



Syllabus for M.Sc. in Cyber Security (MSCS)

(Effective from Academic Year 2022-23)

Programme objectives:

This course intends to gain insight into the importance of cyber security and the integral role of cyber security professionals to develop a high level of professional ethics. It will help the learners to explore foundational cyber security principles, security architecture, attacks, incidents, and emerging IT Security Technologies. Learners will be familiar with key terms and concepts in cyber law, Security Standards, intellectual property rights and Acts on IT Security. Also, it will help to understand principles of web application security and network security

Programme outcomes:

After completing the course, a learner will have fair understanding about Cyber Security

- Upon the completion of this programme the learners will be able to understand, appreciate, employ, design and implement appropriate security technologies and policies to protect computers, digital information and Internet Transactions.
- After completing the course, a learner can also prepare themselves for a career in teaching and research.
- After successful completion of this programme, the learners may excel in their career as:
 - ✓ Cyber Security Consultants
 - ✓ Cyber Security Analyst
 - ✓ Systems and Networks Security Professional
 - ✓ IT Security Officer
 - ✓ IT Infrastructure Analyst
 - ✓ Quality and Security Analyst

Duration of the Course – Minimum: 2 years, Maximum: 4 years.

Conduct of Classes: Weekend for 2 hours of theory and 3 hours of practical (preferably on Sundays)

Eligibility Criteria: B.Sc. (any discipline) or, BCA (with +2 Science) or, B.Tech / BE

Evaluation: Based on Assignments (theory+ practical), Term End Examinations (theory + practical) and Project work (viva voce + Report). Course Coverage – Theory, Practical and Project Work.

Course Structure

1st Semester			
Theory			
Course Code	Course Title	(T-L-P)	Credit
CSPC-01	Data Communication & Networking	T	04
CSPC-02	Information Security	T	04
CSPC-03	Operating System Basics	T	02
Total Theory Credits			10
Laboratory			
CSPCL-01	Data Communication & Networking Lab	L	02
CSPCL-02	Information Security Lab	L	02
CSPCL-03	Operating System Basics Lab	L	02
Total Laboratory Credits			06
TOTAL SEMESTER CREDITS			16

2nd Semester			
Theory			
Course Code	Course Title	(T-L-P)	Credit
CSPC-04	Application Cyber Security	T	04
CSPC-05	Network Cyber Security	T	04
CSPC-06	Web Technology	T	02
Total Theory Credits			10
Laboratory			
CSPCL-04	Application Cyber Security Lab	L	02
CSPCL-05	Network Cyber Security Lab	L	02
CSPCL-06	Web Technology Lab	L	02
Total Laboratory Credits			06
TOTAL SEMESTER CREDITS			16
TOTAL CUMULATIVE CREDITS			32

3rd Semester			
Theory			
Course Code	Course Title	(T-L-P)	Credit
CSPC-07	White Hat Hacking	T	04
CSPC-08	Security Analysis and Reporting	T	04
CSPE-01	Application development using PHP	T	02
Total Theory Credits			10
Laboratory & Project Work			
CSPEL-01	Application development using PHP Lab	L	02
CSPP-04	Project Work	P	04
Total Laboratory & Project Work Credits			06
TOTAL SEMESTER CREDITS			16
TOTAL CUMULATIVE CREDITS			48

4th Semester			
Theory			
Course Code	Course Title	(T-L-P)	Credit
CSPC-09	Computer Forensics	T	04
CSPE-02	Programming in Java	T	04
CSPE-03	Programming in Python	T	02
Total Theory Credits			10
Laboratory			
CSPCL-09	Computer Forensics Lab	L	02
CSPEL-02	Programming in Java Lab	L	02
CSPEL-03	Programming in Python Lab	L	02
Total Laboratory Credits			06
TOTAL SEMESTER CREDITS			16
TOTAL PROGRAMME CREDITS			64

1st Semester

Theory Syllabus

CSPC-01 : DATA COMMUNICATION & NETWORKING	
Block-01	Introduction to Data communication and Networking
Unit-01	Basic Concepts of Data Communication and Networking
Unit-02	Network topology, Categories of a networks, Protocols, Standards in networking
Unit-03	Network Reference Models: OSI and TCP/IP Models
Unit-04	Transmission media & Network Devices
Block -02	Physical Layer and its functionalities
Unit -05	Analog and Digital Signals
Unit -06	Encoding
Unit -07	Multiplexing: FDM,TDM,WDM,SDM
Unit -08	Switching: Message Switching and Circuit Switching and Packet Switching
Block -03	Data Link & Network Layer
Unit-09	Data Link Control Protocols: Ethernet, Token Passing, Multiple Access Control Protocols
Unit-10	Physical Addressing, Error Detection, Framing. Flow Control, Error Control, Congestion Control
Unit-11	Network Layer, Internetworking
Unit-12	IP addressing, Internet Control Protocols (ARP, RARP, ICMP,IGMP)
Block -04	Internet Protocols and Services
Unit-13	Transport Layer protocols: TCP & UDP
Unit-14	Application Layer protocols: HTTP, HTTPs, SMTP, POP, DNS, TELNET, FTP
Unit-15	Internet: Hosts and Domain Names, Addressing Scheme in Internet, Internet Service Providers (ISPs)
Unit-16	Services: www, Intranet, Extranet, Email, Services Provided by Internet, Application of Internet

CSPC-02: INFORMATION SECURITY

Block-01	Information Security Concepts and Cryptography
Unit-01	Information Security Concepts: Information security issues, goals, architecture, Attacks, Security Services and Mechanisms.
Unit-02	Introduction to Cryptography: Network security model, Cryptographic systems, Cryptanalysis, Steganography. Types of Cryptography: Symmetric key and Asymmetric Key Cryptography, Classical Encryption and Decryption Techniques.
Unit-03	Cryptographic Algorithms: Hash Algorithm, Message Digest (MD, Secure Hash algorithm (SHA), Whirlpool, RACE Integrity Primitives Evaluation Message Digest (RIPEMD), Password Hashes
Unit-04	Symmetric & Asymmetric Cryptographic Algorithms: Block Cipher, Data Encryption System (DES), Advance Encryption Standard (AES), RSA Algorithm, File and File System Cryptography, Pretty Good Privacy (PGP/GPG)
Block-02	Security Threats and Vulnerabilities
Unit-05	Overview of Security threats and Vulnerability: Types of attacks on confidentiality, Integrity and Availability. Vulnerability and Threats.
Unit-06	Malware: Viruses, Worms, Trojan horses
Unit-07	Security Counter Measures: Insider & Outsider Attack
Unit-08	Intrusion Detection System, Antivirus Software
Block-03	Ethical Issues in Information Security & Privacy
Unit-09	Information Security, Privacy and Ethics
Unit-10	Cyber Crime and Cyber Terrorism
Unit-11	What is Hacking? Ways of Hacking, Ethical issues, Ethical Hacking
Unit-12	Organized Cyber Crime and IT Act 2002
Block-04	Security Challenges in E-commerce & e-governance
Unit-13	Overview of E-commerce
Unit-14	Historical development and regulatory Framework of e-commerce
Unit-15	Security challenges and future of E-commerce
Unit-16	Concept of e-governance

CSPC-03: OPERATING SYSTEM BASICS

Block-01	Windows Operating System
Unit-01	Introduction, Operating System Concept and its Types, Function of OS, Evolution of Operating Systems. Introduction to Windows, Version of Windows, Operating System Administrator, My Computer, Recycle Bin, Desktop, Drives.
Unit-02	Create a directory/folder, rename/change to a directory/folder, creating a file in a directory/folder, Make the file read only, Make the file/directory hidden, editing a file in a directory/folder, Delete a file in a directory/folder. Listing the files in the directory, create a file, copy a file from one directory to the other, deleting all files from a directory/folder, Deleting a director/folder.
Unit-03	Formatting a hard disk, Loading, update and troubleshoot in Windows Operating System.
Unit-04	Domain, workgroup, Active Directory, User Management, Network Setting, Services, IIS Configuration
Block -02	Linux Operating System
Unit -05	Introduction, History of Linux, Distributions of Linux, Devices and drivers, File system Hierarchy, The components: Kernel, Distribution, XFree86, Sawfish, Gnome
Unit -06	The command line commands, File, management commands, Working with nano, Working with help (man)
Unit -07	SSH and X-forwarding, managing compressed archives with zip and tar, Working with GNU screen, how to add users and groups
Unit -08	Working with su, working with sudo, changing user password, Printing, installing software with Yum, Yast, Rpm, Installing webmin.

Practical Syllabus

CSPCL-01 : DATA COMMUNICATION & NETWORKING LAB

Expt-1	To study about different physical equipment's used for networking
Expt-2	To study different internetworking devices in a computer network
Expt-3	To study the working of Basic Networking Commands
Expt-4	To assign IP address to the PC connected to the internet
Expt-5	To connect the computers in Local Area Network
Expt-6	Creating a Network topology using CISCO packet tracer software

CSPCL-02 : INFORMATION SECURITY LAB

Expt-1	To study the Private Key and Public Key cryptographic systems.
Expt-2	To study the classical encryption techniques: substitution and transposition
Expt-3	To analyze the encryption and decryption of RSA – Public Key Cryptography Algorithm
Expt-4	To study working of Intrusion detection System (IDS) tool
Expt-5	To study the prevention mechanisms to avoid Virus and other Malware in one's PC
Expt-6	To study the prevention mechanisms to protect one's PC from Hackers

CSPCL-03: OPERATING SYSTEM BASICS LAB

Windows OS			Linux OS
1	Windows 7 installation	16	Red Hat Linux Installation
2	File and folder management in Windows	17	Linux Installation using Ubuntu
3	Create a file in windows	18	Linux Installation using Open Suse
4	Create a folder in Windows	19	Working with Linux Graphical User Interface
5	Copy a file to a folder	20	Working with terminal mode
6	Move a file to a folder	21	Basic Linux commands used in terminal Mode
7	Rename a file/ folder	22	Creating a file using Nano
8	Delete a file / folder	23	Working with the su command
9	Make a file read only	24	Working with sudo
10	Hide and unhide the file in Win 7	25	User and group management
11	Working with the command prompt	26	Working with Permissions
12	Steps to create user accounts	27	Installing Software with Rpm
13	Changing Your Password	28	Working with Yum
14	Changing Your Picture	29	Yast
15	Creating a Password-Reset Disk	30	Webmin
		31	Data compression in Linux

2nd Semester Theory Syllabus

CSPC-04 : APPLICATION CYBER SECURITY	
Block-01	System Security
Unit-01	Desktop Security
Unit-02	Programming Bugs and Malicious code
Unit-03	Database Security
Unit-04	Operating System Security: Designing Secure Operating Systems, OS Security Vulnerabilities.
Block -02	Security Management
Unit-05	Disaster recovery
Unit-06	Digital Signature
Unit-07	Ethical Hacking, Penetration Testing
Unit-08	Computer Forensics
Block-03	Fundamentals of cyber law
Unit-09	Outline of legislative framework for cyber Law
Unit-10	History and emergence of cyber law
Unit-11	Outreach and impact of cyber law
Unit-12	Major amendments in various statutes
Block-04	Cyber laws and standards
Unit-13	ISO 27001, Cyber Law (Information Technology Act, 2000)
Unit-14	International Standards maintained for Cyber Security
Unit-15	Security Audit ,Investigation by Investing Agency
Unit-16	Cyber Security Solutions

CSPC-05 : NETWORK CYBER SECURITY

Block-01	Network Security
Unit-01	Network Security Model, Network Security Threats
Unit-02	Firewalls: Overview, Types, Features, User Management
Unit-03	Intrusion Detection System, Intrusion Prevention System
Unit-04	Public Key Infrastructure, Digital Signature Schemes
Block -02	Internet and Web Application Security
Unit-05	Email security: PGP and SMIME
Unit-06	Web Security: Web authentication, Injection Flaws, SQL Injection
Unit-07	Web Browser Security
Unit-08	E-Commerce Security
Block-03	Wireless Network Security
Unit-09	Wireless Network Components
Unit-10	Security issues in wireless Networks
Unit-11	Securing a wireless network
Unit-12	Mobile security
Block-04	Digital & Electronic Signature and Related Laws in India
Unit-13	Digital and Electronic Signature: Concept and Procedure
Unit-14	Digital Signature Certificate
Unit-15	Regulation and Responsibilities of Certifying Authorities and Controller of Certifying Authorities
Unit-16	Addressing Offences: Penalties and Compensation

CSPC-06: WEB TECHNOLOGY

Block-01	Web Applications (HTML & CSS)
Unit-01	Getting Started with HTML Introduction of HTML, writing my first HTML Page, Basic tags used in HTML, Elements In HTML, Attributes In HTML, Formatting In HTML, Meta Tags and their use, commenting a HTML Code, Images and incorporating images, working with Tables, Working with Lists, working with hyperlinks, Frames and frame management, Working with Iframes, Working with Block elements.
Unit-02	Advanced HTML Background images, Coloured text and coloured background, working with fonts, Form designing and Form Management, Using Multimedia inside HTML, Marquee Tag, Headers, Working with Layouts, Role of Tags in Html, Attributes in Html, Event Handling, MIME Media Types.
Unit-03	Getting Started With CSS Introduction of CSS, CSS Syntax, CSS Selectors, Ways To Insert CSS, Background image handling, Background colour management using CSS, Text management using CSS, Font management using CSS, Managing Hyperlinks using CSS, Managing Lists using CSS, Designing Tables using CSS, Working with the BOX Model, Designing Borders using CSS, Designing Outline using CSS, Setting Page Margin using CSS.
Unit-04	Advanced Java CSS Padding using CSS, Setting Display Using CSS, Setting Width And Max Width using CSS, Setting Position using CSS, Setting the Float Property using CSS, Inline Block property, Horizontal Alignment in CSS, Working With Combinators, Working with Pseudo-class, working with Pseudo-elements, Creating a navigation bar, Working with images, Working with Attribute selectors.
Block -02	Web Technology (Java Script, JQuery & Ajax)
Unit-05	Getting Started With JS JavaScript Basics, JavaScript Syntax, Enabling JavaScript in Browsers, Placing JavaScript, Variables, Operators, Conditional Statement(if, if else), Switch case, Loops(while, do while and for loop), Functions, Events and event handling, Cookies, Page Redirection, Dialog Box(Alert, Confirm, prompt), void keyword, Printing webpage using JavaScript.
Unit-06	Advanced Java Script Working with Objects, Numbers, Boolean, String in JavaScript, Arrays and Array Management, Working with Date, Mathematical operations, Regular Expressions, Document Object Model (DOM), Errors and Error Handling, Client Side Validation, Animations in Webpages, Multimedia in Webpages, Image Map.
Unit-07	Basics to JQuery Syntax, Selectors, Functions, events and Animations in JQuery
Unit-08	Introduction to AJAX AJAX - What is AJAX?, AJAX – Technologies, Understanding, Synchronous vs Asynchronous, AJAX - Browser Support, AJAX – Action, AJAX – XMLHttpRequest, How AJAX works?, Ajax First Program With Explanation, Ajax Request, open() and send() methods, Ajax Server Response, responseText and ResponseXML, Java AJAX, AJAX – Examples, Email Finder , Comment Form , Search Example, AJAX - Database Operations, AJAX – Security, AJAX – Issues, AJAX JSON.

2nd Semester

Practical Syllabus

CSPCL-04: APPLICATION CYBER SECURITY LAB	
Expt-1	Study of steps to protect your personal computer system by creating User Accounts with Passwords and types of User Accounts for safety and security.
Expt-2	Study the steps to protect a Microsoft Word Document of different version with different operating system.
Expt-3	Study the steps to remove Passwords from Microsoft Word
Expt-4	Study various methods of protecting and securing databases.
Expt-5	Study “How to make strong passwords” and “passwords cracking techniques”.
Expt-6	Study the steps to hack a strong password.

CSPCL-05: NETWORK CYBER SECURITY LAB	
Expt-1	Study of different wireless network components and features of any one of the Mobile Security Apps.
Expt-2	Study of the features of firewall in providing network security and to set Firewall Security in windows.
Expt-3	Steps to ensure Security of any one web browser (Mozilla Firefox/Google Chrome)
Expt-4	Study of different types of vulnerabilities for hacking a websites / Web Applications.
Expt-5	Analysis the Security Vulnerabilities of E-commerce services.
Expt-6	Analysis the security vulnerabilities of E-Mail Application.

CSPCL-06: WEB TECHNOLOGY LAB	
Expt-1	Develop static pages (using only HTML) of an online Book store. The pages should resemble: www.amazon.com .
Expt-2	Validate the registration, user login and user profile pages using JavaScript.
Expt-3	Use frames to Include Images and Videos.
Expt-4	Add a Cascading Style sheet for designing the web page.
Expt-5	Write a program in JavaScript to print the Fibonacci series.
Expt-6	Write a program in JavaScript to perform Arithmetic Operations.
Expt-7	Write a JavaScript function that checks whether a passed String is palindrome or not.
Expt-8	Write a program in html to Click the button to get your coordinates.
Expt-9	Create an XSLT document to meet the following requirements <ul style="list-style-type: none">• Page should have a title Students.• Page should have a table of student details.• Columns should have following headers: Roll No, First Name, Last Name, Nickname, Marks
Expt-10	Write a table using html and CSS to create examination date sheet of OSOU.

3rd Semester

Theory Syllabus

CSPC-07: WHITE HAT HACKING

CSPC-07: WHITE HAT HACKING	
Block-01	Introduction to Hacking
Unit-01	Introduction: Hacking, Types of Hacking/Hackers, Cybercrime, Types of cybercrime, Hacker Mind set, Threats, Concept of ethical hacking, , Phases involved in hacking, Role of Ethical Hacking, Common Hacking Methodologies, Profiles of Hackers, Benefits of Ethical Hacking, Limitations of Ethical Hacking.
Unit-02	Foot Printing & Reconnaissance: Introduction to foot printing, Use of foot printing, Types of foot printing, Understanding the information gathering process, Information on a company website, methodology of the hackers, Tools used for the reconnaissance phase.
Unit-03	System Hacking: System hacking, Types of System hacking, hacking tools, Computer Hole, Hacking Process, Various methods of password cracking, Remote Password Guessing, Role of eavesdropping, Keystroke Loggers, Types of Keystroke Loggers, Detection, Prevention and Removal.
Unit-04	Sniffers: Introduction, Sniffer, Types of Sniffer, Protocols Susceptible to Sniffing, Active and Passive Sniffing, ARP Spoofing, ARP Spoofing, ARP Poisoning, DNS Spoofing Techniques, MAC Flooding, Sniffing Countermeasures.
Block -02	Hacking Techniques
Unit-05	Trojans, Backdoors, Viruses, and Worms:Overt and Covert Channels, Types of Trojans, Reverse-Connecting Trojans, Netcat Trojan ,Indications of a Trojan Attack, Wrapping, Trojan Construction Kit and Trojan Makers , Countermeasure Techniques in Preventing Trojans, Trojan-Evading Techniques, System File Verification Sub objective to Trojan Countermeasures Viruses and Worms, Difference between a Virus and a Worm, Types of Viruses, Understand Antivirus Evasion Techniques, Understand Virus Detection Methods..
Unit-06	Session Hijacking: Understanding Session Hijacking, Phases involved in Session, Hijacking, Types of Session Hijacking, and Session Hijacking Tools.
Unit-07	Social Engineering Social Engineering, Common Types of Attacks, Insider Attacks, Identity Theft, Phishing Attacks, Online Scams, URL Obfuscation, Social-Engineering Countermeasures.
Unit-08	Denial of Service: Denial of Service, Types of DoS Attacks, DDoS Attacks, BOTs/BOTNETs, “Smurf” Attack, “SYN”, Flooding, DoS/DDoS Countermeasures.
Block-03	Hacking Web Applications and Wireless Networks
Unit-09	Hacking Web Applications & SQL Injection: Hacking Web Servers, Types of Web Server Vulnerabilities, Attacks against Web Servers, IIS Unicode Exploits, Patch Management Techniques, Web Server Hardening Methods Web Application Vulnerabilities, Objectives of Web Application Hacking, Anatomy of an Attack, Web Application Threats, Google Hacking, Web Application Countermeasures Web-Based Password Cracking Techniques, Authentication Types, Password Cracker, Password Attacks: Classification ,Password-Cracking Countermeasures.
Unit-10	SQL Injection and Buffer Overflows: SQL Injection, Steps to Conduct SQL Injection, SQL Server Vulnerabilities, SQL Injection, Countermeasures Buffer Overflows, Types of Buffer Overflows and Methods of Detection, Stack-Based Buffer Overflows, Buffer Overflow Mutation Techniques
Unit-11	Hacking Wireless Networks: Introduction to 802.11, Role of WEP, Cracking WEP Keys, Sniffing Traffic, Wireless DOS, attacks, WLAN Scanners, WLAN Sniffers, Hacking Tools, Securing, Wireless Networks.
Unit-12	IDS, Firewalls & Honey pots

Block-04	IT ACT 2000 (Amended in 2008): Brief Understanding
Unit-13	Jurisdictional Aspects of Cyber Law
Unit-14	Best Practices of Cyber Law across the World
Unit-15	The Appellate Tribunal and latest Amendments
Unit-16	Facets of Cybercrime: Offences, Penalties and Compensation

CSPC-08: SECURITY ANALYSIS AND REPORTING

Block-01	Multidisciplinary Risk Management
Unit-01	Packet Analysis & Risk Management: Introduction, Learning Objectives, Packet analysis and Packet Sniffers, evaluating a packet sniffer, how packet sniffers work, The Multidisciplinary Approach, how to protect your sensitive resources? Frame the Threats and Sources, National Governments, Terrorists, Industrial Spies and Organized Crime Groups, Hacktivists, Hackers, Nature of the Computer Security Community, GAO Threat Table, Hierarchy of Needs, Multidisciplinary Risk Management, Solution strategies, Module 1 – Fundamentals of risk management, Module 2 – Applied standards and cyber risk management, Module 3 – Field skills on cyber risk management, Seven Principles of Network Security Analysis Strategy, Network Traffic Monitoring and Analysis, Importance of Network Monitoring and Analysis, Monitoring and Analysis Techniques, Router Based Monitoring Techniques, Non-Router Based Techniques
Unit-02	Wireless Network Analysis: Wireless Networks, Wi-Fi Networks, Wireless Standards, Wi-Fi Authentication Modes, Wireless Encryption, Break an Encryption, Wireless Threats, Wireless Hacking Methodology, Wireless Traffic Analysis, Launch Wireless Attacks, Crack Wireless Attacks. Best practices on using wireless networks. Tips on internet surfing via public wireless services.
Unit-03	Intrusion Detection & Prevention System: Intrusion Detection System, Types, Passive system v/s reactive system, Signature Based Detection v/s Anomaly Based Detection, Signature Based Detection of Worms and Polymorphic Worms, Control Flow Graph based approach for detecting Polymorphic Worms [2], Tools in intrusion detection, Needs and challenges, IDS in various domains, Intrusion Prevention Systems (IPS), Types of IPS, Host based Intrusion Prevention (HIP), Network based Intrusion Prevention (NIP).
Unit-04	Cyber Crime. IT assets and wireless security: Cybercrime, Overview, Categories, Challenges, Complexities, Effects, Solutions, How to report an incident?, IT assets and wireless security, Securing an asset, Steps of securing an asset, Hardware based security, Types of HSMs, HSM Functionality, How to implement HSM, Firewall, Types of Firewalls, Software Based Firewalls, Hardware Based Firewalls, How to prevent your network from anonymous attack., Wireless security, Use of Wi-Fi, Types of Wireless Security, WPA.
Block -02	Internet Security Analysis
Unit-05	Malware Analysis: Introduction, what is Malware Analysis? The Goals of Malware Analysis. Malware Analysis Techniques. Basic Static Analysis, Basic Dynamic Analysis, Advanced Static Analysis, Advanced Dynamic Analysis, Types of Malware, General Rules for Malware Analysis, Malware Functionality, Downloaders and Launchers, Backdoors, Reverse Shell, RATs, Botnets, RATs and Botnets Compared, Credential Stealers, INA Interception, Hash Dumping, Keystroke Logging, Persistence Mechanisms, Trojanized System, Binaries, DLL Load-Order Hijacking, Privilege Escalation Using SeDebugPrivilege, Covering Its Tracks-User-Mode Rootkits, IAT Hooking, Inline Hooking, Tools for malware analysis, ApatDNS, Autoruns, BinDiff, BinNavi, Deep Freeze.

Unit-06	Email Security Analysis: Threat and Vulnerability analysis of the email system. Threats: Spam, Social Engineering (phishing, targeted attacks), Massive eavesdropping, Other targeted criminal acts, Vulnerabilities: Integrity of email communications, Confidentiality of email communications, Phishing, Types of Phishing, Clone Phishing, Spear Phishing, Phone Phishing, Phishing Techniques and Countermeasures: Email Spoofing, Web Spoofing, Pharming, Malware, Phishing through PDF Documents. Privacy and security countermeasures: Cryptography Overview, Encryption Algorithms, Key Exchange Algorithms, Signature Algorithms, Certificates.
Unit-07	Vulnerability Assessment and Penetration Testing (VPAT): Introduction, Benefits, Methodology, Vulnerability Assessment, Reasons for Vulnerability Existence, Steps for Vulnerability Analysis, Web Application Vulnerabilities, Types: SQL-Injection, Blind Injection Detection, Cross-Site Scripting, Broken Authentication & Session Management, Insecure Direct Object References, Failure to Restrict URL, Remote Code Execution. Vulnerability Assessment Using Acunetix, Working of Vulnerability Assessment Tool. Penetration Testing Overview: What is Penetration Testing? When to Perform Penetration Testing? How is Penetration Testing Beneficial? Penetration Testing Method: Steps of Penetration Testing Method, Planning & Preparation, Reconnaissance, Discovery, Analyzing Information and Risks, Active Intrusion Attempts, Final Analysis, Report Preparation. Penetration Testing Vs. Vulnerability Assessment, Penetration Testing, Vulnerability Assessment, which Option is Ideal to Practice? Types of Penetration Testing: Types of Pen Testing, Black Box Penetration Testing. White Box Penetration Testing, Grey Box Penetration Testing, Areas of Penetration Testing. Penetration Testing Tools, Limitations of Penetration Testing, Conclusion.
Unit-08	Social Engineering: Social Engineering, Overview, Definition(s) of Social Engineering. The Social Engineering Life Cycle: Foot printing, Establishing Trust, Psychological Manipulation, The Exit. Social Engineering Attack Cycle: Research, Developing Rapport and Trust, Exploiting Trust Factor, Exploiting Trust Factor, Recruit & Cloak, Evolve/Regress. The Weapons of a Social Engineer: Shoulder Surfing, Dumpster Diving, Role playing, Trojan horses, Phishing, Surfing Organization Websites & Online forums, Reverse Social Engineering. Different Types of Social Engineering: Physical Social Engineering, Remote Social Engineering, Computer-based Social Engineering, Social Engineering by Email, Phishing, Nigerian 419 or advance-fee fraud scam, Pop-up windows / browser interceptions. Social Engineering by Phone, Mumble Attack, IVR or phone phishing. Detecting / Stopping Social Engineering Attacks. Defending Against Social Engineering.
Block-03	Cyber Incident Handling and Reporting
Unit-09	Cyber security Incident Management: The Cyber security Incident Chain, Stakeholders, Cyber security Incident Checklist. Five Phases of Cyber security Incident Management: Plan & Prepare, Detect & Report, Assess & Decide, Respond & Post-Incident Activity.
Unit-10	Handling an Incident: Preparing to Handle Incidents, Preventing Incidents. Detection and Analysis: Attack Vectors, Signs of an Incident, Sources of Precursors and Indicators, Incident Analysis, Incident Documentation, Incident Prioritization & Incident Notification.
Unit-11	Coordination and Information Sharing: Coordination Relationships, Sharing Agreements and Reporting Requirements. Information Sharing Techniques: Ad Hoc, Partially Automated, Security Considerations. Granular Information Sharing: Business Impact Information, Technical Information.
Unit-12	Containment, Eradication, and Recovery: Choosing a Containment Strategy, Evidence Gathering and Handling, Identifying the Attacking Hosts, Eradication and Recovery. Post-Incident Activity: Lessons Learned, Using Collected Incident Data, Evidence Retention.

Block-04	Case Studies / Data Protection
Unit-13	Case Studies / Data Protection
Unit-14	What's Up With WhatsApp? A Transatlantic View on Privacy and Merger Enforcement in Digital Markets
Unit-15	Facebook Data Theft In Indonesia
Unit-16	Yahoo Data Breach

CSPE-01: APPLICATION DEVELOPMENT USING PHP

Block-01	Introduction to PHP
Unit-01	Basics of PHP Introduction, Algorithm, Flowchart, Program, Programming Languages and its generation, OOPs Concept.
Unit-02	Introduction to PHP PHP Basic (installing Process of PHP (XAMPP)), Structure of PHP program, Write the first PHP program, Syntax, Variables, Constants, echo and Print Command, Data Type, Array Data Type, Types of Array in PHP, Multi dimension Array, Object data Type. Operations: Basics and types of operation in PHP.
Unit -03	Condition Statement (if Statement, if else statement, if else if else statement, Switch Statement), Loop (While, do While, for and for each Loop). Super global Variable.
Unit -04	Form Management Form Design: get and Post method, Working with Textbox, Text Area, Password, Check Box, Radio Buttons, drop down Box, File, Submit Buttons, Reset, Button, data, date Time, Email, search, Tel, URL etc. Working with \$Globals, \$Server, \$ENV, \$SESSION, \$COOKIE with Example. Form Validation, Form Navigation
Block -02	Advance PHP
Unit-05	Object Oriented Concept in PHP Introduction, Basics of OOP in PHP, Pillars of OOPS, Understanding Classes and Objects, PHP Class Properties and Methods, Static, Constants, Constructor and destructor, Magic Methods in PHP, Inheritance in PHP, Interface, Abstract class, Final, Polymorphism
Unit-06	File management and Exception Handling Introduction, what is File, File Formats supported by PHP, File Operations, File Permission.
Unit-07	Error Handling in PHP, Exception Handling, try... catch and throw, Top Level Exception Handler, User Defined Exception Handler
Unit-08	Database Connectivity in PHP Introduction, Introduction to MySQL, what can MySQL do? Why MySQL use with PHP, Features of MySQL, Communication between PHP and MySql Server: Create a connect to the MySql server (mysql, mysqli (MySQL improved, pdo (PHP Data Object)), Create Database and Tables in MySql, Insert Data into MySql Server, Mysql SELECT Statement, Update MySql Records, Delete MySql Records, Example database access from Webpage.

3rd Semester Practical Syllabus

CSPEL-01: APPLICATION DEVELOPMENT USING PHP LAB

Expt-1	Show the steps to install XAMM Software for PHP Programming.
Expt-2	Write a PHP program to display a digital clock which displays the current time.
Expt-3	Write the PHP programs to do the following: a. Implement simple calculator operations. b. Find the transpose of a matrix. c. Multiplication of two matrices
Expt-4	Write a PHP program to Swapping two numbers
Expt-5	Write a PHP program to create a login table.
Expt-6	Write a PHP program for login page using database connectivity
Expt-7	Write a PHP program to find a word in a file.
Expt-8	Write a PHP program to upload an image to the data base.
Expt-9	Write a PHP program to design a registration for with proper validation
Expt-10	Write a program states whether a year is leap year or not from the specified range of years (1991 - 2016). Using Exception Handling.

CSPP-04: PROJECT WORK

4th Semester
Theory Syllabus

CSPC-09: COMPUTER FORENSICS	
Block-01	Introduction to Computer Forensics
Unit-01	Introduction to Digital Forensic Learning Objectives, Introduction. Definition of Computer Forensics, Cybercrime, Evolution of Computer Forensics, Different types of digital forensics, Stages of Computer Forensics Process, need of computer forensics, Rules of Computer Forensic, Computer Forensics Team, Forensics Readiness, what is Forensics Readiness? Goals of Forensic Readiness, Benefits of Forensic Readiness, Steps for Forensic Readiness Planning
Unit – 02	Computer Forensics Investigation Process Introduction to computer crime investigation, Initial decision-making process, Assess the situation, notify decision-makers and acquire authorization, Review policies and laws, identify investigation team members, conduct a thorough assessment, prepare for evidence acquisition, Acquire the data, Analyze the data, Report the investigation
Unit – 03	Digital Evidence and First Responder Procedure Digital Evidence, Locard’s Principle, Best Evidence Rule, Characteristics of Digital Evidence, Stages in Digital Evidence Investigation Process, first responder toolkit, Issues Facing Computer Forensics, Types of investigation, Techniques of digital Forensics
Unit – 04	Understanding Storage Media and File System hard disk drive, details of the internal structure of HDD, low-level formatting, high-level formatting, the booting process, Linux boot process, mac os boot sequence, boot sequence in windows, file system
Block-02	Windows & Network Forensics
Unit – 05	Windows Forensics Introduction, Background and need for Window forensics, Major forensic areas in windows, recovering deleted files and partitions, Anatomy of a disc drive, Data organization in Windows, retrieving deleted files, retrieving cached files, retrieving files in unallocated space, more about recovering lost files/data
Unit – 06	Logs & Event Analysis and Password Cracking Introduction, windows registry, Registry and forensics, windows event log file, Windows Event Log File Format, reading from a Windows event log file, Using Microsoft log parser, Understanding Windows user account management logs, Understanding Windows file and other object Access sets, Auditing policy change, windows password storage, application passwords crackers
Unit – 07	Network Forensics Introduction, network components and their forensics importance, OSI, forensics information from network, Intrusion detection/ prevention system, Wireless Access Points, log analysis, analyzing time stamps, analyzing data, forensics tools, Network tools used for forensics, Software tools used for network forensics
Unit – 08	Wireless Attacks Introduction, wireless fidelity (wi-fi) (802.11), Capturing 802.11 frames, wireless security, Attacks, wireless attacks detection techniques, Wireless Access Point Monitoring, Wireless Client/Node Monitoring, General Wireless Traffic Monitoring, wireless intrusion detection systems, Snort-wireless, WIDZ, Bro

Block-03	Forensic Investigation & Reporting
Unit – 09	Investigating Web Attacks Introduction, Cyber-attack, Cyber Warfare and cyber terrorism, types of web attacks, Spoofing, Repudiation, Privacy attack, Denial of Service, Privilege escalation, SQL Injection Attacks, web attack forensics, Web services forensics, Web Application Forensics, Preliminary Analysis, Website traffic analysis, web application forensics tools, Logparser, EventLog Analyzer, Web log analyzer, Open Web Analytics, Webalizer
Unit – 10	Investigating email Attacks Introduction, Email Structure, Types of email services, Simple Mail Transfer Protocol, email attacks and crimes, Flaming, Email spoofing, Email bombing, Email hacking, Spams, Phishing, Email fraud, Phishing emails, privacy in emails, Email privacy, Email tracking, email forensics, email forensic tools
Unit – 11	Mobile Device Forensics Introduction, challenges in mobile forensics, mobile communication, 802.11 or WiFi, Bluetooth, Infrared (IrDA), evidences in a mobile device, mobile forensic process, Seizure, Acquisition, Examination and Analysis, forensic acquisition tools, Hardware acquisition tools, Software acquisition tools
Unit – 12	Investigative Reports, Expert Witness and Cyber Regulations Introduction, REPORT PREPARATION, Gathering the data, Analyzing the results, Outlining and organizing the report, Writing and Revising a Rough Draft, Expert Witness, finding an expert, What Can (and Can't) an Expert Do? Use an Expert, LEGAL ASPECTS OF COMPUTING, Jurisdiction, Net neutrality, Open Internet, Indian Information Technology Act (IT Act) 2000, Amendments– Indian IT Act (2008)
Block-04	Cyber Forensics from the Perspective of Law Enforcement
Unit-13	Computer Forensics and the Process of Confiscation Concept of Computer Forensic, Collecting Evidence at Individual's Level, Collecting Evidence at ISP Level, Process of Cyber Forensic, Problems with Preserving Computer Evidence, Various branches of Digital Forensics, Process of Confiscation
Unit-14	Relevance of Indian Evidence Act to Cyber Forensics Indian laws relevant to cyber forensics, Introduction to Indian Evidence Act, Amendments to Indian Evidence Act with respect to Electronic Evidence, Evidentiary value of electronic records
Unit-15	Cyber Forensic Labs and Challenges before Law Enforcement Agencies Introduction to cyber forensic labs, Cyber forensic lab structure, Examiner of Electronic evidence, Introduction to Computer emergency response team India (CERT-In), Objectives of CET-In, Challenges before law enforcement, Challenges while Investigation, Dark web (Dark net)
Unit-16	Mobile Network Investigations Mobile Network Technology, Investigations of Mobile Systems, Types of evidence, How data may be acquired

CSPE-02: PROGRAMMING IN JAVA

Block-01	Introduction to Java
Unit-01	Introduction, History of Java, Edition of Java, what is Java, Why Learn Java, Languages and Paradigms, The Basics of Java, Java Features, OOPS Concepts, Evolution of Java, How Java program works, Difference Between C++ and JAVA, Java and Internet, Java and World Wide Web, Java Support System, Java Environment, Components of JDK, Components of API (Application Programming Interface)
Unit-02	Java Program Structure, Simple Java Program, Tokens, Reserved Keywords, Identifiers, Literals, classification of Java Statements, JVM Architecture, How Does the JVM Work, Constants and Variables, Variables, Declaration of Variables, Scope of Variable, Data type, symbolic Constant, Default Values, Type Casting, Command line arguments
Unit-03	Operators, Different types of Operators, Unary Operator, The Arithmetic Operator, The Relational Operators, The Logical Operator, Conditional Operators, The Assignment Operators, The Bitwise Operators, Special Operators, Instanceof Operator, Dot operator, new operator, Precedence of Java Operators
Unit-04	Keyboard input programming: Using InputStreamReader class, Scanner class, CLA, Console class
Block-02	Control Statement & Array in Java
Unit-05	Sequence Control, Implicit and Explicit Sequence Control, Control Statements, Selection Statements, if-Then Statement, If-Then-Else Statement, Switch Statement,
Unit-06	Repetition Statements, While Statement, Do-While Loop Statements, for Loop Statements, Java Jump Statements, Break Statement, Continue Statement, Return Statements, Labeled Loop
Unit-07	Arrays and Strings: Introduction, Overview of Array, Need of Array, Types of Array, One dimensional Array, Two-Dimensional Array, Multidimensional Array
Unit-08	Strings, Concatenation of Strings, Methods for String Comparison, Methods for searching Strings, Changing the case of characters, String Buffer, String Builder
Block-03	OOPs Concept in Java
Unit – 09	Classes: Introduction, Defining a Class, Adding Variables, Adding Methods, Creating Objects, Accessing Class members, Call-by-value and call by reference, Recursion, Access Control Constructors, Method over Loading, Constructor Overloading, Garbage Collection, finalize() method, this keyword, Static Members, Nesting of Methods
Unit – 10	Inheritance: Inheritance, Single Inheritance, Multilevel Inheritance, Multiple Inheritance, Hierarchical Inheritance, Using Super, Constructor -Order of Execution in Inheritance, Overriding methods, Final variables and methods, Final Classes, Abstract methods and Classes, Containership, Visibility Control
Unit – 11	Wrapper Classes And Vectors: Introduction, Wrapper Classes, Number Class, Byte class, Short class, Integer class, Long class, Converting Numbers to and from Strings, Float class, Double class, Character class, Boolean class, Vectors, Creating a vector
Unit – 12	Interface & Packages: Introduction, Interfaces, Defining interface, Implementing interface, Accessing interface method, Accessing interface variable, Extending interfaces, Packages, System packages, Using system packages, User-defined packages, Adding class to a package, Accessing and using package

Block-04	Advanced Concept in Java
Unit -13	Exception Handling: Introduction, Exceptions, Using try& catch, multiple catch clauses, Finally, Throw, Throws
Unit-14	Applets: Introduction, Local & remote applets, Applet vs. applications, Writing applets, Life cycle of an applet, Creating source code of applet, Creating an executable applet, Creating applet tag, Adding applet tag to HTML, Running the applet, Detailed form of applet tag, Passing parameters to applet, Aligning the display, HTML tags, Getting input from user.
Unit-15	Multithreading: Introduction, Multithreading, Uses of Multithreading, The Main Thread, Creating and Running Threads, How to terminate a Threads, Multiple Task using Single Threads, Multiple Task using Multiple Threads, Multiple Task using Multiple Threads and Single Object, Threads Synchronization, Threads Priority, Thread Methods, Threads Communication, Threads Life Cycle.
Unit-16	File Handling: Java Files, Create Read, Write, delete operation

CSPE-03: PROGRAMMING IN PYTHON

Block-01	Introduction to Python
Unit-01	<p>Fundamental of Python What is the program, Need for Programming Languages, Programming Languages, Examples of Programming languages, The Programming Process, Introduction to Python, Common Uses, History of Python Language, Development Steps of Python, Features of Python, Version of Python and Why Python? Applications for Python, Download and installation of Python on Windows, The First Program in Python.</p>
Unit-02	<p>Variables, Expressions and Statements Values and types, Variables, Variable names, keywords, Constants and Identifiers, Data Type in Python, Type Casting in Python (Type Conversion), Operators and operands, Expressions and Statements, Interactive mode and script mode, Order of operations, Comments in Programming, Debugging, Input, Output and Import in Python, Conditional statements/Selection Structure, Iteration Structure, How to Use Break, Continue, and Pass Statements</p>
Unit-03	<p>Functions in Python Why Functions, Write a function definition, How to call a function in Python, Flow of Execution, Functions with arguments (Parameters and arguments), Different Argument types used in Python, void Functions, Functions with return statements, Using main() as a Function, Built-in functions, Type Conversion functions, Math functions.</p>
Unit-04	<p>String Strings in Python, String formatting, Escape Sequences, String Operations and Methods, Strings are immutable, The 'in' operator, Boolean Methods, Parsing strings</p>
Block-02	Advanced concept in Python
Unit-05	<p>Object-oriented Programming in Python Overview of object-oriented programming (OOP), Basic concepts of objects and classes, Constructor in Python (__init__), Inheritance in Python, Overriding Parent Methods, super() Function, Multiple Inheritance, Multilevel Inheritance, Data Encapsulation</p>
Unit-06	<p>Error and Exception Handling Syntax error, Runtime errors 2.4 Semantic errors, Syntax Errors v/s Exceptions, Exception Handling, Catching Specific Exceptions in Python, the except Clause with Multiple Exceptions, Python the try/finally Statement, Raising an Exception, User-Defined Exceptions</p>
Unit-07	<p>File Handling in Python What is a File? File Formats Support by Python, File Operations, opening a File, closing a File, Read and Write Files, Read the file as a single string, Read the file line by line, writing a File, Searching through a file, Python Pickle</p>
Unit-08	<p>Numpy in Python Operations using NumPy, Why NumPy instead of lists? Importing numpy, how to install Numpy in PyCharm, Common functions of numpy, Simple Program using Numpy/ 1D Array, How Numpy is better than Lists in terms of Memory Management, How Numpy is faster and more convenient than Lists in terms of Time, Operations on Arrays, Array Arithmetic, Arithmetic Operations, Aggregation</p>

4th Semester Practical Syllabus

CSPCL-09: COMPUTER FORENSICS LAB

No.	Experiment Name
1.	Study of Computer Forensics and different tools used for forensic investigation
2.	How to Recover Deleted Files using Forensics Tools
3.	Study the steps for hiding and extract any text file behind an image file/ Audio file using Command Prompt.
4.	How to Extract Exchangeable image file format (EXIF) Data from Image Files using Exifreader Software
5.	How to make the forensic image of the hard drive using EnCase Forensics.
6.	How to Restoring the Evidence Image using EnCase Forensics
7.	How to Collect Email Evidence in Victim PC
8.	How to Extracting Browser Artifacts
9.	How to View Last Activity of Your PC
10.	Find Last Connected USB on your system (USB Forensics)
11.	Comparison of two Files for forensics investigation by Compare IT software
12.	Live Forensics Case Investigation using Autopsy

CSPEL-02: Programming in Java Lab

No.	Experiment Name
1.	Write a Java program to display Welcome message
2.	Write a Java program to demonstrate Command line arguments
3.	Write a Java program to demonstrate Scanner(I/O Streams)
4.	Write a Java program to demonstrate BufferedReader(I/O Streams)
5.	Write a Java program to demonstrate Arrays.
6.	Write a Java program to find both the largest and smallest number in a list of integers.
7.	Write a Java program that uses both recursive and non-recursive functions to print thenth value in the Fibonacci sequence.
8.	Write a Java program that checks whether a given string is palindrome or not.
9.	Write a Java program to sort a list of names in ascending order.
10.	A program to illustrate the concept of class with Constructor overloading
11.	A program to illustrate the concept of class with Method overloading
12.	A program to illustrate the concept of Dynamic Polymorphism.
13.	A program to illustrate the concept of Single inheritance
14.	A program to illustrate the concept of Multi level inheritance
15.	A program to illustrate user defined packages
16.	A program to illustrate the concept of Abstract Classes
17.	Write a Java program to implement the concept of exception handling
18.	A program to illustrate the concept of threading using Thread Class
19.	A program to illustrate the concept of threading using runnable Interface
20.	Develop an applet that displays a simple message
21.	Develop an applet that displays lines, rectangles, ovals, square etc.

CSPEL-03: PROGRAMMING IN PYTHON LAB

No.	Experiment Name
1.	Demonstrate how to install python and Pycharm
2.	Write a python programme to display "Hello World" in script mode
3.	Write a python program to demonstrate operator concept
4.	Write a program to find the average of any five numbers.
5.	Write a python program to demonstrate conditional Statement (if, elif) etc
6.	Write a program to check a year for leap year.
7.	Write a Python program to find those numbers which are divisible by 7 and multiple of 5, between 1500 and 2700 (both included)
8.	Write a python program to demonstrate operator concept
9.	Write a Python program to find GCD of two numbers
10.	Write a Python program to find the exponentiation of a number.
11.	Write a Python Program to find the maximum from a list of numbers.
12.	Write a Python Program to perform Linear Search
13.	Write a Python Program to perform Binary Search
14.	Write a Python program to find first n prime numbers.
15.	Write a Python program to multiply matrices.
16.	Write a program to compute the number of characters, words and lines in a file.
17.	Write a program to find the average of any five numbers.
18.	Write a program to find simple interest.
19.	Write a Python program which accepts the radius of a circle from the user and compute the area
20.	Suppose the cover price of a book is Rs 240.95, but bookstores get a 40% discount. Shipping costs Rs 30 for the first copy and 75 cents for each additional copy. What is the total wholesale cost for 60 copies? Write the program in Python.