19CY4111: Vulnerability Assessment & Penetration Testing

B.Tech. IV Year I Sem. **L T P C**
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Prerequisites:

- Knowledgeininformationsecurity.
- KnowledgeonWebApplication.

CourseObjectives:

1. Understand the ethics of hacking and the importance of ethical hacking, as well as develop knowledge and skills in vulnerability assessment and penetration testing.
2. Comprehend and analyze various types of attacks in cybersecurity, Gain proficiency in using Metasploit for penetration testing.
3. Develop management and reporting skills for penetration test. Explore and exploit vulnerabilities in operating systems.
4. Gain knowledge of web application security vulnerabilities and acquire skills in vulnerability analysis.
5. Develop skills in malware analysis and client-side browser exploits.

CourseOutcomes:

1. Evaluate the ethical considerations and legal implications in conducting ethical hacking activities using appropriate tools.
2. Analyze and defend against social engineering, physical penetration, and insider attacks using automating penetration testing processes.
3. Manage and report penetration tests effectively and Develop and execute Linux and Windows exploits, bypassing memory protections.
4. Analyze and mitigate web application security vulnerabilities and Conduct vulnerability analysis.
5. Evaluate and protect against client-side browser exploits.

UNIT-I

Introduction Ethics of Ethical Hacking: Why you need to understand your enemy's tactics, recognizingthegrayareasinsecurity,VulnerabilityAssessmentandPenetrationTesting.PenetrationTestingandTools:SocialEngineering Attacks:How asocialengineeringattackworks,conductinga socialengineering attack, common attacks used in penetration testing, preparing yourself for face-to-faceattacks,defending againstsocialengineering attacks.

UNIT-II

PhysicalPenetrationAttacks:Whyaphysicalpenetrationisimportant,conductingaphysicalpenetration, Common ways into a building, Defending against physical penetrations. Insider Attacks:Conducting an insider attack, Defending against insider attacks. Metasploit: The Big Picture, GettingMetasploit,UsingtheMetasploitConsoletoLaunchExploits,ExploitingClient-SideVulnerabilitieswithMetasploit, Penetration Testing with Metasploit's Meterpreter,

Automating and Scripting Metasploit,GoingFurtherwithMetasploit.

UNIT-III

ManagingaPenetrationTest:planningapenetrationtest,structuringapenetrationtest,executionof apenetration test, information sharing during a penetration test, reporting the results of a PenetrationTest.BasicLinuxExploits:StackOperations, BufferOverflows, LocalBufferOverflowExploits,ExploitDevelopment Process. Windows Exploits: Compiling and Debugging Windows Programs, WritingWindows Exploits, Understanding Structured Exception Handling (SEH), Understanding WindowsMemoryProtections(XPSP3,Vista,7andServer2008),BypassingWindowsMemoryProtections.

UNIT-IV

Web Application Security Vulnerabilities: Overview of top web application security vulnerabilities,Injection vulnerabilities, cross-Site scripting vulnerabilities, the rest of the OWASP Top Ten SQLInjection vulnerabilities, Cross-site scripting vulnerabilities. Vulnerability Analysis: Passive Analysis,SourceCode Analysis,BinaryAnalysis.

UNIT-V

Client-Side Browser Exploits: Why client-side vulnerabilities are interesting, Internet explorer securityconcepts, history of client- side exploits and latest trends, finding new browser-based vulnerabilitiesheapspraytoexploit,protectingyourselffromclient-sideexploit.MalwareAnalysis:CollectingMalwareand Initial Analysis: Malware, Latest Trends in Honeynet Technology, Catching Malware: Setting theTrap,Initial AnalysisofMalware.

TEXTBOOKS:

1. GrayHatHacking-TheEthicalHackersHandbook,AllenHarper,StephenSims,MichaelBaucom,3rd Edition,Tata McGraw-Hill.
2. TheWebApplicationHacker'sHandbook-DiscoveringandExploitingSecurityflaws,DafyddSuttard,Marcuspinto,1stEdition,Wiley Publishing.

REFERENCEBOOKS:

1. PenetrationTesting:Hands-onIntroductiontoHacking",GeorgiaWeidman,1stEdition,NoStarchPress.
2. ThePenTesterBlueprint-StartingaCareerasanEthicalHacker",L.Wylie,KimCrawly,1stEdition,WileyPublications.

19CY4112: Network Management Systems and Operations

B.Tech. IV Year I Sem. **L T P C**

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CourseObjectives:

1. To equip students with a comprehensive understanding of network management complexities, challenges, and best practices.
2. To understand network management challenges, the complexities of network configuration, and its impact on the operational state of networks.
3. To equip students with the knowledge and skills to effectively identify and address network faults, as well as assess and optimize network performance.,
4. To provide students with a comprehensive understanding of network security principles, management tools, and technologies to ensure a secure and efficient network infrastructure.
5. To provide students with a comprehensive understanding of various network management tools and technologies used for monitoring, managing, and automating network resources.

CourseOutcomes:

1. Apply network management techniques to manage entities within an organization effectively.
2. Implement configuration and operation strategies for managing network devices in practical systems.
3. Assess the challenges and considerations in capacity planning for complex network topologies.
4. Apply risk assessment techniques to identify potential security threats and vulnerabilities.
5. Implement alerting and notification mechanisms using the network management tools.

UNIT-I

The Network Management Challenge: Introduction, The Internet and Network Management, InternetStructure, Managing an Entity, Internal and External policies, The state of Network Management,Network Management in the Gartner Model, Benefits of Automation, The Lack of Industry Response,ImpactonBusiness,Distributed Systemsand newabstractions.

AReviewofNetworkElementsandServices:Introduction,NetworkDevicesandNetworkServices,NetworkElementsandElementManagement,EffectofphysicalorganizationonManagement,ExamplesofNetwork ElementsandServices,BasicEthernetSwitch,VLANSwitch,AccessPointforaWirelessLAN, CableModemSystem,DSLModemSystemandDSLAM,CSU/DSUusedinWideAreaDigitalCircuits,ChannelBank,IPRouter,Firewall,DNSServer,DHCPServer,WebServer,HTTP LoadBalancer.

UNIT-II

The Network Management Problem: Introduction, What is Network Management?, The scope ofNetwork Management, variety and multi-vendor environments, element and network managementsystems, scale and complexity, types of networks, classification of devices, FCAPS: The IndustryStandardDefinition,Themotivationforautomation,WhyAutomationhasnotoccurred,OrganizationofmanagementSoftware.

Configuration and Operation: Introduction, Intuition for configuration, configuration and

protocollayering,dependenciesamongconfigurationparameters,seekingamoreprecisedefinition ofconfiguration, configuration and temporal consequences, configuration and global consistency, globalstate and practical systems, configuration and default values, partial state, automatic update andrecovery, Interface paradigm and incremental configuration, commit and rollback during configuration,automated rollback and timeout, snapshot, configuration, and partial state, separation of setup andactivation.

UNIT-III

Fault detection and correction: Introduction, Network Faults, Trouble Reports, Symptoms, AndCauses, Troubleshooting And Diagnostics, Monitoring, Baselines, Items That Can Be Monitored,Alarms, Logs, And Polling, Identifying The Cause Of A Fault, Human Failure And Network Faults,Protocol Layering And Faults, Hidden Faults And Automatic Correction, Anomaly Detection And EventCorrelation,FaultPrevention.

Performance Assessment and Optimization: Introduction, aspects of performance, Items that canbe measured,measures ofnetworkperformance,application andendpointsensitivity,degradedservice, variance in traffic and congestion, congestion, delay and utilization, local and end-to-endmeasurements, passive observation Vs. active probing, bottlenecks and future planning, capacityPlanning, planning the capacity of a switch, planning the capacity of a router, planning the capacity ofan Internet connection, measuring peak and average traffic on a link, estimated peak utilization and95thpercentile,relationshipbetweenaverageandpeakutilization,consequencesformanagement and the 50/80 Rule, capacity planning for a complex topology, a capacity planning process, route changesandtrafficengineering,failurescenariosand availability.

UNIT-IV

Security:Introduction,Theillusionofasecurenetwork,securityasaprocess,securityterminologyandconcepts, management goals related to security, Risk Assessment, Security policies, acceptable usepolicy, basic technologies used for security, management issues and security, Security architecture:Perimeter Vs. Resources, element coordination and firewall unification, resource limits and denial ofservice, management ofauthentication,access controlanduserauthentication, managementofwireless networks, security of the network, role-based access control, audit trails and security logging,keymanagement.

Managementtoolsandtechnologies:Introduction,theprincipleofmostrecentchange,theevolution of Management tools, management tools as applications, using a separate network for management,types of management tools, physical layer testing tools, reach ability and connectivity tools (ping),packet analysistools,discoverytools,deviceinterrogationinterfacesandtools, eventmonitoringtools,triggers, Urgency Levels, And Granularity, events, Urgency Levels and traffic, performance monitoringtools,flowanalysistools,routingandtrafficengineeringtools,Configurationtools,SecurityEnforcementtools,NetworkPlanningtools,IntegrationofManagementtools,NOCsandRemote Monitoring,RemoteCLIAccess,RemoteAggregationOfManagementTraffic.

UNIT-V

NetworkManagementTools: ZabbixLabs,Nagios,GoogleCloudnetwork,AutomationwithTerraform.

TEXT BOOKS:

1. AutomatedNetworkManagementSystems,D.Comer,PrenticeHall,2006,ISBNNo.0132393085.
2. NagiosCoreAdministrationCookbook-SecondEdition,TomRyder,2016,Packtpublishing,ISBN:781785889332.
3. Terraform: UpandRunning,YevgeniyBrikman,2017,O'ReillyMedia,Inc.,ISBN:9781491977088.

REFERENCEBOOK:

1.AppliedNetworkSecurityMonitoring,ChrisSanders,JasonSmith,Syngresspublications.

19CY4171 : Edge Analytics (Professional Elective – IV)

B.Tech. IV Year I Sem. **L T P C**
3 - - 3

Prerequisites

A basic knowledge of "Python Programming"

Course Objectives:

1. To introduce the fundamentals of Edge Analytics
2. To give an overview of Architectures, Components, Communication Protocols and tools used for Edge Analytics.
3. To give an overview of Microsoft Azure.
4. To use Micropython for Edge Analytics.
5. To develop edge analytics application

Course Outcomes:

1. Understand the concepts of Edge Analytics, both in theory and in practical application..
2. Demonstrate a comprehensive understanding of different tools used at edge analytics.
3. Experiment with edge devices by working with Microsoft Azure IoT Hub.
4. Develop edge analytics applications using Micropython.
5. Formulate, Design and Implement the solutions for real world edge analytics.

UNIT - I

Introduction to Edge Analytics. What is edge analytics, Applying and comparing architectures, Key benefits of edge analytics, Edge analytics architectures, Using edge analytics in the real world.

UNIT - II

Basic edge analytics components, Connecting a sensor to the ESP-12F microcontroller, KOM-MICS smart factory platform, Communications protocols used in edge analytics, Wi-Fi communication for edge analytics, Bluetooth for edge analytics communication, Cellular technologies for edge analytics communication, Long-distance communication using LoRa and Signfox for edge analytics.

UNIT - III

Working with Microsoft Azure IoT Hub, Cloud Service providers, Microsoft Azure, Exploring the Azure portal, Azure ioT Hub, Using the Raspberry Pi with Azure IoT edge, Connecting our Raspberry Pi edge device, adding a simulated temperature sensor to our edge device.

UNIT - IV

Using Micropython for Edge Analytics, Understanding Micropython, Exploring the hardware that runs MicroPython, Using MicroPython for an edge analytics application, Using edge intelligence with microcontrollers, Azure Machine Learning designer, Azure IoT edge custom vision.

UNIT - V

Designing a Smart Doorbell with Visual Recognition setting up the environment, Writing the edge code, creating the Node-RED dashboard, Types of attacks against our edge analytics applications, Protecting our edge analytics applications.

TEXT BOOK:

1. Hands-On Edge Analytics with Azure IoT: Design and develop IoT applications with edge analytical solutions including Azure IoT Edge by Colin Dow.

REFERENCE BOOKS:

1. Learn Edge Analytics - Fundamentals of Edge Analytics: Automated analytics at source using Microsoft Azure by Ashish Mahajan.

19CY4172 :Web & Database Security (Professional Elective – IV)

B.Tech. IV Year I Sem. **L T P C**

3 - - 3

CourseObjectives:

1. To equip students with a comprehensive understanding of web security principles, cryptography, and digital identification.
2. To educate students about the threats to user privacy posed by the web and equip them with privacy-protecting techniques.
3. To familiarize students with recent advancements in database security, access control models, and trust management techniques.
4. To equip students with the knowledge and skills necessary to assess the security vulnerabilities in databases.
5. To explore emerging trends and cutting-edge techniques in privacy protection for database publishing.

CourseOutcomes:

1. Understand the fundamental concepts of web security, including the importance of protecting sensitive data and maintaining the confidentiality, integrity, and availability of web resources.
2. Identify common security risks and vulnerabilities associated with web servers, proxies and clients.
3. Explore advanced access control models and their application in database security.
4. Evaluate the current capabilities of Hippocratic Databases in preserving data privacy.
5. Assess the challenges and potential solutions for efficiently enforcing security and privacy policies in mobile computing environments.

UNIT-I

TheWebSecurity,TheWeb SecurityProblem,RiskAnalysisandBestPractices
Cryptography and the Web: Cryptography and Web Security, Working Cryptographic Systems andProtocols,Legal Restrictionson Cryptography,DigitalIdentification

UNIT-II

The Web's War on Your Privacy, Privacy-Protecting Techniques, Backups and Antitheft, Web ServerSecurity,Physical SecurityforServers,HostSecurityforServers,SecuringWebApplications

UNIT-III

Database Security: Recent Advances in Access Control, Access Control Models for XML, DatabaseIssuesin TrustManagementand TrustNegotiation,Securityin DataWarehousesand OLAPSystems

UNIT-IV

SecurityRe-engineeringforDatabases:ConceptsandTechniques,DatabaseWatermarkingforCopyright Protection, Trustworthy Records Retention, Damage Quarantine and Recovery in DataProcessingSystems,HippocraticDatabases:CurrentCapabilitiesand

UNIT-V

Future Trends Privacy in Database Publishing: A Bayesian Perspective, Privacy-enhanced Location-basedAccessControl,EfficientlyEnforcingthe Security and PrivacyPoliciesinaMobileEnvironment

TEXTBOOKS:

1. WebSecurity,Privacy andCommerceSimsonGArfinkel,GeneSpafford,O'Reilly.
2. HandbookonDatabasesecurityapplicationsandtrendsMichaelGertz,SushilJajodia.

REFERENCEBOOKS:

1. AndrewHoffman,WebApplicationSecurity:ExploitationandCountermeasuresforModernWebApplications,O'reilly.
2. JonathanLeBlancTimMesserschmidt,IdentityandDataSecurityforWebDevelopment-BestPractices,O'reilly.
3. McDonaldMalcolm,WebSecurityFor Developers,NoStarch Press,US.

19CY4173: Computer Security & Audit Assurance (Professional Elective – IV)

B.Tech. IV Year I Sem. **L T P C**

3 - - 3

Course Objectives:

1. To state the basic concepts in information systems security, including security technology and principles.
2. To acquire knowledge about software security and trusted systems and IT security management.
3. To understand audit , standard practices and policies.
4. To explain concepts related to various cryptographic tools.
5. To understand and implement disaster recovery planning control.

Course Outcomes:

1. State the requirements and mechanisms for identification and authentication.
2. Explain and compare the various access control policies and models as well as the assurance of these models.
3. Understand various standard practices and policies in conducting audits.
4. Understand and analyze the significance of Network Security and Control, Internet Banking Risks and Control.
5. Developing appropriate disaster recovery strategy.

UNIT - I

System Audit and Assurance – Characteristics of Assurance services, Types of Assurances services, Certified Information system auditor, Benefits of Audits for Organization, COBIT.

UNIT - II

Internal Control and Information system Audit - Internal Control, Detective control, Corrective Control, Computer Assisted Audit Tools and Techniques.

UNIT - III

Conducting Audit – Standard practices, policies, Audit planning, Risk Assessment, Information gathering techniques, Vulnerabilities, System security testing, conducting Audits for Banks.

UNIT - IV

Network Security and Control, Internet Banking Risks and Control, Operating System Risks and Control, Operational Control Overview.

UNIT - V

Business Continuity and Disaster Recovery Planning Control – Data backup/storage, Developing appropriate Disaster recovering strategy, Business Impact analysis.

TEXT BOOK:

1. Information System Audit and Assurance; D. P. Dube, Ved Prakash Gulati; Tata McGraw- Hill Education, 01 Jan 2005.

REFERENCE BOOKS:

1. William Stallings and Lawrie Brown, Computer Security: Principles and Practice, Pearson education
2. Martin Weiss and Michael G. Solomon, Auditing IT Infrastructures For Compliance (Information Systems Security & Assurance), Jones and Bartlett Publishers, Inc.

19CY4174: Social Media Security

B.Tech. IV Year I Sem. **L T P C**
3 - - 3

Course Objectives:

1. Give introduction about the social networks
2. To demonstrate the usage of Social Media.
3. To understand the need of security in social data.
4. To become familiar in the Phishing attacks
5. To demonstrate the basic concepts of Policies and Privacy

CourseOutcomes:

1. Learn about browser's risks.
2. Learn about Social Networking, Understand the risks while using social media. Guidelines for social networking.
3. Understand how to secure different web browsers.
4. Understand how an e-mail works, learn threats involved using an email communication, safety measures while using e-mail.

UNIT–I

Introduction to Social Media, Understanding Social Media, Different Types and Classifications, TheValue of Social Media, Cutting Edge Versus Bleeding Edge, The Problems That Come With SocialMedia,IsSecurityReallyanIssue? TakingtheGoodWiththe Bad.

UNIT-II

Dark side Cybercrime, Social Engineering, Hacked accounts, cyberstalking, cyberbullying, predators,phishing,hackers.

UNIT–III

Being bold versus being overlooked Good social media campaigns, Bad social media campaigns,Sometimesit'sbettertobeoverlooked,Socialmediahoaxes,Thehumanfactor,Content management,Promotionofsocial media.

UNIT-IV

Risks of Social media Introduction Public embarrassment, Once it's out there, it's out there Falseinformation,Informationleakage,Retentionandarchiving,Lossofdataandequipment.

UNIT–V

Policiesand PrivacyBlockinguserscontrollingapp privacy,Location awareness,SecurityFakeaccountspasswords,privacyandinformation sharing

TEXTBOOKS:

1. Interdisciplinary ImpactAnalysis ofPrivacy in Social Networks,Recognizing Your

DigitalFriends, Encryption for Peer-to-Peer Social Networks Crowd sourcing and Ethics, Authors:AltshulerY,EloviciY,CremersA.B,AharonyN,Pentland A.(Eds.).

2. Socialmediasecurityhttps://www.sciencedirect.com/science/article/pii/B97815974998660000

REFERENCEBOOKS:

1. MichaelCross,SocialMediaSecurityLeveragingSocialNetworkingWhileMitigatingRisk.
2. Online Social Networks Security, Brij B. Gupta, Somya Ranjan Sahoo, Principles, Algorithm,Applications,and Perspectives,CRCpress.

19CY4175: Deep Learning (Professional Elective – IV)

B.Tech. IV Year I Sem. **L T P C**
3 - - 3

CourseObjectives: Studentswillbeable:

1. TounderstandcomplexityofDeepLearningalgorithmsandtheirlimitations
2. To learn about Convolutional Neural Networks
3. TobecapableofperformingexperimentsinDeepLearningusingreal-worlddata.
4. To learn about Applications of Deep Learning to NLP.
5. To understand Analogy reasoning.

CourseOutcomes:

1. Implementdeeplearningalgorithms,understandneuralnetworksandtraversethelayersofdata.
2. Learntopicssuchasconvolutionalneuralnetworks,recurrentneuralnetworks,trainingdeep networksand high-level interfaces.
3. UnderstandapplicationsofDeepLearningtoComputerVision.
4. Analyze and understandapplicationsofDeepLearningtoNLP.
5. Understanding the concepts of recurrent neural networks.

UNIT-I

Introduction: Feed forward Neural networks, Gradient descent and the back-propagation algorithm,Unit saturation, the vanishing gradient problem, and ways to mitigate it. RelU Heuristics for avoidingbad local minima, Heuristics for faster training, Nestors accelerated gradient descent, Regularization,Dropout

UNIT-II

ConvolutionalNeuralNetworks: Architectures,convolution/poolinglayers,RecurrentNeuralNetworks:LSTM,GRU,EncoderDecoderarchitectures.DeepUnsupervisedLearning:Autoencoders,Variational Auto-encoders, Adversarial Generative Networks, Auto-encoder and DBM Attention andmemorymodels,DynamicMemoryModels

UNIT-III

ApplicationsofDeepLearningtoComputerVision: Imagesegmentation,objectdetection,automaticimagecaptioning,ImagegenerationwithGenerativeadversarialnetworks,videototextwithLSTMmodels,Attention Modelsforcomputervisiontasks

UNIT-IV

Applications of Deep Learning to NLP: Introduction to NLP and Vector Space Model of Semantics,WordVectorRepresentations:ContinuousSkip-GramModel,ContinuousBag-of-Wordsmodel(CBOW),Glove,Evaluationsand Applicationsin word similarity

UNIT-V

Analogy reasoning: Named Entity Recognition, Opinion Mining using Recurrent Neural Networks:Parsing and Sentiment Analysis using Recursive Neural Networks: Sentence

Classification usingConvolutionalNeural Networks,Dialogue Generationwith LSTMs.

TEXTBOOKS:

1. DeepLearningbyIanGoodfellow,YoshuaBengioandAaronCourville, MITPress.
2. TheElementsofStatisticalLearningbyT. Hastie, R.Tibshirani, andJ.Friedman,Springer.
3. ProbabilisticGraphicalModels.Koller,andN.Friedman, MITPress.

REFERENCEBOOKS:

1. Bishop, C,M.,PatternRecognitionandMachineLearning, Springer,2006.
2. Yegnanarayana,B.,ArtificialNeuralNetworksPHILearningPvt. Ltd,2009.
3. Golub,G.,H.,andVanLoan, C.F.,MatrixComputations,JHUPress, 2013.
4. SatishKumar,NeuralNetworks: AClassroomApproach,TataMcGraw-HillEducation,2004.

19CY4176: Authentication Techniques (Professional Elective – V)

B.Tech. IV Year I Sem. **L T P C**

3 - - 3

Course Objectives:

1. Knowledge on concept of authentication types, protocols, physical identificationandvariousauthentication algorithms.
2. To learn text ad voice based authentication techniques.
3. To learn different types of digital identification.
4. To acquire knowledge of different international standards and policies for authentication
5. To explore different tools used for authentication.

CourseOutcomes

1. Understanddifferent typesofauthenticationtechniques
2. Understandtextbasedandvoice-basedauthenticationtechniques
3. Analyse different digital identification techniques
4. Understand significanceofauthenticationalgorithmsanditsstandards
5. Applyvariousauthentication protocolsinmulti-serverenvironmentandtheirrepresentation.

UNIT-I:

DefinitionofAuthentication,Identification/verification,Stagesandstepsofauthentication,Authentication Entity : User, Device and Application; Authentication attributes: Source, Location, Path,Time duration etc.; Authentication Types : Direct / Indirect, One Way / Mutual, On demand/ Periodic/Dynamic/Continuousauthentication,Assisted/Automatic;3Factorsofauthentication;Passwords,Generation of passwords of varied length and of mixed type, OTP, passwords generation using entityidentitycredentials;Securecapture,processing, storage,verificationandretrievalofpasswords;

UNIT-II:

Physicalidentificationusingsmartcards,remotecontroldevice,proximitysensors,surveillancecamera, authentication in Card present / Card Not Present transactions as ATM/ PoS Device, mobilephone,wearabledeviceandIoTdevice-basedauthentication;singlesign-on;SymmetricKeyGeneration,KeyEstablishment,KeyAgreementProtocols;

UNIT-III:

Biometrics – photo, face, iris, retinal, handwriting, signature, fingerprint, palm print, hand geometry,voice – Textbased and text independent voice authentication,style oftalking,walking,writing,keystrokes,gaitetc.multi-modalbiometrics.

UNIT-IV:

Matching algorithms, Patterns analysis, errors, performance measures, ROC Curve; AuthenticationStandards– International,UIDAIStandard.Kerberos,X.509AuthenticationService,PublicKeyInfrastructure, Scanners and Software; Web Authentication Methods:Http based, Token Based,OAuthand API.

UNIT-V:

Userauthenticationprotocolsinmulti-serverenvironment,BANLogic,Representationofauthenticationprotocols using BAN Logic, Random Oracle Model, Scyther Tools, Proverif tool, Chebyshev ChaoticMap,FuzzyExtractor,FuzzyExtractorMap,BloomFilter,LUDecompositionbasedUserAuthentication,Blockchain based authentication.

TEXTBOOKS:

Protocols for Authentication and Key Establishment, Colin Boyd and Anish Mathuria, springer, 2021GuidetoBiometrics,RuudM.Bolle,SharathPankanti,Nalini K.Ratha,AndrewW.Senior,JonathanH.Connell,Springer2009.

REFERENCEBOOKS:

1. DigitalImageProcessingusingMATLAB,RafaelC.Gonzalez,RichardEugeneWoods,2nd Edition,TataMcGraw-HillEducation 2010.
2. Biometric System and Data Analysis: Design, Evaluation, and data Mining, Ted Dunstone andNeil Yager,Springer.
3. BiometricsTechnologiesandverificationSystems,JohnVacca,ElsevierInc.,2007.
4. PatternClassification,RichardO.Duda,DavidG.Stork,Peter E.Hart,Wiley 2007.

19CY4177: Quantum Computing (Professional Elective – V)

B.Tech. IV Year I Sem. **L T P C**
3 - - 3

CourseObjectives:

1. Tointroducethefundamentalsofquantumcomputing
2. Theproblem-solvingapproachusingfinitedimensionalmathematics
3. To acquire knowledge of quantum architecture and its essentials
4. Knowledge of quantum algorithms
5. To understand the Impact of Quantum Computing on Cryptography

CourseOutcomes:

1. Understandbasicsofquantum computing
2. Understand basic quantum theory and its essentials
3. Understandphysicalimplementationof Qubit
4. UnderstandQuantumalgorithmsandtheirimplementation
5. UnderstandtheImpactofQuantumComputingonCryptography

UNIT-I

Introduction to Essential Linear Algebra: Some Basic Algebra, Matrix Math, Vectors and VectorSpaces,SetTheory.**ComplexNumbers:**Definition ofComplexNumbers,AlgebraofComplexNumbers,ComplexNumbersGraphically,VectorRepresentationsofComplexNumbers,PauliMatrice,TranscendentalNumbers.

UNIT-II

Basic Physics for Quantum Computing: The Journey to Quantum, Quantum Physics Essentials,Basic AtomicStructure,HilbertSpaces,Uncertainty,QuantumStates,Entanglement.

BasicQuantumTheory: FurtherwithQuantumMechanics,QuantumDecoherence,QuantumElectrodynamics, Quantum Chromodynamics, Feynman Diagram Quantum Entanglement and QKD,QuantumEntanglement,Interpretation,QKE.

UNIT-III

QuantumArchitecture: FurtherwithQubits,QuantumGates,MorewithGates,QuantumCircuits, TheD-WaveQuantumArchitecture.**QuantumHardware:**Qubits,HowManyQubitsAreNeeded?AddressingDecoherence,TopologicalQuantumComputing,Quantum Essentials.

UNIT-IV

QuantumAlgorithms: WhatIsanAlgorithm?Deutsch'sAlgorithm,Deutsch-JozsaAlgorithm,Bernstein-VaziraniAlgorithm,Simon'sAlgorithm,Shor'sAlgorithm,Grover'sAlgorithm.

UNIT-V

Current Asymmetric Algorithms: RSA, Diffie-Hellman, Elliptic Curve. **The Impact of QuantumComputingon**
Cryptography: AsymmetricCryptography,SpecificAlgorithms,SpecificApplications.

TEXTBOOKS:

1. NielsenM.A.,QuantumComputationandQuantumInformation,CambridgeUniversityPress
2. Dr.ChuckEasttom,QuantumComputingFundamentals,Pearson

REFERENCEBOOKS:

1. QuantumComputingforComputerScientistsbyNosonS.YanofskyandMircoA.Mannucci
2. BenentiG.,CasatiG.andStriniG.,PrinciplesofQuantumComputationandInformation,Vol .Basic Concepts.Vol.BasicToolsand Special Topics,WorldScientific.
3. Pittenger A.O.,AnIntroductiontoQuantum ComputingAlgorithms.

19CY4178: Data Analytics for Fraud Detection (Professional Elective – V)

B.Tech. IV Year I Sem. **L T P C**

3 - - 3

CourseObjectives:

1. To discussthe overallprocessofhowdataanalyticsisapplied.
2. To discusshowdataanalyticscanbeusedtobetter addressandidentify risks.
3. To discuss about data analytical tests
4. To acquire knowledge of advanced data analytical tests.
5. To helpmitigaterisksfromfraudand wastefor ourclientsandorganizations.

CourseOutcomes

1. Formulatereasonsfor using data analysistodetectfraud.
2. Explaincharacteristicsandcomponentsofthedataandassessitscompleteness.
3. Identifyknownfraudsymptomsandusedigitalanalysistoidentifyunknownfraudsymptoms.
4. Automatethedetectionprocess.
5. Verify resultsand understandhowtoprosecute fraud.

UNIT-I

Introduction: Defining Fraud, Anomalies versus, Fraud, Types of Fraud, Assess the Risk of Fraud,Fraud Detection, Recognizing Fraud, Data Mining versus Data Analysis and Analytics, Data AnalyticalSoftware,AnomaliesversusFraudwithinData,FraudulentDataInclusionsandDeletions .

UNIT-II

The Data Analysis Cycle, Evaluation and Analysis, Obtaining Data Files, Performing the Audit, FileFormatTypes,PreparationforDataAnalysis,ArrangingandOrganizingData,StatisticsandSampling,DescriptiveStatistics,InferentialStatistics.

UNIT-III

Data Analytical Tests: Benford's Law, Number Duplication Test, Z-Score, Relative Size Factor Test,Same-Same-SameTest,Same-Same-DifferentTest.

UNIT-IV

Advanced Data Analytical Tests, Correlation, Trend Analysis, GEL-1 and GEL-2, Skimming and CashLarceny, Billing schemes: and Data Familiarization, Benford's Law Tests, Relative Size Factor Test,MatchEmployee Addressto Supplierdata.

UNIT-V

PayrollFraud,ExpenseReimbursementSchemes,Registerdisbursementschemes.

TEXTBOOK:

1.FraudandFraud Detection:ADataAnalyticsApproachbySunderGee,Wiley.

REFERENCEBOOKS:

1. BlokdykGerardus,DataanalysistechniquesforfrauddetectionCreatespaceIndependentPublishingPlatform.
2. LeonardW.Vona,FraudDataAnalyticsMethodology:TheFraudScenarioApproachtoUncovering Fraudin CoreBusinessSystems,Wiley.

19CY4179: 5G Technologies (Professional Elective – V)

B.Tech. IV Year I Sem. **L T P C**
3 - - 3

Course Objectives:

1. Knowledge on the concepts of 5G and 5G technology drivers.
2. Understand 5Gnetwork architecture,components,featuresand theirbenefits.
3. To understand Transmission and Design Techniques for 5G
4. To analyse Device-to-device (D2D) and machine-to-machine (M2M) type communications.
5. To understand about MassiveMIMO and its models

CourseOutcomes:

1. Understand5Gand5G BroadbandWirelessCommunications.
2. Understand5G wirelessPropagationChannels.
3. UnderstandthesignificanceoftransmissionandDesignTechniquesfor 5G.
4. AnalyzeDevice-to-device(D2D)andmachine-to-machine(M2M)typecommunications.
5. LearnMassiveMIMOpropagationchannelmodels.

UNIT-I:

Overviewof5GBroadbandWirelessCommunications:Evolutionofmobiletechnologies1Gto4G(LTE,LTEA, LTEA Pro), An Overview of 5G requirements, Regulations for 5G, Spectrum Analysis andSharingfor5G.

UNIT-II:

The 5G wireless Propagation Channels: Channel modeling requirements, propagation scenarios
andchallengesinthe5Gmodeling,ChannelModelsformmWaveMIMOSystems.,3GPPstandardsfor5G

UNIT-III:

TransmissionandDesignTechniquesfor
5G:Basicrequirementsoftransmissionover5G,ModulationTechniques – Orthogonal frequency division multiplexing (OFDM), generalized frequency divisionmultiplexing (GFDM), filter bank multi-carriers (FBMC) and universal filtered multi-carrier (UFMC),MultipleAccessesTechniques–
orthogonalfrequencydivisionmultipleaccesses(OFDMA),generalizedfrequencydivisionmultipleaccesses(GFDMA),non-orthogonalmultipleaccesses(NOMA).

UNIT-IV:

Device-to-device (D2D) and machine-to-machine (M2M) type communications – Extension of 4G D2Dstandardization to 5G, radio resource management for mobile broadband D2D, multi-hop and multi-operator D2D communications.

UNITV:

Millimeter-waveCommunications–spectrumregulations,deploymentscenarios,beam-forming,physicallayertechniques,interferenceandmobilitymanagement,MassiveMIMOpropagationchannelmodels, Channel Estimation in Massive MIMO, Massive MIMO with Imperfect CSI, Multi-Cell MassiveMIMO,PilotContamination,SpatialModulation(SM).

TEXTBOOKS:

1. MartinSauter"FromGSMFromGSMtoLTE–AdvancedProand5G:AnIntroductiontoMobileNetworksand MobileBroadband",Wiley-Blackwell.
2. AfifOsseiran,Jose.F.Monserrat,PatrickMarsch,"Fundamentalsof5GMobileNetworks", CambridgeUniversityPress.

REFERENCEBOOKS:

1. JonathanRodriguez,"Fundamentalsof5GMobileNetworks",JohnWiley&Sons.
2. AmitabhaGhoshandRapeepatRatasuk"EssentialsofLTEandLTE-A",CambridgeUniversityPress.
3. AthanasiosG.Kanatos,KonstantinaS.Nikita,PanagiotisMathiopoulos,"NewDirectionsinWirelessCommunication SystemsfromMobileto 5G",CRC Press.
4. TheodoreS.Rappaport,RobertW.Heath,RobertC.Danials,JamesN.Murdock"MillimeterWaveWirelessCommunications",Prentice HallCommunications.

19CY417A: Security Incident & Response Management (Professional Elective – V)

B.Tech. IV Year I Sem. **L T P C**
3 - - 3

Prerequisites:

- Knowledgeininformationsecurityandappliedcryptography.
- KnowledgeinOperatingSystems and Networking Fundamentals.
- Knowledge on Ethical and Legal Considerations

CourseObjectives:

1. Understand the Real-World Incident Landscape and Learn how to create an organizational incident response plan.
2. Understand Live Data Collection in Incident Response and Identify the types of data that should be collected during live data acquisition
3. Understand the Importance of Network Monitoring and Set Up an Effective Network Monitoring System.
4. Understand Analysis Methodology and Learn various methods to access and retrieve data from different sources securely
5. Understand HFS+ and File System Analysis and Learn how to conduct file system analysis to extract valuable information for incident investigations.

CourseOutcomes:

1. To understand the importance of preparation, documentation, and prioritization, and be capable of leading or contributing effectively to incident response efforts within their organizations.
2. Implementing live data collection on both Windows and Unix systems, selecting appropriate live response tools, and understanding the significance of forensic duplication in incident response investigations.
3. Analyze network traffic and data to detect security incidents in enterprise environments
4. Identify data analysis methodologies and possess specialized knowledge in investigating Windows-based systems.
5. Understanding of investigating Mac OS X systems and applications

UNIT-I

Introduction:Preparing fortheInevitable incident:Realworldincident,IR managementincidenthandbook, Pre-incident preparation, Preparing the Organization for Incident Response, Preparing theIR team, Preparing the Infrastructure for Incident Response. Incident Detection and Characterization:Getting the investigation started on the right foot, collecting initial facts, Maintenance of Case Notes,UnderstandingInvestigativePriorities.Discoveringthescopeofincident:Examininginitiald ata,Gathering and reviewing preliminary evidence, determining a course of action, Customer data lossscenario,Automated clearingfraud scenario.

UNIT-II

Data Collection: Live Data Collection: When to perform live response, Selecting a live response

tool,whattocollect,collectionbestpractices,LivedatacollectiononMicrosoftWindowsSystems,LiveDataCollectiononUnix-BasedSystems.ForensicDuplication:ForensicImageFormats,Traditionalduplication,Livesystemduplication,Duplicationof enterpriseAssets.

UNIT-III

Network Evidence: The case for network monitoring, Types for network monitoring, Setting Up aNetwork Monitoring System, Network Data, Analysis, Collect Logs Generated from Network Events.EnterpriseServices:NetworkInfrastructureServices,EnterpriseManagementApplications,Webservers,Database Servers

UNIT-IV

Data Analysis: Analysis Methodology: Define Objectives, Know your data, Access your data, Analyseyourdata,EvaluateResults.InvestigatingWindowsSystems:NTFSandFileSystemanalysis,Prefetch,Event logs, Scheduled Tasks, The Windows Registry, Other Artifacts of Interactive Sessions, MemoryForensics,AlternativePersistence Mechanisms.

UNIT-V

Investigating Mac OS X Systems: HFS+ and File System Analysis, Core Operating systems data.Investigating Applications: What is Application Data?, Where is application data stored?, GeneralInvestigationmethods,WebBrowser,Email Clients,InstantMessage Clients.

TEXTBOOKS:

1. "IncidentResponseandComputerForensics",JasonT.Luttgens,MathewPepeandKevinMandia,3rdEdition,Tata McGraw-Hill Education.
2. "CyberSecurityIncidentResponse-HowtoContain,Eradicate,andRecoverfromIncidents",Eric.C.Thompson,Apress.

REFERENCEBOOKS:

1."TheComputerIncidentResponsePlanningHandbook:ExecutablePlansforProtectingaInformationatRisk",N.K.McCarthy,Tata McGraw-Hill.

19CY4151: Vulnerability Assessment & Penetration Testing lab

B.Tech. IV Year I Sem. **L T P C**

- - 2 1

CourseObjectives: Thislabsessionfocusesontrainingthestudentsin:

1. PenetrationTestingmethodologies.
2. Monitoringthenetwork trafficand
3. Tounderstandthehostandservicesdiscovery

CourseOutcomes:

1. Designformonitoring networktraffic
2. Performdifferentpenetrationtestingmethods
3. Designdifferenttypesof vulnerabilitiesscanning
4. Understand webapplicationassessment

ListofExperiments:

1. MonitoringNetworkTraffic
2. Host& ServicesDiscoveryusingNmap
3. VulnerabilityScanningusingOpenVAS
4. InternalPenetrationTesting
    a. Mapping
    b. Scanning
    c. GainingaccessthroughCVE's
    d. SniffingPOP3/FTP/TelnetPasswords
    e. ARPPoisoning
    f. DNSPoisoning
5. ExternalPenetrationTesting
    a. EvaluatingexternalInfrastructure
    b. Creatingtopologicalmap&identifyingIP addressoftarget
    c. Lookup domainregistryforIPinformation
    d. ExaminginguseofIPV6atremotelocation
6. Different typesofvulnerabilityscanning
7. VulnerabilityscanningwithNessus
8. Webapplicationassessmentwithnikto&burpsuite

TEXTBOOKS:

1. "GrayHatHacking-TheEthicalHackersHandbook", AllenHarper,StephenSims, MichaelBaucom,3rd Edition,Tata McGraw-Hill.
2. "The Web Application Hacker's Handbook-Discovering and Exploiting Security flaws", DafyddSuttard,Marcuspinto,1stEdition,WileyPublishing.

REFERENCEBOOKS:

1. "Penetration Testing: Hands-on Introduction to Hacking", Georgia Weidman, 1st Edition, NoStarchPress.
2. "ThePenTester Blueprint-StartingaCareer asanEthicalHacker",L.Wylie,Kim Crawly,1stEdition,WileyPublications.

19CY4181: Major Project Phase – I

B.Tech. IV Year I Sem.

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19CY4182: Mini Projects

B.Tech. IV Year I Sem.

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IV-II- SEMESTER

19MB4211: Organizational Behaviour

B.Tech. IV Year II Sem. **L T P C**
3 - - 3

Course Objectives: The objective ofthe course is

1. To provide the students with the conceptualframework and the theoriesunderlying OrganizationalBehavior.
2. To Discuss the over view of cognitive process in an organisation.
3. To analyse the dynamics of the organisationalbehaviour with respect to communication.
4. To analyse the dynamics of the organisationalbehaviour with respect to power and politics.
5. To understand the factors that are leading to improve the performance of an organisation.

CourseOutcomes:

1. Demonstratetheapplicabilityofanalyzingthecomplexitiesassociatedwithmanagementofindividualbehaviorinthe organization.
2. Analyzethecomplexitiesassociatedwithmanagementofthegroupbehaviorintheorganization.
3. Demonstratehowtheorganizationalbehaviorcanintegrateinunderstandingthemotivation(why) behind behaviorofpeopleintheorganization.
4. Analyse the dynamics of the organisationalbehaviour with respect to power and politics
5. Understand the factors that are leading to improve the performance of an organisation

UNIT-I:

IntroductiontoOB-Definition,NatureandScope–Environmentalandorganizationalcontext–ImpactofIT,globalization,Diversity,Ethics,culture,rewardsystemsandorganizationaldesignonOrganizationalBehaviour.CognitiveProcesses-I:PerceptionandAttribution:NatureandimportanceofPerception–Perceptualselectivityandorganization–Socialperception–AttributionTheories–Locusofcontrol–Attribution Errors–Impression Management.

UNIT-II:

CognitiveProcesses-II:PersonalityandAttitudes–Personalityasacontinuum–Meaningofpersonality-JohariWindowandTransactionalAnalysis-NatureandDimensionofAttitudes–Jobsatisfactionandorganizational commitment-Motivational needs and processes- Work-Motivation Approaches Theoriesof Motivation- Motivation across cultures - Positive organizational behaviour: Optimism – Emotionalintelligence– Self-Efficacy.

UNIT-III:

Dynamics of OB-I: Communication – types – interactive communication in organizations –

barriers tocommunication and strategies to improve the follow of communication - Decision Making: Participativedecision-making techniques – creativity and group decision making. Dynamics of OB –II Stress andConflict: Meaning and types of stress –Meaning and types of conflict - Effect of stress and intra-individualconflict-strategiestocope with stressand conflict.

UNIT-IV:

Dynamics of OB –III Power and Politics: Meaning and types of power – empowerment - Groups Vs.Teams – Nature of groups – dynamics of informal groups – dysfunctions of groups and teams – teamsinmodern workplace.

UNIT-V:

Leading High performance: Job design and Goal setting for High performance- Quality of Work Life-SociotechnicalDesignandHigh-performanceworkpractices-Behaviouralperformancemanagement:reinforcementandpunishmentasprinciplesofLearning– ProcessofBehavioural modification-Leadershiptheories-Styles,ActivitiesandskillsofGreatleaders.

REFERENCEBOOKS:

1. Luthans,Fred:OrganizationalBehaviour10/e,McGraw-Hill,2009
2. McShane: OrganizationalBehaviour,3e,TMH,2008
3. Nelson:Organizational Behaviour,3/e,Thomson,2008.
4. NewstromW.John&DavisKeith,OrganisationalBehaviour--HumanBehaviouratWork,12/e,TMH,NewDelhi,2009.
5. PierceandGardner:ManagementandOrganisationalBehaviour:AnIntegratedperspective,Thomson,2009.
6. Robbins,P.Stephen,TimothyA.Judge:OrganisationalBehaviour,12/e,PHI/Pearson,NewDelhi,2009.
7. PareekUdai:BehaviouralProcessatWork:Oxford&IBH,NewDelhi,2009.
8. Schermerhorn:OrganizationalBehaviour9/e,Wiley,2008.
9. Hitt:OrganizationalBehaviour,Wiley,2008
10. Aswathappa: OrganisationalBehaviour,7/e,Himalaya,2009
11. Mullins:ManagementandOrganisationalBehaviour,Pearson,2008.
12. McShane,Glinow:OrganisationalBehaviour--Essentials,TMH,2009.
13. IvancevichOrganisationalBehaviourandManagement, 7/e,TMH,2008.

19CY4271: Quantum Cryptography (Professional Elective – VI)

B.Tech. IV Year II Sem. **L T P C**

3 - - 3

CourseObjectives:

1. Tobuildquantum-preparednessforthepostquantumera.
2. To understand quantum information and computation.
3. To Understand attack Strategies on QKD Protocols.
4. To understandstatisticalanalysisofQKDNetworksinReal-LifeEnvironment.
5. To applyQuantum-cryptographicnetworks.

CourseOutcomes:

1. BasicunderstandingaboutQuantumInformationandComputation.
2. Understand about Quantum adaptive cascade protocol and its blocks.
3. Understandattack StrategiesonQKDProtocols.
4. AnalyzeandunderstandstatisticalanalysisofQKDNetworksinReal-LifeEnvironment.
5. ApplyQuantum-cryptographicnetworks.

UNIT-I

QuantumInformationTheory,UnconditionalSecureAuthentication,Entropy,QuantumKeyDistribution,QuantumChannel,PublicChannel,QKDGain,Finite Resources

UNIT-II

Adaptive Cascade Introduction, Error Correction and the Cascade Protocol, Adaptive Initial Block-SizeSelection,Fixed InitialBlock-Size,DynamicInitial Block-Size,Examples

UNIT-III

AttackStrategiesonQKDProtocols:Introduction,AttackStrategiesinanIdealEnvironment,Individual Attacksin an RealisticEnvironmentQKDSystems:Introduction,QKDSystems

UNIT-IV

StatisticalAnalysisofQKDNetworksinReal-LifeEnvironment:StatisticalMethods,StatisticalAnalysisQKDNetworksBasedon Q3P:QKD Networks,PPP,Q3P,Routing,Transport

UNIT-V

Quantum-CryptographicNetworksfromaPrototypetotheCitizen:TheSECOQCProject,HowtoBringQKDintothe“Real”LifeTheRingofTrustModel:Introduction,ModelofthePointofTrust,Communication in the Point of Trust Model, Exemplified Communications, A Medical InformationSystem Based on the Ring ofTrust

TEXTBOOK:

1.KollmitzerC.,PivkM.(Eds.),AppliedQuantumCryptography,Lect.NotesPhys.797(Springer,BerlinHeidelberg 2010).

REFERENCEBOOKS:

1. GeraldB.Gilbert,MichaelHamrick,andYaakovS.Weinstein,QuantumCryptography,WorldScientificPublishing.
2. GillesVanAssche,QuantumCryptographyandSecret-KeyDistillation,CambridgeUniversityPress.

19CY4272: IoT Cloud Processing and Analytics (Professional Elective – VI)

B.Tech. IV Year II Sem. **L T P C**
3 - - 3

Course Objectives:

1. To acquire knowledge on IoT networking connectivity protocols.
2. To understand IoT Analytics for thecloudprocessing.
3. To analyse and explore IoT Data.
4. To learn about data science for IoT analytics.
5. To determine the Strategies to Organize Data for Analytics

CourseOutcomes:

1. Understand thearchitecturalcomponentsandprotocolsforapplicationdevelopment.
2. Identify dataanalyticsand datavisualizationtoolsasper the problem characteristics.
3. Analyse, collect,storeIoTdata.
4. Apply Data Science for IoT Analytics
5. Access strategies to organize data for analytics

UNIT-I

IoTdevices,Networkingbasics,IoTnetworkingconnectivityprotocols,IoTnetworkingdatamessaging protocols,Analyzing data toinferprotocolanddevice characteristics.

UNIT-II

IoT Analytics for the Cloud: Introduction to elastic analytics, Decouple key components, Cloud securityandanalytics,Designingdataprocessingfor analytics,Applyingbigdatatechnologytostorage.

UNIT-III

Exploring IoT Data: Exploring and visualizing data, Techniques to understand data quality, Basic timeseriesanalysis,Statistical analysis.

UNIT-IV

Data Science for IoT Analytics: Introduction to Machine Learning, Feature engineering with IoT data,Validation methods, Understanding the bias–variance tradeoff, Use cases for deep learning with IoTdata.

UNIT-V

Strategies to Organize Data for Analytics: Linked Analytical Datasets, Managing data lakes, dataretentionstrategy.

TEXTBOOKS:

1. ArshdeepBahgaandVijayMadisetti,"InternetofThings–

AHandsonApproach",UniversitiesPress,2015.
2. Kevin,Townsend,Carles,Cufí,AkibaandRobertDavidson,"GettingStartedwithBluetooth LowEnergy"O'Reilly.

REFERENCEBOOKS:

1. MadhurBhargava"IoTProjectswithBluetoothLowEnergy,PacktPublishing,August2017.
2. RobinHeydon,"BluetoothLowEnergy:TheDeveloper'sHandbook",Pearson, October2012.
3. KumarSaurabh,"CloudComputing",WileyIndia,1stEdition,2016.

19CY4273: Cloud Security (Professional Elective – VI)

B.Tech. IV Year II Sem. **L T P C**
3 - - 3

Pre-requisites: ComputerNetworks, CryptographyandNetworkSecurity,CloudComputing.

CourseObjectives:

1. Tounderstandthefundamentalsconceptsofcloudcomputing.
2. Tounderstandthecloudsecurityandprivacyissues.
3. TounderstandtheThreatModelandCloudAttacks.
4. TounderstandtheDataSecurityandStorage.
5. To analyzeSecurityManagementin theCloud.

CourseOutcome

1. Abilitytoacquiretheknowledge onfundamentalsconceptsofcloud computing.
2. Abletodistinguishthevariouscloud securityandprivacyissues.
3. Able toanalyzethevariousthreatsand Attacktools.
4. Abletounderstand theData Securityand Storage.
5. Able toanalyzethe SecurityManagementintheCloud.

UNIT-I

OverviewofCloudComputing: Introduction,DefinitionsandCharacteristics,CloudServiceModels,CloudDeploymentModels,Cloud ServicePlatforms,ChallengesAhead.
IntroductiontoCloudSecurity:Introduction,CloudSecurityConcepts,CSACloudReferenceModel,NISTCloud ReferenceModel,NISTCloud ReferenceModel.
Note: Laboratorypracticewillbeimpartedwiththehelpofrelevantcasestudiesasandwhenrequired.

UNIT-II

CloudSecurityandPrivacyIssues: Introduction,CloudSecurityGoals/Concepts,CloudSecurityIssues,SecurityRequirementsforPrivacy,PrivacyIssuesin Cloud.

InfrastructureSecurity:TheNetworkLevel,theHostLevel,theApplicationLevel,SaaSApplicationSecurity,PaaSApplicationSecurity,IaaSApplication Security.
Note: Laboratorypracticewillbeimpartedwiththehelpofrelevantcasestudiesasandwhenrequired.

UNIT-III

ThreatModelandCloudAttacks: Introduction,ThreatModel-Typeof attackentities,Attacksurfaceswithattackscenarios,ATaxonomyofAttacks,AttackTools-Network-levelattacktools,VM-levelattacktools,VMMattacktools,SecurityTools,VMM securitytools.
Note: Laboratorypracticewillbeimpartedwiththehelpofrelevantcasestudiesasandwhenrequired.

UNIT-IV

Information Security Basic Concepts, an Example of a Security Attack, Cloud Software SecurityRequirements, Rising Security Threats. **Data Security and Storage:** Aspects of Data Security, DataSecurity Mitigation,ProviderData andItsSecurity.

Note: Laboratorypracticewillbeimpartedwiththehelpofrelevantcasestudiesasandwhenrequired.

UNIT-V

EvolutionofSecurity Considerations,SecurityConcernsofCloud OperatingModels,IdentityAuthentication, Secure Transmissions, Secure Storage and Computation, Security Using EncryptionKeys, Challenges of Using Standard Security Algorithms, Variations and Special Cases for SecurityIssueswith Cloud Computing,Side ChannelSecurityAttacksinthe Cloud

SecurityManagementintheCloud-

SecurityManagementStandards,AvailabilityManagement,AccessControl,SecurityVulnerability,Patch,and ConfigurationManagement.

Note: Laboratorypracticewillbeimpartedwiththehelpofrelevantcasestudiesasandwhenrequired.

TEXTBOOKS:

1. CloudSecurityAttacks,Techniques,Tools,andChallengesbyPreetiMishra,EmmanuelSPilli,Jaipur RCJoshiGraphicEra,1st Editionpublished 2022by CRC press.
2. Cloud Computing with Security Concepts and Practices Second Edition by Naresh KumarSehgal Pramod Chandra, P. Bhatt John M. Acken,2nd Edition Springer nature Switzerland AG2020.
3. CloudSecurityandPrivacybyTimMather,SubraKumaraswamy,andShahedLatiFirstEdition,September2019.

REFERENCEBOOKS:

1. EssentialsofCloudComputingbyK.ChandrasekaranSpecialIndianEditionCRCpress.
2. CloudComputingPrinciplesand Paradigmsby RajkumarBuyya,JohnWiley.

19CY4274: Digital Watermarking and Steganography (Professional Elective – VI)

B.Tech. IV Year II Sem. **L T P C**

3 - - 3

CourseObjectives:

1. Tolearnaboutthewatermarkingmodelsandmessagecoding.
2. To learn about the watermarking side information &analysing errors
3. Tolearnaboutwatermarksecurityandauthentication.
4. To learn about watermarking perceptualmodels.
5. Tolearnabout steganography.

CourseOutcomes:

1. KnowtheHistoryandimportanceofwatermarkingandsteganography.
2. AnalyzeApplicationsandpropertiesofwatermarkingandsteganography.
3. DemonstrateModelsandalgorithmsofwatermarking.
4. PossessthepassionforacquiringknowledgeandskillinpreservingauthenticationofInformation.
5. Identifytheoreticfoundationsofsteganographyandsteganalysis.

UNIT-I

Introduction: Information Hiding, Steganography and Watermarking – History ofwatermarking –Importanceofdigitalwatermarking–Applications–Properties–Evaluatingwatermarkingsystems.

Watermarking models & message coding: Notation – Communications – Communication basedmodels – Geometric models – Mapping messages into message vectors – Error correction coding –Detectingmulti-symbolwatermarks.

UNIT-II

Watermarkingwithsideinformation&analyzing errors: InformedEmbedding–InformedCoding–Structured dirty-paper codes - Message errors – False positive errors – False negative errors – ROCcurves– Effectofwhitening on errorrates.

UNIT-III

Perceptual models: Evaluating perceptual impact – General form of a perceptual model – Examplesof perceptual models – Robust watermarking approaches - Redundant Embedding, Spread SpectrumCoding,EmbeddinginPerceptuallysignificantcoefficients.

UNIT-IV

Watermarksecurity&authentication:Securityrequirements–Watermarksecurityandcryptography –Attacks–Exactauthentication– Selectiveauthentication –Localization –Restoration.

UNIT-V

Steganography: Steganography communication – Notation and terminology – Information TheoreticFoundationsofsteganography–Practicalsteganographicmethods–

Minimizingtheembeddingimpact
– Steganalysis

TEXTBOOK:

1.IngemarJ.Cox,MatthewL.Miller,JeffreyA.Bloom,JessicaFridrich,TonKalker,"DigitalWaterm arkingandSteganography",MarganKaufmannPublishers,NewYork,2008.

REFERENCEBOOK:

1.

IngemarJ.Cox,MatthewL.Miller,JeffreyA.Bloom,"DigitalWatermarking",MarganK aufmannPublishers,NewYork,2003.

19CY4275: Data Privacy (Professional Elective – VI)

B.Tech. IV Year II Sem. **L T P C**

3 - - 3

CourseObjectives:

1. Theobjectiveofthiscourseisto provide fundamental concepts of data privacy.
2. Exploresarchitectural,algorithmicandtechnologicalfoundationsforthemaintenance ofthe privacyofindividuals.
3. To conduct a comprehensive survey of techniques
4. To learntheconceptsofconfidentialityof organizations,andtheprotectionofsensitive information, despite the requirement that information be released publicly or semi-publicly.
5. To explore the intersection of technology, policy, privacy, and freedom of information acts.

CourseOutcomes:

1. Discusstheconceptsofprivacyintoday'senvironment.
2. understanding of data explosion, statistics, data sharing practices, protection, privacy and risk measurements.
3. Impact of automationischangingtheconceptsandexpectationsconcerningprivacyandthe increasinglyinterconnected issueofsecurity.
4. Analyse how emergingissuesareaffectingsocietyandbusiness,withaconcentrationonhow informationsecuritymustshape corporatepractices.
5. Explaintheknowledgeoftheroleofprivateregulatoryandself-helpefforts.

UNIT-I:

Introduction- Fundamental Concepts, Definitions, Statistics, Data Privacy Attacks, Data linking andprofiling,accesscontrolmodels,role-basedaccesscontrol,privacypolicies,theirspecifications,languagesandimplementation,privacypolicylanguages,privacyindifferentdomains-medical,financial,etc.

UNIT-II:

Dataexplosion-StatisticsandLackofbarriersinCollectionandDistributionofPerson-specificinformation, Mathematical model for characterizing and comparing real-world data sharing practices andpolicies and for computing privacy and risk measurements, Demographics and Uniqueness, **ProtectionModels**-Null-map,k-map,Wrongmap

UNIT-III:

Survey of techniques- Protection models (null-map, k-map, wrong map), Disclosure control, Inferringentityidentities,Strengthandweaknessesoftechniques,entry specific databases.

UNIT-IV:

Computationsystemsforprotectingdelimiteddata-MinGen,Datafly,Mu-Argus,k-Similar,Protectingtextualdocuments:Scrub.

UNIT-V:

Technology, Policy, Privacy and Freedom- Medical privacy legislation, policies and best practices,Examination of privacy matters specific to the World Wide Web, Protections provided by the Freedom ofInformationActortherequirementforsearch warrants.

TEXTBOOKS:

1. B.Raghunathan,TheCompleteBookofDataAnonymization:FromPlanningtoImplementation,1st Edition,AuerbachPub,2013.
2. L.Sweeney,ComputationalDisclosureControl:APrimeronDataPrivacyProtection,MITComputerScience,2002.

REFERENCEBOOKS:

1. NishantBhajariaDataPrivacy:A runbookforengineers,ManningPublications.
2. GwenKennedy,DataPrivacyLaw:APracticalGuidetotheGDPR,ISBN-13:978-0999512722,ISBN-10:0999512722.

19CY4281: Major Project Phase - II

B.Tech. IV Year II Sem.

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