for feedback.

### 4. Data Analysis

- **Statistical Tools:**

Familiarize yourself with tools like MATLAB, R, or Python for data analysis.

- **Interpreting Results:**  
Learn to draw meaningful conclusions from your data and relate them back to your research questions.

## 5. Writing Research Papers

- **Structure of a Research Paper:**  
Abstract, Introduction, Methodology, Results, Discussion, Conclusion, and References.
- **Academic Writing Skills:**  
Focus on clarity, coherence, and proper citation of sources.
- **Peer Review Process:**  
Understand the importance of peer review and how to respond to reviewers' comments.

## 6. Presentation Skills

- **Effective Communication:**  
Develop skills to present your research findings clearly and confidently.
- **Use of Visual Aids:**  
Incorporate slides, charts, and graphs to enhance your presentations.

## 7. Ethical Considerations in Research

- **Understanding Ethics:**  
Familiarize yourself with ethical guidelines related to research involving human subjects, data privacy, and plagiarism.
- **Responsible Conduct of Research:**  
Promote integrity and accountability in your research practices.

## Submitting Manuscripts to Scopus-Indexed Conferences or Web of Science or Proceedings /Book Chapters

### 1. Identify Relevant Conferences

- **Research Scopus-Indexed Conferences:**  
Use platforms like Conference Alerts, IEEE Xplore, or the Scopus website to find conferences in your field.
- **Check Conference Indexing:**  
Ensure that the conference is indexed in Scopus by checking its official website or the Scopus database.

### 2. Prepare Your Manuscript

- **Follow Conference Guidelines:**  
Each conference has specific formatting and submission guidelines. Adhere to these requirements.
- **Structure of the Manuscript:**  
Title, Abstract, Introduction, Methodology, Results, Discussion, Conclusion, and References.
- **Language and Clarity:**  
Use clear and concise language. Consider having your manuscript proofread by peers or professionals.
- **Submission of manuscript, Registration and Presentation finally Publication**

## Course outcomes:

- At the end of the course the student will be able to:
- **Produce High-Quality Research Papers:** Create research papers that meet international conference and peer-reviewed journal standards.
- **Identify Suitable Journals:** Effectively select appropriate journals for publication based on research scope and impact.
- **Proficiency in Writing:** Demonstrate skill in writing and structuring research papers according to academic conventions.
- **Engage in Peer Review:** Actively participate in the peer review process by providing and receiving constructive feedback.
- **Develop Presentation Skills:** Acquire skills for presenting research at conferences, including crafting effective abstracts and posters.
- **Understand Ethical Considerations:** Cultivate a strong understanding of ethical issues in research and publication practices.
- **Utilize Citation Management Tools:** Use citation management tools to organize references and ensure proper attribution.
- **Respond to Reviewer Comments:** Refine the ability to address reviewer comments and revise manuscripts

effectively.

The assessment for **Skill Enhancement for Research Excellence** will be divided into **Continuous Internal Evaluation (CIE) and Semester End Examination (SEE)**, each carrying **50 marks**.

**Continuous Internal Evaluation (CIE) – 50 Marks**

CIE shall be conducted **weekly** and will be assessed based on:

- **Base Papers Referred & Review** – 10 Marks
- **Presentations on Proposed Concepts** – 15 Marks
- **Preparation of Conference Papers (Preferably Scopus Indexed or Reputed Conferences)** – 25 Marks

**Semester End Examination (SEE) – 50 Marks**

- The **SEE examiner may be appointed from the same college** for evaluation.
- The candidate must **present their research work** before the examiner.
- **Mandatory requirement:** The candidate must have **submitted a paper to a conference or accepted or presented** at a reputed conference.
- Marks will be awarded based on:
  - **Research Presentation Quality** – 25 Marks
  - **Clarity of Concept & Methodology** – 15 Marks
  - **Conference Submission & Acceptance/Presentation** – 10 Marks