NOIDA INSTITUTE OF ENGINEERING & TECHNOLOGY, GREATER NOIDA, GAUTAM BUDDH NAGAR
(AN AUTONOMOUS INSTITUTE)

Affiliated to

DR. A.P.J. ABDUL KALAM TECHNICAL UNIVERSITY, LUCKNOW

Evaluation Scheme & Syllabus

For

Bachelor of Technology
Computer Science and Engineering (Cyber Security)

Third Year

(Effective from the Session: 2025-26)

NOIDA INSTITUTE OF ENGINEERING & TECHNOLOGY, GREATER NOIDA, GAUTAM BUDDH NAGAR
(AN AUTONOMOUS INSTITUTE)
Bachelor of Technology
Computer Science and Engineering (Cyber Security)

Evaluation Scheme
SEMESTER-V

Sl. No.	Subject Codes	Subject	Types of Subjects	Periods		Evaluation Schemes					End Semester		Total	Credit
				L	T	P	CT	TA	TOTAL	PS	TE	PE		
1	BCSCY0502	Network Security and Cryptography	Mandatory	3	1	0	30	20	50		100		150	4
2	BCSCC0501	Design Thinking-II	Mandatory	2	1	0	30	20	50		100		150	3
3		Departmental Elective-I	Departmental Elective	3	0	0	30	20	50		100		150	3
4		Departmental Elective-II	Departmental Elective	3	0	0	30	20	50		100		150	3
5	BCSCY0551	Ethical Hacking	Mandatory	0	0	6				50		100	150	3
6	BCSE0555	Web Technologies	Mandatory	0	0	6				50		100	150	3
7	BCSCY0552	Network Security and Cryptography Lab	Mandatory	0	0	4				50		50	100	2
8	BCSE0559	Internship Assessment-II	Mandatory	0	0	2				50			50	1
9	BNC0501/ BNC0502	Constitution of India, Law and Engineering / Essence of Indian Traditional Knowledge	Compulsory Audit	2	0	0	30	20	50		50		100	NA
10		*Massive Open Online Courses (For B.Tech. Hons. Degree)	MOOCs											
		TOTAL		**13**	**2**	**18**	**120**	**80**	**200**	**200**	**400**	**250**	**1050**	**22**

*** List of MOOCs Based Recommended Courses for Third year (Semester-V) B. Tech Students**

Sr. No.	Subject Code	Course Name	University / Industry Partner Name	No of Hours	Credits
1	BMC0067	AWS Certified Security Specialty 2024 [NEW]	Infosys Wingspan (Infosys Springboard)	38 hrs.	3
2	BMC0082	Introduction to AI & ML	Infosys Wingspan (Infosys Springboard)	64h13m	4

PLEASE NOTE: -

- **A 3–4-week Internship shall be conducted during summer break after semester-IV and will be assessed during semester-V.**
- **Compulsory Audit (CA) Courses (Non-Credit - BNC0501/BNC0502)**
  - All Compulsory Audit Courses (a qualifying exam) do not require any credit.
  - The total and obtained marks are not added to the grand total.

Abbreviation Used:

L: Lecture, T: Tutorial, P: Practical, CT: Class Test, TA: Teacher Assessment, PS: Practical Sessional, TE: Theory End Semester Exam., CE: Core Elective, OE: Open Elective, DE: Departmental Elective, PE: Practical End Semester Exam, CA: Compulsory Audit, MOOCs: Massive Open Online Courses.

DEPARTMENTAL ELECTIVES

Subject Code	Subject Name	Types of subjects	Bucket Name	Branch	Semester
BCSCY0511	Cyber Threat Intelligence	Departmental Elective- I	Cyber Security-II	CSE (CYS)	5
BCSCY0512	Malware Analysis and Reverse Engineering	Departmental Elective- II		CSE (CYS)	5
BCSDS0511	Data Analytics	Departmental Elective- I	Data Analytics	CSE (CYS)	5
BCSAI0519	Business Intelligence and Data Visualization	Departmental Elective- II		CSE (CYS)	5
BCSE0512	Python Web Development with Django	Departmental Elective- I	Full Stack Development	CSE (CYS)	5
BCSE0514	Design Patterns	Departmental Elective- II		CSE (CYS)	5

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Evaluation Scheme
SEMESTER-VI

Sl. No.	Subject Codes	Subject	Types of Subjects	Periods			Evaluation Schemes				End Semester		Total	Credit
				L	T	P	CT	TA	TOTAL	PS	TE	PE		
1	BCSCY0601	Digital Forensic	Mandatory	3	1	0	30	20	50		100		150	4
2		Departmental Elective-III	Departmental Elective	3	0	0	30	20	50		100		150	3
3		Departmental Elective-IV	Departmental Elective	3	0	0	30	20	50		100		150	3
4		Open Elective- I	Open Elective	3	0	0	30	20	50		100		150	3
5	BCSCY0652	Penetration Testing	Mandatory	0	0	6				50		100	150	3
6	BCSML0653	Machine Learning and It's Application	Mandatory	0	0	6				50		100	150	3
7	BCSCY0651	Digital Forensic Lab	Mandatory	0	0	2				25		25	50	1
8	BCSE0659	Mini Project	Mandatory	0	0	6				50		100	150	3
9	BNC0601/ BNC0602	Constitution of India, Law and Engineering / Essence of Indian Traditional Knowledge	Compulsory Audit	2	0	0	30	20	50		50		100	NA
10		MOOCs (For B.Tech. Hons. Degree)	MOOCs											
		TOTAL		**14**	**1**	**20**	**120**	**80**	**200**	**175**	**400**	**325**	**1100**	**23**

*** List of MOOCs Based Recommended Courses for Third year (Semester-VI) B. Tech Students**

S. No.	Subject Code	Course Name	University / Industry Partner Name	No of Hours	Credits
1	BMC0073	Cyber Security and Applied Ethical Hacking	Infosys Wingspan (Infosys Springboard)	12h 59m	0.5
2	BMC0095	ReactJS	Infosys Wingspan (Infosys Springboard)	61h 2m	4

PLEASE NOTE: -

- **Compulsory Audit (CA) Courses (Non-Credit - BNC0601/BNC0602)**
  - All Compulsory Audit Courses (a qualifying exam) do not require any credit.
  - The total and obtained marks are not added to the grand total.

Abbreviation Used:

L: Lecture, T: Tutorial, P: Practical, CT: Class Test, TA: Teacher Assessment, PS: Practical Sessional, TE: Theory End Semester Exam., CE: Core Elective, OE: Open Elective, DE: Departmental Elective, PE: Practical End Semester Exam, CA: Compulsory Audit, MOOCs: Massive Open Online Courses.

DEPARTMENTAL ELECTIVES

Subject Code	Subject Name	Types of subjects	Bucket Name	Branch	Semester
BCSCY0611	IoT Security and Forensic	Departmental Elective- III	Cyber Security-II	CYS	6
BCSCY0612	Blockchain and Cryptocurrency Security	Departmental Elective- IV		CYS	6
BCSAI0617	Programming for Data Analytics	Departmental Elective- III	Data Analytics	CYS	6
BCSAI0622	Social Media Analytics	Departmental Elective- IV		CYS	6
BCSAI0612	Advanced Java Programming	Departmental Elective- III	Full Stack Development	CYS	6
BCSE0614	Web Development using MEAN Stack	Departmental Elective- IV		CYS	6

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A student will be eligible to get Under Graduate degree with Honours only, if he/she completes the additional MOOCs courses such as Coursera certifications, or any other online courses recommended by the Institute (Equivalent to 20 credits). During Complete B.Tech. Program Guidelines for credit calculations are as follows.

1. For 6 to 12 Hours =0.5 Credit
2. For 13 to18 =1 Credit
3. For 19 to 24 =1.5 Credit
4. For 25 to 30 =2 Credit
5. For 31 to 35 =2.5 Credit
6. For 36 to 41 =3 Credit
7. For 42 to 47 =3.5 Credit
8. For 48 and above =4 Credit

For registration to MOOCs Courses, the students shall follow Coursera registration details as per the assigned login and password by the Institute these courses may be cleared during the B. Tech degree program (as per the list provided). After successful completion of these MOOCs courses, the students shall provide their successful completion status/certificates to the Controller of Examination (COE) of the Institute through their coordinators/Mentors only.

The students shall be awarded Honours Degree as per following criterion.

i. If he / she secures 7.50 as above CGPA.
ii. Passed each subject of that degree program in the single attempt without any grace.
iii. Successful completion of MOOCs based 20 credits

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Course Code: BCSCY0502	Course Name: Network Security and Cryptography	L	T	P	C
Course Offered in: Cyber Security		3	1	0	4

Pre-requisite: Understanding of basic Networking Terms (e.g., IP, LAN, Router), Awareness of Digital Tools (Email, Cloud, Antivirus), Fundamental Logical Thinking , Cybersecurity fundamentals

Course Objectives: This course aims to introduce the fundamental principles and concepts of network security and cryptography, provide insights into common network-based attacks and vulnerabilities and develop the ability to design secure network architectures using modern cryptographic tools and techniques.

Course Outcome: After completion of the course, the student will be able to		Bloom's Knowledge Level (KL)
CO1	Understand the fundamentals of cryptography and its applications in network security.	K2
CO2	Analyse different encryption algorithms and cryptographic protocols.	K3
CO3	Implement secure communication protocols to protect data transmission over networks.	K3
CO4	Identify common network attacks and employ countermeasures to mitigate them.	K4
CO5	Implement secure network architectures using cryptographic techniques.	K4

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	1	1	1	1	2	1	1	1	1	2	2	2
CO2	3	3	2	-	-	2	1	2	2	2	2	**1**	2	2	2
CO3	3	3	3	-	-	3	1	1	2	-	1	1	2	3	3
CO4	3	3	3	-	-	3	-	-	2	-	1	1	2	3	3
CO5	3	3	3	3	3	3	-	-	2	2	3	2	2	3	3

Course Contents / Syllabus

Module 1	Introduction to Network Security	**09 hours**

Overview of Network Security Principles, Goals and Objectives of Network Security, Threats, Attacks, and Vulnerabilities (e.g., Malware, DoS), Security Policies and Mechanisms (e.g., Access Control, Firewalls), Risk Management and Assessment (e.g., Risk Analysis, Mitigation Strategies)

Module 2	Cryptographic Techniques	**09 hours**

Introduction to Cryptography, Classical Cryptographic Techniques (Caesar Cipher, Monoalphabetic Cipher), Modern Symmetric Encryption Algorithms (AES, DES), Public Key Cryptography and RSA Algorithm (Key Generation, Encryption/Decryption), Digital Signatures and Hash Functions (SHA, Message Authentication Codes)

Module 3	Secure Communication Protocols	**10 hours**

Secure Socket Layer (SSL) / Transport Layer Security (TLS – handshake process, certificate-based authentication), Internet Protocol Security (IPsec – AH/ESP protocols, tunnel and transport mode), Secure Shell (SSH – key-based authentication, port forwarding), Wireless Security Protocols (WPA, WPA2 – PSK, EAP authentication), Virtual Private Networks (VPNs – site-to-site VPN, remote access VPN).

Module 4	Network Attacks and Défense Mechanisms	**12 hours**

Types of Network Attacks (e.g., Denial of Service, Man-in-the-Middle), Intrusion Detection and Prevention Systems (IDS/IPS, Signature-based and Anomaly-based Detection), Firewalls and Proxy Servers (Packet Filtering, Application Layer Filtering), Network Access Control (NAC, Role-based Access Control), Secure DNS and DHCP (DNSSEC, DHCP Snooping), Introduction to OSSEC, OSSEC Architecture (Agent-based and Agentless Modes), Event Collection (Syslog, File Monitoring), Rule-Based Detection (Decoders and Rules), Log Analysis (Centralized Logging, Alert Levels), Real-Time Alerting (Active Responses, Notifications)

Module 5	Secure Network Design and Implementation	**8 hours**

Network Architecture Design Principles (segmentation, least privilege), Defence-in-Depth Strategy (multiple security layers, redundancy), Secure Routing Protocols (BGP security, OSPF authentication), Security Best Practices for LANs, WANs, and Wireless Networks (encryption, access control), Security Assessment and Auditing (vulnerability scanning, log analysis)

	Total Lecture Hours	**48 hours**

Textbook:

1	Network Security with OpenSSL: Cryptography for Secure Communications	John Viega, Matt Messier, Pravir Chandra
2	Cryptography and Network Security: Principles and Practice	William Stallings

Reference Books:

S.No	Book Title	Author(s)
1.	GNU Privacy Guard (GPG) for Beginners	David W. Boles
2.	Public-Key Cryptography: Theory and Practice	Douglas Stinson
3.	OSSEC Host-Based Intrusion Detection Guide	Rory Bray, Daniel Cid, Andrew Hay
4.	Nginx HTTP Server - Third Edition	Clement Nedelcu
5.	Mastering OpenVPN	Eric F Crist
6.	StrongSwan: The Open Source VPN	Andreas Steffen
7.	Nmap Network Scanning: The Official Nmap Project Guide to Network Discovery and Security Scanning	Gordon Fyodor Lyon
8.	Kali Linux Revealed: Mastering the Penetration Testing Distribution	Raphael Hertzog, Jim O'Gorman, Mati Aharoni

NPTEL/ Youtube/ Faculty Video Link:
1. https://www.youtube.com/watch?v=Q-HugPvA7GQ&list=PL71FE85723FD414D7
2. https://onlinecourses.nptel.ac.in/noc22_cs90/preview

OpenSSL / AES Cryptography Library /GnuPG /
RSA Cryptography Library / OSSEC / OpenVPN /
StrongSwan / Nmap / Kali Linux /

Mode of Evaluation

CIE							ESE	Total
ST1	ST2	ST3	TA1 5	TA2 5	TA3 5	Attendance 5		
30			20				100	150

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B.TECH THIRD YEAR		
Subject Code: BCSCC0501	**L T P** 2-1-0	
Subject Name: DESIGN THINKING –II	**Credits** 3	
Pre- requisites: Student must complete Design Thinking-I course.		
Course Contents/Syllabus		
Unit-1	Design thinking & Innovation, Design Thinking Mindset and Principles, recap of 5-Step Process of Design Thinking, Design Approaches, additional in-depth examples of each design approaches. Simon Sinek's – Start with Why, The Golden Circle , Asking the "Why" behind each example (an in-class activity of asking 5-WHYS) , The Higher Purpose, in-class activity for LDO & sharing insights Visualization and its importance in design thinking , reflections on wheel of life (in-class activity for visualization & Wheel of Life), Linking it with Balancing Priorities (in class activity), DBS Singapore and Bank of Americas' Keep the Change Campaign. Litter of Light & Arvind Eye Care Examples, understanding practical application of design thinking tools and concepts, case study on McDonald's Milkshake / Amazon India's Rural Ecommerce & Gillette Working on 1-hour Design problem, Applying RCA and Brainstorm on innovative solutions. Main project allocation and expectations from the project.	8 hours
Unit-2	Refine and narrow down to the best idea, 10-100-1000gm, QBL, Design Tools for Convergence – SWOT Analysis for 1000gm discussion. In-class activity for 10-100-1000gm & QBL Prototyping (Convergence): Prototyping mindset, tools for prototyping – Sketching, paper models, pseudo-codes, physical mockups, Interaction flows, storyboards, acting/role-playing etc, importance of garnering user feedback for revisiting Brainstormed ideas. Napkin Pitch, Usability, Minimum Viable Prototype, Connecting Prototype with 3 Laws, A/B Testing, Learning Launch. Decision Making Tools and Approaches – Vroom Yetton Matrix, Shift-Left, Up, Right, Value Proposition, Case study: Careerbuddy, You-Me-Health Story & IBM Learning Launch. In-class activities on prototyping- paper-pen / physical prototype/ digital prototype of project's 1000gm idea.	8 hours
Unit-3	Storytelling: Elements of storytelling, Mapping personas with storytelling, Art of influencing, Elevator Pitch, Successful Campaigns of well-known examples, in-class activity on storytelling. Testing of design with people, conducting usability test, testing as hypothesis, testing as empathy, observation and shadowing methods, Guerrilla Interviews, validation workshops, user feedback, record results, enhance, retest, and refine design, Software validation tools, design parameters, alpha &beta testing, Taguchi, defect classification, random sampling.	8 hours

	Final Project Presentation and assessing the impact of using design thinking	
Unit-4	Innovation: Need & Importance, Principles of innovations, Asking the Right Questions for innovation, Rationale for innovation, Quality: Principles & Philosophies, Customer perception on quality, Kaizen, 6 Sigma. FinTech case study of Design Thinking application – CANVAS Leadership, types, qualities and traits of leaders and leadership styles, Leaders vs Manager, Personas of Leaders & Managers, Connecting Leaders-Managers with 13 Musical Notes, Trait theory, LSM (Leadership Situational Model), Team Building Models: Tuckman's and Belbin's. Importance of Spatial elements for innovation.	8 hours
Unit-5	Comprehensive human goal: the five dimensions of human endeavour (Manaviya - Vyavstha) are: Education- Right living (Sikhsa- Sanskar), Health – Self-regulation (Swasthya - Sanyam), Justice – Preservation (Nyaya- Suraksha), Production – Work (Utpadan – Karya), Exchange – Storage (Vinimya – Kosh), Darshan-Gyan-Charitra (Shifting the Thinking) Interconnectedness and mutual fulfilment among the four orders of nature recyclability and self-regulation in nature, Thinking expansion for harmony: Self-exploration (Johari's window), group behaviour, interpersonal behaviour and skills, Myers-Briggs personality types (MBTI), FIRO-B test to repair relationships.	8 hours

Course Outcomes – After completion of this course students will be able to:

CO1	Learn sophisticated design tools to sharpen their problem-solving skills	K2
CO2	Construct innovate ideas using design thinking tools and converge to feasible idea for breakthrough solution	K6
CO3	Implement storytelling for persuasive articulation	K3
CO4	Understanding the nature of leadership empowerment	K2
CO5	Understand the role of a human being in ensuring harmony in society and nature	K2

Text Books:

1. Arun Jain, UnMukt : Science & Art of Design Thinking, 2020, Polaris
2. Gavin Ambrose and Paul Harris, Basics Design 08: Design Thinking, 2010, AVA Publishing SA
3. R R Gaur, R Sangal, G P Bagaria, A Foundation Course in Human Values and Professional Ethics, First Edition, 2009, Excel Books: New Delhi

Reference Books:

1. Jeanne Liedta, Andrew King and Kevin Benett , Solving Problems with Design Thinking – Ten Stories of What Works, 2013, Columbia Business School Publishing.
2. Dr Ritu Soryan, Universal Human Values and Professional Ethics, 2022, Katson Books.
3. Vijay Kumar, 101 Design Methods: A Structured Approach for Driving Innovation in Your Organization, 2013, John Wiley and Sons Inc, New Jersey.
4. Roger L. Martin, Design of Business: Why Design Thinking is the Next Competitive Advantage, 2009, Harvard Business Press, Boston MA.
5. Tim Brown, Change by Design, 2009, Harper Collins.
6. Pavan Soni, Design your Thinking : The Mindsets, Toolsets and Skill Sets for Creative Problem-Solving, 2020, Penguin Books.

Links: NPTEL/You Tube/Web Link
https://www.youtube.com/watch?v=6_mHCOAAEI8 https://nptel.ac.in/courses/110106124 https://designthinking.ideo.com/ https://blog.experiencepoint.com/how-mcdonalds-evolved-with-design-thinking
https://www.coursera.org/lecture/uva-darden-design-thinking-innovation/the-ibm-story-iq0kE https://www.coursera.org/lecture/uva-darden-design-thinking-innovation/the-meyouhealth-story-part-i-what-is-W6tTs https://onlinecourses.nptel.ac.in/noc19_mg60/preview
https://www.youtube.com/watch?v=HTSCbxSxsg&list=PL1xHD4vteKYVpaIiy295pg6_SY5qznc77&index=5 https://www.youtube.com/watch?v=NnlS2BzXvyM https://www.youtube.com/watch?v=7enWesSofhg
https://youtu.be/rthuFS5LSOo https://www.youtube.com/watch?v=kho6oANGu_A
https://www.youtube.com/watch?v=9vMpHk44XXo&list=PL1xHD4vteKYVpaIiy295pg6_SY5qznc77&index=6 Reinforcement Learning Tutorial | Reinforcement Learning Example Using Python | Edureka - YouTube Association Rule Mining – Solved Numerical Question on Apriori Algorithm(Hindi) - YouTube Q Learning Explained | Reinforcement Learning Using Python | Q Learning in AI | Edureka - YouTube

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Course Code: BCSCY0551	Course Name: ETHICAL HACKING	L	T	P	C
Course Offered in: CYBERSECURITY		0	0	6	3

Pre-requisite: Basic understanding of computer networks and operating systems. Familiarity with programming concepts (preferably in languages like Python, C, or Java). Knowledge of cybersecurity fundamentals.

Course Objective: To equip students with the skills and knowledge to identify, exploit vulnerabilities in computer systems ethically, and to understand the legal responsibilities of ethical hacking.

Course Outcome: After completion of the course, the student will be able to		Bloom's Knowledge Level (KL)
CO1	Understand the concept of hacking and perform hacking related activities ethically	K2
CO2	Acquire knowledge and skills of various tools used in footprints, port scanning, and reconnaissance techniques and will apply in the field of cyber security	K3
CO3	Identify, analyze, and mitigate security vulnerabilities in web applications using tool	K3
CO4	Develop the ability to conduct comprehensive scanning and enumeration to identify network resources, services, and potential vulnerabilities effectively using openVAS	K4
CO5	Execute and defend against system hacking techniques, including gaining unauthorized access, escalating privileges, and maintaining persistent control.	K4

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1	1	2	1	3	2			2	2	1	2	3	3
CO2	3	3			3	1	2	1			2	2	1	3	3	2
CO3	3	3			3	1	2	1	1	1	2	2	2	1	2	3
CO4	3	3	2	3	3			1	1	1	2	2	1	1	2	3
CO5	3	3	2	3	3			2	1	1	2	2	2	3	2	3

Course Contents / Syllabus

Module 1	Introduction to Ethical Hacking	**14 hours**

Understanding the Concept of Ethical Hacking, History and Evolution of Hacking, Scope and Importance of Ethical Hacking in Cybersecurity, Legal and Ethical Considerations in Ethical Hacking, Common Terminologies and Tools Used in Ethical Hacking

Module 2	Footprinting and Reconnaissance	**14 hours**

Introduction to Cuckoo Sandbox, Basic Usage of Cuckoo Sandbox, Malware Analysis with Cuckoo Sandbox, Integrating Cuckoo Sandbox with Security Operations, Footprinting Concepts and Methodologies, Passive and Active Reconnaissance Techniques, Information Gathering through Search Engines, Social Media, and WHOIS Lookup, Network Scanning and Enumeration Techniques, Vulnerability Scanning and Analysis

Module 3	Secure Communication Protocols	**14 hours**

Introduction to Web Application Security, Common Web Vulnerabilities (SQL Injection, XSS, CSRF, etc.), Web Application Reconnaissance and Footprinting, Web Application Scanning and Enumeration, Secure Coding Practices and Web Application Hardening

Module 4	Network Attacks and Défense Mechanisms	**15 hours**

Port Scanning Techniques (TCP, UDP), Service Enumeration and Version Detection, OS Fingerprinting, Vulnerability Assessment and Analysis, Using Scanning Tools like Nmap, Nessus, and OpenVAS.

Module 5	System Hacking	**15 hours**

Wi-Fi Password Cracking Techniques, Escalating Privileges and Gaining Unauthorized Access, Exploiting System Vulnerabilities, Malware Analysis and Reverse Engineering, Countermeasures and Defensive Strategies against System Hacking

	Total Lecture Hours	**72 hours**

Textbook:

1	The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy	Patrick Engebretson.
2	CEH Certified Ethical Hacker All-in-One Exam Guide	Matt Walker.
3	Web Application Hacker's Handbook: Finding and Exploiting Security Flaws	Dafydd Stuttard and Marcus Pinto.

Reference Books:

S.No	Book Title	Author(s)
9.	Penetration Testing: A Hands-On Introduction to Hacking	Georgia Weidman.
10.	Metasploit: The Penetration Tester's Guide	David Kennedy, Jim O'Gorman, Devon Kearns, and Mati Aharoni.
11.	Hacking: The Art of Exploitation	Jon Erickson
12.	OWASP Testing Guide	OWASP Foundation.
13.	Nmap Network Scanning: The Official Nmap Project Guide to Network Discovery and Security Scanning	Gordon Fyodor Lyon.

NPTEL/ Youtube/ Faculty Video Link:
1. https://www.youtube.com/watch?v=aFpI0VIkRKg
2. https://www.youtube.com/watch?v=lzhJGS2alvM
3. https://nptel.ac.in/courses/106105217

Mode of Evaluation

CIE	ESE	Total
PS		
50	100	150

List Of Practical's (Indicative & Not Limited To)
1. Introduction to virtualized environments and setup
2. Familiarization with Linux command line interface
3. Demonstration of basic ethical hacking tools and their usage
4. Ethical hacking scenarios and role-playing exercises
5. Discussion and analysis of legal and ethical case studies related to hacking
6. Setting up a virtualized environment for reconnaissance activities
7. Demonstration of passive reconnaissance techniques using OSINT tools
8. Hands-on practice with active reconnaissance techniques such as DNS interrogation and ping sweeps
9. Conducting information gathering through search engines, social media, and WHOIS lookup
10. Performing network scanning and enumeration using tools like Nmap
11. Setup of virtualized lab environment for practical exercises.

12. Guided practice sessions on using web application security tools such as Burp Suite, OWASP ZAP, and Nikto.
13. Hands-on exercises allowing students to exploit and patch common web vulnerabilities.
14. Discussion and analysis of lab results to reinforce learning outcomes and address any questions or concerns.
15. Setting up a virtualized environment for scanning and enumeration activities
16. Hands-on practice with different port scanning techniques using Nmap
17. Service enumeration exercises using Nmap and Netcat
18. OS fingerprinting demonstration using Nmap or Xprobe2
19. Vulnerability assessment lab using Nessus or OpenVAS, analysing scan results, and prioritizing vulnerabilities
20. Setup of virtualized lab environment for practical exercises.
21. Step-by-step guidance on using password cracking tools, privilege escalation techniques, and exploit frameworks.
22. Supervised practice sessions allowing students to perform password cracking, privilege escalation, vulnerability exploitation, malware analysis, and reverse engineering tasks.
23. Discussion and analysis of lab results to reinforce learning outcomes and address any questions or concerns.

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B.TECH THIRD YEAR		
Subject Code: BCSE0555		**L T P** 0-0-6
Subject Name: Web Technologies		**Credits** 3
Pre- requisites: Basic Knowledge of any programming language like C/C++/Python/Java. Familiarity with basic concepts of Internet.		
Course Contents/Syllabus		
Unit-1	Introduction to HTML & CSS: **Introduction:** Introduction to Web Technology, History of Web and Internet, Connecting to Internet, Introduction to Internet services and tools, Client-Server Computing, Protocols Governing Web, Basic principles involved in developing a web site, Planning process, Types of Websites, Web Standards and W3C recommendations. **Web Hosting:** Web Hosting Basics, Types of Hosting Packages, Registering domains, Defining Name Servers, Using Control Panel, Creating Emails in Cpanel, Using FTP Client, Maintaining a Website.	10 hours
Unit-2	Responsive Websites with Bootstrap : **HTML:** What is HTML, DOM- Introduction to Document Object Model, Basic structure of an HTML document, Mark up Tags, Heading-Paragraphs , Line Breaks, Understand the structure of HTML tables. Lists, Working with Hyperlinks, Image Handling, Understanding Frames and their needs, HTML forms for User inputs. New form Elements- date, number, range, email, search and data list, Understanding audio, video and article tags. **XML:** Introduction, Tree, Syntax, Elements, Attributes, Namespaces, Display, HTTP request, Parser, DOM, XPath, XSLT, XQuerry, XLink, Validator, DTD, Schema, Server.	14 hours
Unit-3	Introduction to JavaScript and ES6: **Concept of CSS 3:** Creating Style Sheet, CSS Properties , CSS Styling(Background, Text Format, Controlling Fonts) , Working with block elements and objects , Working with Lists and Tables , CSS Id and Class, Box Model(Introduction, Border properties, Padding Properties, Margin properties) CSS Advanced(Grouping, Dimension, Display, Positioning, Floating, Align, Pseudo class, Navigation Bar, Image Sprites, Attribute sector) , CSS Color, Creating page Layout and Site. **Bootstrap:** Introduction, Bootstrap grid system, Bootstrap Components.	16 hours
Unit-4	Introduction to XML and JSON: **JavaScript Essentials**: Introduction to Java Script , Javascript Types , Var, Let and Const Keywords, Operators in JS , Conditions Statements , Java Script Loops, JS Popup Boxes , JS Events , JS Arrays, Working with Arrays, JS Objects ,JS Functions , Using Java Script in Real time , Validation of Forms, Arrow functions and default arguments, Template Strings, Strings methods, Callback functions, Object de-structuring, Spread and Rest	16 hours

	Operator, Typescript fundamentals, Typescript OOPs- Classes, Interfaces, Constructor etc. Decorator and Spread Operator Difference == & ===, Asynchronous Programming in ES6, Promise Constructor, Promise with Chain, Promise Race.	
Unit-5	Introduction to PHP: Introduction to PHP, Basic Syntax, Variables & Constants, Data Type, Operator & Expressions, Control flow and Decision making statements, Functions, Strings, Arrays. **Working with files and directories:** Understanding file& directory, Opening and closing, a file, Coping, renaming and deleting a file, working with directories, Creating and deleting folder, File Uploading & Downloading. **Session & Cookies:** Introduction to Session Control, Session Functionality What is a Cookie, Setting Cookies with PHP. Using Cookies with Sessions, Deleting Cookies, Registering Session variables, Destroying the variables and Session.	16 hours

Sr. No.	Program Title	CO Mapping
1	A.Overview and Installation of various code editors.	CO1
2	B. Overview and Installation of various servers	CO1
3	Implementing HTML program that represent in the document as a start tag, which gives the name and attributes	CO2
4	Implementing HTML program that represents a document	CO2
5	Implementing HTML program to display your simple CV	CO2
6	Creating html document that represents document object model	CO2
7	To Create a table to show your class time table.	CO2
8	Apply various colors to suitably distinguish keywords , also apply font styling like italics, underline and two other fonts to words you find appropriate , also use header tags.	CO2
9	Create a webpage with HTML describing your department use paragraph and list tags	CO2
10	Implementing HTML program that for Heading	CO2
11	Implementing program that implement paragraph and line-break	CO2
12	Use tables to provide layout to your HTML page describing your college infrastructure.	CO2
13	Use and tags to provide a layout to the above page instead of a table layout	CO2

14	Create links on the words e.g. —Wi-Fi and —LAN to link them to Wikipedia pages	CO2
15	Insert an image and create a link such that clicking on image takes user to other page	CO2
16	Change the background color of the page; At the bottom create a link to take user to the top of the page.	CO2
17	Creating HTML program to implement three articles with independent, self-contained content.	CO2
18	Creating a XML document that defines the self-descriptive tags	CO2
19	Designing XML document that store various book data such as: book category, title, author, year and price	CO2
20	To Describe the various types of XML key components	CO2
21	Design XML DTD to define the structure and legal element and attribute of XML document	CO2
22	To implement internal and external DTD	CO2
23	Use frames such that page is divided into 3 frames 20% on left to show contents of pages, 60% in center to show body of page, remaining on right to show remarks.	CO2
24	Design a HTML registration form that takes user name, user password and mobile number with submit button control	CO2
25	Design a HTML5 document that implement of date, number, range, email, search and data list.	CO3
26	Implementation in HTML5 that include native audio and video support without the need for Flash.	CO3
27	Create a simple form to submit user input like his name, age, address and favourite subject, movie and singer.	CO3
28	Add few form elements such as radio buttons, check boxes and password field. Add a submit button at last.	CO3
29	Add CSS property assign a style or behavior to an HTML element such as: color, border, margin and font-style.	CO3
30	Add To Style Text Elements with Font, Size, and Color in CSS	CO3
31	Applying a block element in CSS acquires up the full width available for that content.	CO3

32	Demonstrating the CSS Box model with consists of: borders, padding, margins, and the actual content.	CO3
33	Design a web page by applying CSS grouping and dimensions property.	CO3
34	Design a XML Schema that describes the structure of an XML document.	CO3
35	Design a XML document that describe the well-formed XML document	CO3
36	Design a XML document of CD Catalog through each <CD> element, and displays the values of the <ARTIST> and the <TITLE> elements in an HTML table	CO3
37	Create a XSL document for and taken xml document by you.	CO3
38	Create a XSLT document for and taken xml document by you with all steps	CO3
39	Design a web page by applying CSS Display and Positioning property.	CO3
40	Design a web page by applying CSS Display and Positioning property .	CO3
41	Design a web page by applying CSS pseudo classes.	CO3
42	Creating a Java Script code to implement all data types.	CO4
43	Design a basic structure of Bootstrap Grid system.	CO4
44	Design All Bootstrap Components with example.	CO4
45	Implementing a program in Java script to implement augmented function.	CO4
46	Implementing a program to implement calculator application as real time.	CO4
47	Design a HTML form validation using Java Script.	CO4
48	Write a program to implement Arrow function with default argument in ES6	CO4
49	Implementing a program in ES6 to implement Template string concepts	CO4
50	Implementing a program in ES6 to implement all string methods.	CO4
51	Creating a Java Script program to implement Dialog, Confirm and Message Popup Boxes.	CO4
52	Implementing a Java Script program to implement onClick and onSubmit event	CO4
53	Creating a java script code to implement ‘let’ keyword	CO4
54	Creating a java script code to implement ‘const’ keyword	CO4
55	Implementing a program to implement call back functions in ES6.	CO4

56	Implementing a program for de-structuring of an array in ES6	CO4
57	Javascript code to implement object and class concepts in Typescript.	CO4
58	Write a Typescript program that implement interface and constructor	CO4
59	Write a code in typescript that implement decorator and spread operator	CO4
60	Create a constant by using define() function with its proper syntax	CO4
61	Creating PHP script that return any data types whatever you use.	CO4
62	Implementing a code in Java Script to implement Spread and rest operator	CO4
63	Javascript code that should compile by Typescript compiler as'tsc'	CO4
64	Write a code in typescript that implement Asynchronous Programming concepts.	CO4
65	Write a program in Typescript that implement promise constructor	CO4
66	Implementing promise and chain concepts in Typescript	CO4
67	Write a code in typescript that implement Promise.race() static method.	CO4
68	Crating a program that implement control flow and decision making statement.	CO4
69	Creating PHP to implements parameterized function	CO5
70	Creating program in PHP to store multiple string and concatenate these string and print it.	CO5
71	Write a PHP script to create and delete directory structure	CO5
72	Program to upload and download a file in PHP	CO5
73	Implements single dimension array in PHP	CO5
74	Write a PHP code to open and close a file in a proper manner	CO5
75	Write a PHP script to copying, renaming and deleting a file.	CO5
76	PHP program to create and destroy a session.	CO5
77	PHP program to set and delete a cookie.	CO5
78	PHP program to manually register the session variable	CO5
79	PHP program to manually destroy the session variable	CO5

80	PHP program to store the session data on one page and would be available on second page.	CO5

Course Outcomes – After completion of this course students will be able to:

CO1	Identify the basic facts and explaining the basic ideas of Web technology and internet.	K1, K2
CO2	Applying and creating various HTML5 semantic elements and application with working on HTML forms for user input.	K3, K6
CO3	Understanding and applyingtheconceptsofCreatingStyleSheetCSS3 and bootstrap.	K2, K3
CO4	Analysing and implementing concept of JavaScript and its applications.	K4, K6
CO5	Creating and evaluating dynamic web pages using the concept of PHP.	K5, K6

Text Books:

1. C Xavier, "Web Technology and Design", 1nd Edition 2003, New Age International.
2. Raj Kamal, "Internet and Web Technologies", 2nd Edition 2017,Mc Graw Hill Education.
3. Oluwafemi Alofe, "Beginning PHP Laravel",2nd Edition 2020, kindle Publication.

Reference Books:

1. Burdman, Jessica, "Collaborative Web Development" 5th Edition 1999, Addison Wesley Publication.
2. Randy Connolly, "Fundamentals of Web Development",3rd Edition 2016,
3. Ivan Bayross," HTML, DHTML, Java Script, Perl & CGI", 4th Edition 2010 BPB Publication

Links: NPTEL/You Tube/Web Link

Unit 1 https://youtu.be/96xF9phMsWA
https://youtu.be/Zopo5C79m2k
https://youtu.be/ZliIs7jHi1s
https://youtu.be/htbY9-yggB0

Unit 2 https://youtu.be/vHmUVQKXlVo
https://youtu.be/qz0aGYrrlhU
https://youtu.be/BsDoLVMnmZs
https://youtu.be/a8W952NBZUE

Unit 3 https://youtu.be/1Rs2ND1ryYc
https://youtu.be/vpAJ0s5S2t0
https://youtu.be/GBOK1-nvdU4
https://youtu.be/Eu7G0jV0ImY

Unit 4 https://youtu.be/-qfEOE4vtxE https://youtu.be/PkZNo7MFNFg https://youtu.be/W6NZfCO5SIk https://youtu.be/DqaTKBU9TZk
Unit 5 https://youtu.be/_GMEqhUyyFM https://youtu.be/ImtZ5yENzgE https://youtu.be/xIApzP4mWyA https://youtu.be/qKR5V9rdht0

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY
GREATER NOIDA-201306
(An Autonomous Institute)
School of Computer Science in Emerging Technologies

LAB Course Code: BCSCY0552	LAB Course Name: Network Security and Cryptography Lab	L	T	P	C
Course Offered in: CSE(CYS)		0	0	4	2

Pre-requisite: Data Structures and Algorithms, Python / C / Java Syntax, Discrete Mathematics

Course Objectives:

The course objectives for the practicals are to provide students with hands-on experience and skills in various aspects of cybersecurity using the mentioned tools. The practicals aim to equip students with the knowledge and skills necessary to address cybersecurity challenges and contribute effectively to the industry.

Course Outcome: After completion of the course, the student will be able to		Bloom's Knowledge Level (KL)
CO1	Demonstrate secure key exchange techniques like AES,DES, RSA, Diffie-Hellman and digital signatures.	K3
CO2	Configure and analyze secure web communication using SSL/TLS and IPsec VPNs.	K4
CO3	Evaluate the concept of perfect secrecy through one-time pad implementation.	K5

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	2	3	-	-	3	3	3	3
CO2	3	3	-	-	3	3	2	3	3	2	-	3	3	3
CO3	3	3	-	-	3	3	2	3	3	3	-	3	3	3

List Of Practical's (Indicative & Not Limited To)

1. Implementing shift cipher.
2. Implementing Mono alphabetic substitution cipher.
3. Implementing one time pad and perfect secrecy.
4. Implementing Message authentication codes.
5. Implementing cryptographic hash functions and applications.
6. Implementation of Symmetric Encryption Algorithms AES (Advanced Encryption Standard).
7. Implementation of Symmetric Encryption algorithm DES (Data Encryption Standard) using Python.
8. Implementation of Public Key Cryptography RSA (Rivest-Shamir-Adleman).
9. Implementation of Public Key Cryptography-ECC (Elliptic Curve Cryptography).
10. Implementing Digital Signatures.
11. Implementing Diffie-Hellman key establishment.
12. Configuration of SSL/TLS for Secure Web Communication.
13. Setting up IPsec VPN for Secure Network Communication.
14. Network Security Assessment and Penetration Testing.

Total Hours: 48 hrs.

Mode of Evaluation

CIE			PE	Total
PS1 10	PS2 20	PS3 20		
50			50	100

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY
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School of Computer Science in Emerging Technologies

Course Code: BCSCY0511	Course Name: Cyber Threat Intelligence	L	T	P	C
Course Offered in: B. Tech. (as department elective, offered by CSE(CYS))		3	0	0	3

Pre-requisite: Basic computer literacy, Fundamental networking, Introduction to cybersecurity, Problem-solving and Logical analysis and pattern recognition.

Course Objectives:

Understand Threat Landscapes and emerging risks to master intelligence threat analysis skills and enhance defensive strategies to improve Decision-Making for Future Trends .

Course Outcome: After completion of the course, the student will be able to		Bloom's Knowledge Level (KL)
CO1	Define Cyber Threat Intelligence (CTI) and its role in proactive cybersecurity and apply CTI analysis to a real-world threat scenario.	K1,K2
CO2	Understand and apply the intrusions model to demonstrate threat sharing and frameworks.	K2, K3
CO3	Categorize and evaluate threat intelligence sources, select optimal collection methods, and process raw data into actionable intelligence.	K3, K4
CO4	Differentiate between IOCs (Indicators of Compromise) and IOAs (Indicators of Attack) and Analyze adversary TTPs (Tactics, Techniques, Procedures) using frameworks .	K4, K5
CO5	Integrate CTI into security operations (SOC/IR/Threat Hunting), evaluate intelligence-sharing platforms and measure threat intel ROI (Return on Investment).	K4 , K5

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	3	2	3	2	-	3	1	2	1	2	-	2	1
CO2	2	3	3	3	3	2	-	3	1	2	1	2	2	3	2
CO3	2	2	3	3	3	1	-	3	2	1	1	1	3	3	3
CO4	3	2	3	3	3	1	-	2	2	1	2	1	-	3	3
CO5	3	3	3	2	3	1	-	3	2	1	2	1	-	2	3

Course Contents / Syllabus

Module 1	Introduction to Cyber Threat Intelligence (CTI)	10 hours

Definition and importance of CTI, Differences between tactical, operational, and strategic intelligence, The intelligence lifecycle (Planning, Collection, Processing, Analysis, Dissemination, Feedback), Key stakeholders (SOC teams, executives, law enforcement)

Module 2	Threat Intelligence Frameworks & Models	10 hours

MITRE ATT&CK Framework (Tactics, Techniques, Procedures - TTPs), The Diamond Model of Intrusion Analysis (Adversary, Infrastructure, Capability, Victim), Cyber Kill Chain (Lockheed Martin's 7-stage model), STIX/TAXII (Structured Threat Information eXpression & Trusted Automated eXchange of Intelligence)

Module 3	Collection & Processing of Threat Data	10 hours

Sources of threat intelligence (Open-Source, Closed/Private, Technical, Human), Data collection methods (Logs, Threat Feeds, Dark Web Monitoring, Honeypots), Processing raw data into actionable intelligence, Tools for automation (MISP, ThreatConnect, Recorded Future)

Module 4	Threat Analysis & Attribution	10 hours

Analyzing IOCs (Indicators of Compromise) and IOAs (Indicators of Attack), Behavioral analysis (TTPs of threat actors)

Threat actor profiling (APT groups, cybercriminals, hacktivists), Case studies (e.g., SolarWinds, WannaCry, Emotet).		
Module 5	**Operationalizing Threat Intelligence**	**8 hours**
Integrating CTI into SOC, IR, and threat hunting, Sharing intelligence (ISACs, ISAOs, and vendor platforms), Measuring effectiveness (ROI of threat intelligence), Future trends (AI in CTI, automation, deception technologies).		
	Total Lecture Hours	**48 hours**

Textbook:

S.No 1.	**Book Title : Cyber Threat Intelligence**	**Auhor : Martin Lee**

Reference Books:

S.No 2.	**Book Title : Threat Intelligence: From Data to Action**	**Author : Recorded Future (Edited by Robert M. Lee & others)**

NPTEL/ Youtube/ Faculty Video Link:

Youtube	https://www.youtube.com/watch?v=BzXICnDoFSU&ab_channel=Archer
Youtube	https://www.youtube.com/watch?v=kCOa5Pebdg8&ab_channel=SKILLOGIC
Youtube	https://www.youtube.com/watch?v=p7by_uWzdEg&ab_channel=PrabhNair

Mode of Evaluation

CIE							ESE	Total
ST1	**ST2**	**ST3**	**TA1**	**TA2**	**TA3**	**Attendance**		
			5	**5**	**5**	**5**		
30			**20**				**100**	**150**

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY
GREATER NOIDA-201306
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School of Computer Science in Emerging Technologies

Course Code: BCSCY0512	Course Name: Malware Analysis and Reverse Engineering	L	T	P	C
Course Offered in: B. Tech. (as department elective, offered by CSE(CYS))		3	0	0	3

Pre-requisite: Computer Networks, Operating Systems, C/C++ or Python Programming

Course Objectives: This course introduces techniques for analyzing and understanding malware behavior and reverse engineering malicious software. It equips students with skills to dissect malware through static and dynamic analysis and understand countermeasures and detection techniques.

Course Outcome: After completion of the course, the student will be able to		Bloom's Knowledge Level (KL)
CO1	Demonstrate an understanding of malware, its types, lifecycle, and behavioral characteristics.	K1, K2
CO2	Apply static analysis techniques to examine file structures, metadata, and signatures of malware.	K2, K3
CO3	Perform dynamic analysis to observe runtime behavior and system interaction of malware in isolated environments.	K3, K4
CO4	Detect evasion and obfuscation techniques employed by malware to bypass security mechanisms.	K4
CO5	Develop comprehensive malware analysis reports including IOCs, attack vectors, and mitigation recommendations.	K5

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	3	2	3	2	-	3	1	2	1	2	-	2	1
CO2	2	3	3	3	3	2	-	3	1	2	1	2	2	3	2
CO3	2	2	3	3	3	1	-	3	2	1	1	1	3	3	3
CO4	3	2	3	3	3	1	-	2	2	1	2	1	-	3	3
CO5	3	3	3	2	3	1	-	3	2	1	2	1	-	2	3

Course Contents / Syllabus

Module 1	Introduction to Malware	10 hours

Definition and classification of malware: viruses, worms, Trojans, ransomware, spyware, adware, bots. Malware attack vectors and lifecycle: infection, persistence, execution, command and control, exfiltration. Motivation behind malware: cybercrime, hacktivism, cyber espionage, cyber warfare. Legal and ethical implications of malware analysis.

Module 2	Static Analysis Techniques	10 hours

Analyzing executable file formats (PE for Windows, ELF for Linux), Analyze executable file headers and attributes using tools such as PEStudio, PEiD, and Detect It Easy. Extracting and analyzing strings using tools like Strings and FLOSS, Apply hashing algorithms (e.g., MD5, SHA-256) and use VirusTotal to perform file integrity and reputation analysis, Detecting and unpacking packed binaries, Introduction to YARA rule writing for malware identification.

Module 3	Dynamic Analysis Techniques	10 hours

Setting up isolated environments for analysis using VirtualBox/VMware, Monitoring process behaviour with Process Explorer and Process Monitor, Observing network activity with Wireshark, TCPView, and Fakenet-NG, Identifying system changes: file system, registry, services, etc, Introduction to automated malware analysis platforms like Cuckoo Sandbox. Behavioural indicators and basic evasion techniques observed in malware.

Module 4	Reverse Engineering Essentials	10 hours

x86 architecture overview and instruction set, Understanding control flow (loops, branches, function calls), Using IDA Pro and Ghidra to disassemble and analyze binary code, Recognizing common library functions and reconstructing logic, Debugging with x64dbg/OllyDbg: breakpoints, stepping, memory inspection, Identifying obfuscation and anti-disassembly techniques.

Module 5	Advanced Topics & Reporting	8 hours

- Code injection and hooking techniques (DLL injection, API hooking), Memory forensics with Volatility: scanning processes, dumped modules, Anti-analysis techniques: anti-debugging, anti-VM, code obfuscation, IOC (Indicators of Compromise)

extraction: IPs, domains, file paths, hashes, Creating professional malware analysis reports with attack summary and mitigation steps. Case studies of real-world malware (e.g., WannaCry, Emotet, Zeus).

Total Lecture Hours	**48 hours**

Textbook:

S.No	Book Title	Author
	Practical Malware Analysis* - Michael Sikorski, Andrew Honig, The IDA Pro Book* - Chris Eagle, The Art of Memory Forensics* - Michael Hale Ligh et al.	

S.No	Book Title	Author

NPTEL/ Youtube/ Faculty Video Link:

	OpenSecurityTraining.info – Reverse Engineering
	Malware Unicorn – https://www.malwareunicorn.org/
	https://bazaar.abuse.ch/

Mode of Evaluation

CIE							ESE	Total
ST1	ST2	ST3	TA1 5	TA2 5	TA3 5	Attendance 5		
30			20				100	150

NIET Greater Noida Autonomous Institute	**NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY** **GREATER NOIDA-201306** **(An Autonomous Institute)** **School of Computer Science in Emerging Technologies**

B.TECH THIRD YEAR		
Subject Code: BCSDS0511		**L T P** 3-0-0
Subject Name: DATA ANALYTICS		**Credits:** 3
Pre- requisites: Basic Knowledge of Statistics and Probability.		
Course Contents/Syllabus		
Unit-1	**Introduction to Data Science**: Big Data, the 5 V's, Evolution of Data Science, Datafication, Skillsets needed, Data Science Lifecycle, types of Data Analysis, Data Science Tools and technologies, Need for Data Science, Analysis Vs Analytics Vs Reporting, Big Data Ecosystem, Future of Data Science, Applications of Data Science in various fields, Use cases of Data science-Facebook, Netflix, Amazon, Uber, AirBnB.	8 hours
Unit-2	**Data Handling:** Types of Data: structured, semi-structured, unstructured data, Numeric, Categorical, Graphical, High Dimensional Data, Transactional Data, Spatial Data, Social Network Data, standard datasets, Data Classification, Sources of Data, Data manipulation in various formats, for example, CSV file, pdf file, XML file, HTML file, text file, JSON, image files etc. import and export data in R/Python.	8 hours
Unit-3	**Data Pre-processing:** Form of Data Pre-processing, data Attribute and its types, understanding and extracting useful variables, KDD process, Data Cleaning: Missing Values, Noisy Data, Discretization and Concept hierarchy generation (Binning, Clustering, Histogram), Inconsistent Data, Data Integration and Transformation. Data Reduction: Data Cube Aggregation, Data Compression, Numerosity Reduction.	8 hours
Unit-4	**Exploratory Data Analysis:** Handling Missing data, Removing Redundant variables, variable Selection, identifying outliers, Removing Outliers, Time series Analysis, Data transformation and dimensionality reduction techniques such as Principal Component Analysis (PCA), Factor Analysis (FA) and Linear Discriminant Analysis (LDA), Univariate and Multivariate Exploratory Data Analysis. Data Munging, Data Wrangling- APIs and other tools for scrapping data from the web/ internet using R/Python.	8 hours
Unit-5	**Data Visualization:** Introductions and overview, Debug and troubleshoot installation and configuration of the Tableau. Creating Your First visualization: Getting started with Tableau Software, Using Data file formats, connecting your Data to Tableau, creating basic charts (line, bar charts, Tree maps), Using the Show me panel. Tableau Calculations: Overview of SUM, AVR, and Aggregate features Creating custom calculations and fields, Applying new data calculations to your visualization. Manipulating Data in Tableau: Cleaning-up the data with the Data Interpreter, structuring your data, Sorting, and filtering Tableau data, Pivoting Tableau data. Advanced Visualization Tools: Using Filters, Using the Detail panel Using the Size panels, customizing filters, Using and Customizing tooltips, Formatting your data with colours, Creating Dashboards & Stories, Distributing & Publishing Your Visualization	8 hours

List of Practical		
Sr. No.	**Program Title**	**CO Mapping**
1	• Installation of MySQL, Anaconda, and Tableau • To perform data import/export (.CSV, .XLS, .TXT) operations using data frames in R/Python • To perform data pre-processing operations i) Handling Missing data ii) Min-Max normalization • To perform dimensionality reduction operation using PCA Houses Data Set • To perform statistical operations (Mean, Median, Mode and Standard deviation) using	CO1
2	**Tableau – getting started** • User interface • Methodology for working with the interface • Connecting to different types of data sources (Excel, csv, Access, MySQL, Tableau Server) • Editing Data Connections and Data Sources; Live mode vs. Extract mode • Date interpreter / Pivot **Joining multiple datasets** • Union / Join • Cross database joins Data Blending – integrating different data source	CO2
3	**Basic functionalities** • Filtering • Sorting • Grouping • Hierarchies • Creating sets • Pivot tables Types of dates – Continuous vs. Discreet • **Calculations** • Syntax • Table calculations • LOD expressions • Aggregate Date, Logic, String, Number, Type calculations **Built-in chart types/visualisations:** • Line chart • Dot chart • Bar chart	CO3

	• Other types of visualisation (bullet graph, Heat map, Tree map, etc.). Combo charts – dual axis	
4	**Custom chart types:** • KPI matrix • Waterfall • Gantt • Dot plot • Pareto Analytics' options: trend lines, forecasting, clustering	CO4
5	**CREATE AND FORMAT REPORTS USING THE TABLEAU DESKTOP** • Describe the use of Page Backgrounds and Templates • Create visualizations to display the data • Apply drill through and drill down • Create and manage slicers with the use of filters • Explore visual interactions • Review Bookmarks • Publish the report to the Tableau online **Dashboards and stories** • Building dashboards • Dashboard objects • Dashboard formatting Dashboard extensions Story points	CO5

Course Outcomes – After completion of this course students will be able to:

CO1	Understand the fundamental concepts of data analytics in the areas that plays major role within the realm of data science.	K1
CO2	Explain and exemplify the most common forms of data and its representations.	K2
CO3	Understand and apply data pre-processing techniques.	K3
CO4	Analyse data using exploratory data analysis.	K4
CO5	Illustrate various visualization methods for different types of data sets and application scenarios.	K3

Text Books:

1. Glenn J. Myatt, Making sense of Data: A practical Guide to Exploratory Data Analysis and Data Mining, John Wiley Publishers, 2007.
2. Data Analysis and Data Mining, 2nd Edition, John Wiley & Sons Publication, 2014

Reference Books:

1. Open Data for Sustainable Community: Glocalized Sustainable Development Goals, Neha Sharma, Santanu Ghosh, Monodeep Saha, Springer, 2021.
2. The Data Science Handbook, Field Cady, John Wiley & Sons, Inc, 2017
3. Data Mining Concepts and Techniques, Third Edition, Jiawei Han, Micheline Kamber, Jian Pei, Morgan Kaufmann, 2012.

Links: NPTEL/You Tube/Web Link

https://www.youtube.com/playlist?list=PL15FRvx6P0OWTlNBS_93NHG2hIn9cynVT

https://www.youtube.com/playlist?list=PLLy_2iUCG87DxxkLX4Pc3wCvsF1yAvz0T

https://www.youtube.com/watch?v=lhO3fBiMDag

https://www.youtube.com/watch?v=q4pyaVZjqk0

https://www.youtube.com/playlist?list=PLWPirh4EWFpGXTBu8ldLZGJCUeTMBpJFK

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B. TECH THIRD YEAR		
Subject Code: BCSAI0519		**L T P** 3-0-0
Subject Name: BUSINESS INTELLIGENCE AND DATA VISUALIZATION		**Credits** 3
Pre- requisites: Basic Knowledge of Business intelligence.		
Course Contents/Syllabus		
Unit-1	**Introduction To Business Intelligence:** Business Intelligence (BI), Scope of BI solutions and their fitting into existing infrastructure, BI Components and architecture, BI Components, Future of Business Intelligence, Functional areas of BI tools, End user assumptions, setting up data for BI, Data warehouse, OLAP and advanced analytics, Supporting the requirements of senior executives including performance management, Glossary of terms and their definitions specific to the field of BI and BI systems.	8 hours
Unit-2	**Elements Of Business Intelligence Solution**s: Business Query and Reporting, Reporting, Dashboards and Scorecards Development, Development, Scorecards, Metadata models, Automated Tasks and Events, Mobile Business Intelligence, Software development kit (SDK). Stages of Business Intelligence Projects, Project Tasks, Risk Management and Mitigation, Cost justifying BI solutions and measuring success, BI Design and Development, Building Reports, Building a Report, Drill-up, Drill- down Capabilities.	8 hours
Unit-3	**Introductions and overview:** What Tableau can and cannot do well, Debug and troubleshoot installation and configuration of the software. **Creating Your First visualization:** Getting started with Tableau Software, Using Data file formats, connecting your Data to Tableau, creating basic charts (line, bar charts, Tree maps), Using the Show me panel **Tableau Calculations:** Overview of SUM, AVR, and Aggregate features Creating custom calculations and fields, Applying new data calculations to your visualization. **Formatting Visualizations:** Formatting Tools and Menus, formatting specific parts of the view, Editing and Formatting Axes	8 hours
Unit-4	**Manipulating Data in Tableau:** Cleaning-up the data with the Data Interpreter, structuring your data, Sorting, and filtering Tableau data, Pivoting Tableau data. **Advanced Visualization Tools:** Using Filters, Using the Detail panel Using the Size panels, customizing filters, Using and Customizing tooltips, Formatting your data with colours. **Creating Dashboards & Stories:** Using Storytelling, creating your first dashboard and Story, Design for different displays, Adding interactivity to your Dashboard **Distributing & Publishing Your Visualization:** Tableau file types, Publishing to Tableau	8 hours

	Online, sharing your visualization, Printing, and exporting. **Given a case study**: Perform Interactive Data Visualization with Tableau	
Unit-5	**Introduction to power BI :**Describe the Power BI ecosystem, Define Power BI and its relationship with Excel, Discuss the Power BI suite of products, Describe how the Power BI products integrate, Explain the typical analytics process flow, Differentiate between the various data sources, Connect Power BI to a data source, Clean and transform data to ensure data quality, Load the data to the Power BI Data Model, Describe the Power BI ecosystem, Define Power BI and its relationship with Excel, Discuss the Power BI suite of products, Describe how the Power BI products integrate, Explain the typical analytics process flow.	8 hours

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B.TECH THIRD YEAR	
Subject Code: BCSE0512	**L T P** 3-0-0
Subject Name: Python Web Development With Django	**Credits** 3

Pre- requisites: Students should have good knowledge of Python Programming and Python coding experience.

Course Contents/Syllabus

Unit-1	Collections-Container datatypes, Tkinter-GUI applications, Requests-HTTP requests, BeautifulSoup4-web scraping, Scrapy, Zappa, Dash, CherryPy, Turbo Gears, Flask, Web2Py, Bottle, Falcon, Cubic Web, Quixote, Pyramid.	8 hours
Unit-2	Understanding Django environment, Features of Django and Django architecture, MVC and MTV, Urls and Views, Mapping the views to URLs, Django Template, Template inheritance Django Models, Creating model for site, Converting the model into a table, Fields in Models, Integrating Bootstrap into Django, Creating tables, Creating grids, Creating carousels.	8 hours
Unit-3	Introduction to Django Authentication System, Security Problem & Solution with Django Creating Registration Form using Django, Adding Email Field in Forms, Configuring email settings, Sending emails with Django, Adding Grid Layout On Registration Page, Adding Page Restrictions, Login Functionality Test and Logout.	8 hours
Unit-4	Database Migrations, Fetch Data From Database, Displaying Data On Templates, Adding Condition On Data, Sending data from url to view, Sending data from view to template, Saving objects into database, Sorting objects, Filtering objects, Deleting objects, Difference between session and cookie, Creating sessions and cookies in Django.	8 hours
Unit-5	Creating a functional website in Django, Four Important Pillars to Deploy, registering on Heroku and GitHub, Push project from Local System to GitHub, Working with Django Heroku, Working with Static Root, Handling WSGI with gunicorn, Setting up Database & adding users.	8 hours

Course Outcomes – After completion of this course students will be able to:

CO1	Apply the knowledge of python programing that are vital in understanding Django application and analyze the concepts, principles and methods in current client-side technology to implement Django application over the web.	K3,K6
CO2	Demonstrate web application framework i.e. Django to design and implement typical dynamic web pages and interactive web based applications.	K3, K6
CO3	Implementing and analyzing the concept of Integrating Accounts & Authentication on Django.	K3, K4
CO4	Understand the impact of web designing by database connectivity with SQLite in the current market place where everyone uses to prefer electronic medium for shoping, commerce, and even social life also.	K2, K3

CO5	Analyzing and creating a functional website in Django and deploy Django Web Application on Cloud.	K3, K6

Text Books:

1. Martin C. Brown, "Python: The Complete Reference Paperback", 4th Edition 2018, McGraw Hill Education Publication.
2. Reema Thareja, "Python Programming: Using Problem Solving Approach", 3rd Edition 2017, Oxford University Press Publication.
3. 3. Daniel Rubio, Apress," Beginning Django Web Application Development and Deployment with Python", 2nd Edition 2017, Apress Publication.
4. William Jordon, "Python Django Web Development: The Ultimate Django web framework guide for Beginners", 2nd Edition 2019, Kindle Edition.

Reference Books:

1. Tom Aratyn, "Building Django 2.0 Web Applications: Create enterprise-grade, scalable Python web applications easily with Django 2.0", 2nd Edition 2018, and Packt Publishing.
2. Nigel George, "Build a website with Django", 1st Edition 2019, GNW Independent Publishing Edition.
3. Ray Yao," Django in 8 Hours: For Beginners, Learn Coding Fast! 2nd Edition 2020, independently published Edition.
4. Harry Percival, "Test-Driven Development with Python: Obey the Testing Goat: Using Django, Selenium, and JavaScript", 2nd Edition 2019, Kindle Edition.

Links: NPTEL/You Tube/Web Link

https://youtu.be/eoPsX7MKfe8?list=PLIdgECt554OVFKXRpo_kuI0XpUQKk0ycO
https://youtu.be/tA42nHmmEKw?list=PLh2mXjKcTPSACrQxPM2_1Ojus5HX88ht7
https://youtu.be/8ndsDXohLMQ?list=PLDsnL5pk7-N_9oy2RN4A65Z-PEnvtc7rf
https://youtu.be/QXeEoD0pB3E?list=PLsyeobzWxl7poL9JTVyndKe62ieoN-MZ3
https://youtu.be/9MmC_uGjBsM?list=PL3pGy4HtqwD02GVgM96-V0sq4_DSinqvf

https://youtu.be/F5mRW0jo-U4
https://youtu.be/yD0_1DPmfKM?list=PLQVvvaa0QuDe9nqlirjacLkBYdgc2inh3
https://youtu.be/rHux0gMZ3Eg
https://youtu.be/jBzwzrDvZ18 https://youtu.be/RiMRJMbLZmg

https://youtu.be/8DF1zJA7cfc
https://youtu.be/CTrVDi3tt8o https://youtu.be/FzGTpnI5tpo
https://youtu.be/z4lfVsb_7MA https://youtu.be/WuyKxdLcw3w

https://youtu.be/UxTwFMZ4r5k https://youtu.be/2Oe55iXjZQI
https://youtu.be/zV8GOI5Zd6E https://youtu.be/uf2tdzh7Bq4
https://youtu.be/RzkVbz7Ie44

https://youtu.be/kBwhtEIXGII https://youtu.be/Q_YOYNiSVDY
https://youtu.be/_3AKAdHUY1M
https://youtu.be/6DI_7Zja8Zc https://youtu.be/UkokhawLKDU

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B.TECH THIRD YEAR

Subject code: BCSE0514	**L T P** 3-0-0
Subject Name: Design Pattern	**Credits** -3

Pre- requisites: Object Oriented Analysis and Design. Data structures and algorithms. Programming Language (C++ or Java).

Course Contents/Syllabus

Unit-1	Describing Design Patterns, Design Patterns in Smalltalk MVC, The Catalog of Design Patterns, Organizing the Catalogue, Design Patterns for Solving the Real life Problems, Selection and Use of Design patterns. Principle of least knowledge.	8 hours
Unit-2	Creational Patterns: Abstract Factory, Builder, Factory Pattern, Prototype Pattern, Singleton pattern.	8 hours
Unit-3	Structural Pattern Part-I, Adapter, Bridge, Composite. Structural Pattern Part-II, Decorator Pattern, Façade Pattern, Flyweight Pattern, Proxy Pattern.	8 hours
Unit-4	Behavioural Patterns Part: I, Chain of Responsibility Pattern, Command Pattern, Interpreter Pattern, Iterator Pattern. Behavioural Patterns Part: II, Mediator, Memento, Observer Pattern.	8 hours
Unit-5	Behavioural Patterns Part: III, State Patterns, Strategy, Template Patterns, Visitor, Expectation from Design Patterns.	8 hours

Course Outcomes – After completion of this course students will be able to:

CO1	Construct a design consisting of a collection of modules.	K2, K6
CO2	Exploit well-known design patterns (such as Iterator, Observer, Factory and Visitor)	K4, K5
CO3	Distinguish between different categories of design patterns	K4
CO4	Ability to understand and apply common design patterns to incremental/iterative Development	K2, K6
CO5	Ability to identify appropriate patterns for design of given problem and Design the software using Pattern Oriented Architectures	K1, K2, K6

Text Books:

1. Eric Freeman, Elisabeth Freeman, Kathy Sierra, Bert Bates Head First Design Patterns, 2004, O'Reilly
2. Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides Design Patterns: Elements of Reusable Object- oriented Software Addison-Wesley, 1995

Reference Books:

1. Design Pattern s By Erich Gamma , Pearson Education
2. Patterns in JAVA Volume -I By Mark Grand, Wiley Dream

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Links: NPTEL/You Tube/Web Link
https://youtu.be/C_oPLDaSy-8
https://youtu.be/NU_1StN5Tkk

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B.TECH THIRD YEAR		
Subject Code: BNC0501		**L T P** 3-0-0
Subject Name: Constitution Of India, Law And Engineering		
Pre- requisites: To acquaint the students with legacies of constitutional development in India and help them to understand the most diversified legal document of India and philosophy behind it.		
Course Contents/Syllabus		
Unit-1	Meaning of the constitution law and constitutionalism, Historical Background of the Constituent Assembly, Government of India Act of 1935 and Indian Independence Act of 1947,Enforcement of the Constitution, Indian Constitution and its Salient Features, The Preamble of the Constitution, Fundamental Rights, Fundamental Duties, Directive Principles of State Policy, Parliamentary System, Federal System, Centre-State Relations, Amendment of the Constitutional Powers and Procedure, The historical perspectives of the constitutional amendments in India, Emergency Provisions: National Emergency, President Rule, Financial Emergency, and Local Self Government – Constitutional Scheme in India.	8 hours
Unit-2	Powers of Indian Parliament Functions of Rajya Sabha, Functions of Lok Sabha, Powers and Functions of the President, Comparison of powers of Indian President with the United States, Powers and Functions of Vice- President, Powers and Functions of the Prime Minister, Judiciary – The Independence of the Supreme Court, Appointment of Judges, Judicial Review, Public Interest Litigation, Judicial Activism, LokPal, Lok Ayukta, The Lokpal and Lok ayuktas Act 2013, State Executives – Powers and Functions of the Governor, Powers and Functions of the Chief Minister, Functions of State Cabinet, Functions of State Legislature, Functions of High Court and Subordinate Courts.	8 hours
Unit-3	The Legal System: Sources of Law and the Court Structure: Enacted law -Acts of Parliament are of primary legislation, Common Law or Case law, Principles taken from decisions of judges constitute binding legal rules. The Court System in India and Foreign Courtiers (District Court, District Consumer Forum, Tribunals, High Courts, Supreme Court). Arbitration: As an alternative to resolving disputes in the normal courts, parties who are in dispute can agree that this will instead be referred to arbitration. Contract law, Tort, Law at workplace.	8 hours
Unit-4	Intellectual Property Laws: Introduction, Legal Aspects of Patents, Filing of Patent Applications, Rights from Patents, Infringement of Patents, Copyright and its Ownership, Infringement of Copyright, Civil Remedies for Infringement, Regulation to Information, Introduction, Right to Information Act, 2005, Information Technology Act, 2000, Electronic Governance, Secure Electronic Records and Digital Signatures, Digital Signature Certificates, Cyber Regulations Appellate Tribunal, Offences, Limitations of the Information Technology Act.	8 hours

Unit-5	Sole Traders, Partnerships: Companies: The ompany's Act: Introduction, Formation of a Company, Memorandum of Association, Articles of Association, Prospectus, Shares, Directors, General Meetings and Proceedings, Auditor, Winding up. E-Governance and role of engineers in E-Governance, Need for reformed engineering serving at the Union and State level, Role of I.T. professionals in Judiciary, Problem of Alienation and Secessionism in few states creating hurdles in Industrial development.	8 hours

Course Outcomes – After completion of this course students will be able to:

CO1	Identify and explore the basic features and modalities about Indian constitution.	K1
CO2	Differentiate and relate the functioning of Indian parliamentary system at the center and state level.	K2
CO3	Differentiate different aspects of Indian Legal System and its related bodies.	K4
CO4	Discover and apply different laws and regulations related to engineering practices.	K4
CO5	Correlate role of engineers with different organizations and governance models	K4

Text Books:

1. M Laxmikanth: Indian Polity for civil services and other State Examination,6th Edition, Mc Graw Hill
2. Brij Kishore Sharma: Introduction to the Indian Constitution, 8th Edition, PHI Learning Pvt. Ltd.
3. Granville Austin: The Indian Constitution: Cornerstone of a Nation (Classic Reissue), Oxford University Press.

Reference Books:

1. Madhav Khosla: The Indian Constitution, Oxford University Press.
2. PM Bakshi: The Constitution of India, Latest Edition, Universal Law Publishing.
3. V.K. Ahuja: Law Relating to Intellectual Property Rights (2007)

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B.TECH THIRD YEAR

Subject Code: BNC0502	**L T P** 3-0-0
Subject Name: ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE	

Pre- requisites: Computer Organization and Architecture

Course Contents/Syllabus

Unit-1	State in Ancient India: Evolutionary Theory, Force Theory, Mystical Theory Contract Theory, Stages of State Formation in Ancient India, Kingship , Council of Ministers Administration Political Ideals in Ancient India Conditions' of the Welfare of Societies, The Seven Limbs of the State, Society in Ancient India, Purusārtha, Varnāshrama System, Āshrama or the Stages of Life, Marriage, Understanding Gender as a social category, The representation of Women in Historical traditions, Challenges faced by Women.	8 hours
Unit-2	Evolution of script and languages in India: Harappan Script and Brahmi Script. The Vedas, the Upanishads, the Ramayana and the Mahabharata, Puranas, Buddhist And Jain Literature in Pali,Prakrit And Sanskrit, Sikh Literature, Kautilya's Arthashastra, Famous Sanskrit Authors, Telugu Literature, Kannada Literature,Malayalam Literature ,Sangama Literature Northern Indian Languages & Literature, Persian And Urdu ,Hindi Literature	8 hours
Unit-3	Pre-Vedic and Vedic Religion, Buddhism, Jainism, Six System Indian Philosophy, Shankaracharya, Various Philosophical Doctrines , Other Heterodox Sects, Bhakti Movement, Sufi movement, Socio religious reform movement of 19th century, Modern religious practices.	8 hours
Unit-4	Astronomy in India, Chemistry in India, Mathematics in India, Physics in India, Agriculture in India, Medicine in India , Metallurgy in India, Geography, Biology, Harappan Technologies, Water Management in India, Textile Technology in India ,Writing Technology in India Pyrotechnics in India Trade in Ancient India/,India's Dominance up to Pre-colonial Times..	8 hours
Unit-5	Indian Architect, Engineering and Architecture in Ancient India, Sculptures, Pottery, Painting, Indian Handicraft, UNESCO'S List of World Heritage sites in India, Seals, coins, Puppetry, Dance, Music, Theatre, drama, Martial Arts Traditions, Fairs and Festivals, UNESCO'S List of Intangible Cultural Heritage, Calenders, Current developments in Arts and Cultural, Indian's Cultural Contribution to the World. Indian Cinema.	8 hours

Course Outcomes – After completion of this course students will be able to:

CO 1	Understand the basics of past Indian politics and state polity.	K2
CO 2	Understand the Vedas, Upanishads, languages & literature of Indian society.	K2
CO 3	Know the different religions and religious movements in India.	K4
CO 4	Identify and explore the basic knowledge about the ancient history of Indian agriculture, science & technology, and ayurveda.	K4
CO 5	Identify Indian dances, fairs & festivals, and cinema.	K1

Text Books:

1. Behrouz Forouzan, "Data Communication and Networking" Fourth Edition-2006, Tata McGraw Hill

2. Andrew Tanenbaum “Computer Networks”, Fifth Edition-2011, Prentice Hall.
3. William Stallings, “Data and Computer Communication”, Eighth Edition-2008, Pearson.

Reference Books:

1. Kurose and Ross, “Computer Networking- A Top-Down Approach”, Eighth Edition-2021, Pearson.
2. Peterson and Davie, “Computer Networks: A Systems Approach”, Fourth Edition-1996, Morgan Kaufmann

Links: NPTEL/You Tube/Web Link

https://www.youtube.com/watch?v=LX_b2M3IzN8

https://www.youtube.com/watch?v=LnbvhoxHn8M

https://www.youtube.com/watch?v=ddM9AcreVqY

https://www.youtube.com/watch?v=uwoD5YsGACg

https://www.youtube.com/watch?v=bTwYSA478eA&list=PLJ5C_6qdAvBH01tVf0V4PQsCxGE3hSqEr
https://www.youtube.com/watch?v=tSodBEAJz9Y

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Course Code: BCSCY0601	Course Name: Digital Forensic	L	T	P	C
Course Offered in: B.Tech CSE (Cybersecurity)		3	1	0	4

Pre-requisite: Fundamental knowledge of computer networks, operating systems, and cybersecurity principles

Course Objectives: To equip students with the skills to investigate and analyze digital devices and mobile platforms. Students will learn to recover and examine data from computers, smartphones, and other digital media. The course covers methods for detecting cybercrimes, collecting digital evidence, and understanding legal procedures.

Course Outcome: After completion of the course, the student will be able to		Bloom's Knowledge Level (KL)
CO1	Understand the fundamental principles of digital forensics, including the legal and ethical considerations involved in handling digital evidence.	K2
CO2	Perform forensic analysis on computer systems, recover data, and document findings in a comprehensive forensic report.	K3
CO3	Analyze the data from mobile devices using industry-standard tools and techniques.	K4
CO4	Analyze network traffic to identify and investigate network-based attacks and anomalies.	K4
CO5	Conduct forensic investigations in cloud environments and apply forensic techniques to emerging technologies such as IoT and big data	K3

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	1	1	1	1	2	1	1	1	2	2	2	2
CO2	3	3	2	3	3	2	1	2	-	-	2	2	2	2	2
CO3	3	3	-	-	3	3	1	1	-	-	3	2	1	3	3
CO4	3	3	-	-	3	3	1	1	2	2	3	2	2	3	3
CO5	3	3	3	3	3	3	1	1	2	2	-	2	2	3	3

Course Contents / Syllabus

Module 1	Introduction to Digital Forensics	**09 hours**

Evolution and Scope of Digital Forensics, Types of Digital Forensics Legal and Ethical Issues, Digital Evidence and Chain of Custody, Forensic Process and Methodology,Tools and Software Overview,Forensic Readiness and Incident Response.

Module 2	Computer Forensics	**09 hours**

Fundamentals of Computer Forensics, File Systems and Data Structures, Forensic Imaging and Acquisition, Deleted Data Recovery and Analysis, Operating System Artifacts (Windows, Linux),Application and User activity Analysis, Forensic Reporting and Documentation, OpenVAS: Installation, Scanning, Reporting.

Module 3	Mobile Forensics	**10 hours**

Mobile Device Architecture, Mobile Data Sources, Acquisition Techniques (Logical, Physical, Cloud), Mobile Forensic Tools, Data Analysis and Artifact Extraction, Anti-Forensics and Encryption Challenges Legal Protocols for Mobile Device Seizure

Module 4	Network Forensics	**12 hours**

Network Forensics Fundamentals, Network Architecture and Protocols, Traffic Capture and Analysis, Log Analysis and Correlation, Attack Detection and Investigation, Advanced Techniques (DPI, Flow Analysis), Encrypted Traffic Analysis, Case Studies and Practical Labs

Module 5	Cloud and Emerging Technologies Forensics	**8 hours**

Cloud Forensics Basics and Challenges, Evidence Collection in Cloud Environments, IoT Forensics Techniques and Tools, AI/ML

Forensics and Deepfake Detection, Cryptocurrency and Blockchain Forensics, Future Trends in Digital Forensics, Research Areas and Emerging Technologies.

Total Lecture Hours	**48 hours**

Textbook:

1	Computer Forensics: Computer Crime Scene Investigation	John Vacca ,2015 [only one edition
2	Practical Digital Forensics: Forensic Lab Setup, Evidence Analysis, and Structured Investigation Across Windows, Mobile, Browser, HDD, and Memory	Akashdeep Bhardwaj, Keshav Kaushik , 2023

Reference Books:

S.No	Book Title	Author(s)
14.	Mastering Network Forensics: A practical approach to investigating and defending against network attacks	Nipun Jaswal, 2024
15.	Ethical Hacking and Network Analysis with Wireshark: Exploration of network packets for detecting exploits and malware	Manish Sharma , 2024
16.	OSSEC Host-Based Intrusion Detection Guide	Rory Bray, Daniel Cid, Andrew Hay
17.	Nginx HTTP Server - Third Edition	Clement Nedelcu
18.	Mastering OpenVPN	Eric F Crist
19.	StrongSwan: The Open Source VPN	Andreas Steffen
20.	Nmap Network Scanning: The Official Nmap Project Guide to Network Discovery and Security Scanning	Gordon Fyodor Lyon
21.	Kali Linux Revealed: Mastering the Penetration Testing Distribution	Raphael Hertzog, Jim O'Gorman, Mati Aharoni

NPTEL/ Youtube/ Faculty Video Link:

https://www.youtube.com/watch?v=5e5KdbY-xzE

https://www.youtube.com/playlist?list=PLa2xctTiNSCiTGuejkc05zsr-G5t9AuH8

https://www.youtube.com/playlist?list=PLJu2iQtpGvv-2LtysuTTka7dHt9GKUbxD

https://www.youtube.com/watch?v=uCqeNnH1EpQ

https://www.youtube.com/watch?v=MnzHF_jygws

Mode of Evaluation

CIE							ESE	Total
ST1	ST2	ST3	TA1 5	TA2 5	TA3 5	Attendance 5		
30			20				100	150

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LAB Course Code: BCSCY0651	LAB Course Name: Digital Forensic Lab	L	T	P	C
Course Offered in: CSE (Cyber Security)		**0**	**0**	**2**	**1**

Pre-requisite: Operating systems, Computer Networks, and Cybersecurity principles

Course Objectives: To provide hands-on experience in investigating and analyzing digital and mobile devices. Students will learn to use various forensic tools and techniques to recover, analyze, and report digital evidence. The practical cover disk imaging, file carving, OS artifact analysis, mobile data extraction, network traffic analysis, and cloud forensics.

Course Outcome: After completion of the course, the student will be able to		Bloom's Knowledge Level (KL)
CO1	Apply digital evidence collection techniques and forensic tool usage by and utilizing OpenVAS for vulnerability scanning.	K3
CO2	Analyze digital evidence in mobile devices ,network forensics investigations, applying forensic techniques to extract valuable insights.	K4
CO3	Analyze digital evidence in cloud and emerging technology environments, applying forensic techniques to conduct investigations and ensure compliance with legal and ethical standards.	K5

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	2	3	3	2	3	3	3	3
CO2	3	3	3	3	3	3	2	3	3	2	3	3	3	3
CO3	3	3	3	3	3	3	2	3	3	3	3	3	3	3

List Of Practical's (Indicative & Not Limited To)

1. Using tools to identify and collect digital evidence
2. Installation and basic usage of forensic tools
3. Analyzing case studies related to legal and ethical issues
4. Research and documentation on a historical case
5. Creating and verifying disk images
6. Recovering files and data from disk images
7. Analyzing system artifacts from different OS
8. Installing OpenVAS, performing scans, and generating reports
9. Extracting data logically from various mobile devices
10. Extracting data physically from various mobile devices
11. Analyzing extracted data from mobile devices
12. Identifying and reporting on challenges in mobile forensics
13. Capturing and analyzing network packets
14. Using tools like tcpdump to capture network traffic
15. Detecting and analyzing network-based attacks
16. Performing deep packet inspection and correlating events
17. Extracting and analyzing data from cloud platforms
18. Performing forensic analysis on various IoT devices
19. Research and document emerging trends in forensics

Total Hours: 48 hrs.

Mode of Evaluation

CIE			PE (If mentioned in curriculum)	Total
PS1 10	**PS2 20**	**PS3 20**		
50			**50**	**100**

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Course Code: BCSAI0612	Course Name: Advanced Java Programming	L	T	P	C
Course Offered in: CSE/CS/IT/CSE(AI)/CSE(AIML)/CSE(IOT)/CSE(AI)/CSE(DS)/CSE-R/M.Tech int		3	0	0	3

Pre-requisite: Basic knowledge of Core Java (OOP, exception handling, collections), multithreading, and fundamentals of SQL/database operations.

Course Objectives: To equip students with in-depth knowledge of server-side programming using Java technologies such as Servlets, JSP, JDBC, and frameworks like Spring and Hibernate. The aim of this course is to enable students to build dynamic web applications and enterprise-level solutions with real world project exposure.

Course Outcome: After completion of the course, the student will be able to		Bloom's Knowledge Level (KL)
CO1	Apply JDBC to integrate Java applications with relational databases for dynamic data handling and managing server-side programming using Servlets for handling web requests and responses.	K3
CO2	Analyze the use of JSP scripting elements, expression language, and directives to determine their effectiveness in dynamic web page rendering and maintainability.	K4
CO3	Implement modular, maintainable Java applications using advanced dependency injection techniques within the Spring Ecosystem.	K3
CO4	Design modular, loosely coupled web applications by implementing the MVC architecture using Spring MVC and Spring Boot.	K6
CO5	Deploy JPA to map, store, retrieve, and update data from java objects to relational databases and vice versa with RESTful APIs to enable scalable and maintainable services.	K6

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	3	3	2	2	2	2	1	1	1	1	2	3	2	1	1
CO2	3	2	3	2	2	2	1	1	1	1	2	3	2	1	1
CO3	3	3	3	2	3	2	1	1	1	1	2	3	2	1	1
CO4	3	3	2	3	3	1	2	2	2	1	2	2	1	1	1
CO5	3	3	3	3	3	1	2	2	2	2	3	3	2	1	1

Course Contents / Syllabus

Module 1	JDBC & Servlets	18 hours

JDBC: Introduction, JDBC Driver, DB Connectivity, Connection, Statement, Result Set, Prepared Statement, Transaction Management, Stored Procedures.
Servlet: Servlet Overview, Servlet Life Cycle, Servlet API, Generic Servlet, HTTP Servlet, Redirect requests to other resources using RequestDispatcher, sendRedirect, Session Tracking: Using cookies, URL rewriting, and HttpSession.

Module 2	JSP	14 hours

JSP: Introduction, Life Cycle of JSP, JSP to Servlet Conversion, JSP Scripting Elements , JSP Implicit Objects, JSP Directives, Expression Language, Exception Handling in JSP, Servlet-JSP-JDBC Integration, Login and registration system using JSP and Servlet.

Module 3	Spring Framework	16 hours

Spring : Overview of Spring Ecosystem, Spring Modules, IOC container, Types of Dependency Injection (DI): Constructor Injection Setter Injection, Field Injection, Configuration Approaches: Java-based Configuration, Component Scanning, Annotation-based Configuration, Spring JDBC, Spring Project Setup using Maven. **Case Study 1:** Develop a Spring application utilizing Dependency Injection, component scanning, and annotation-based configuration within a Maven-based setup

Module 4	Spring MVC & Spring Boot	16 hours

Spring MVC: Overview of Spring MVC architecture, Controllers in Spring MVC, Passing Data Between Controller and View, JSP in Spring MVC, Integration with Spring JDBC.
Spring Boot: Introduction, Creating a Spring Boot project using Spring Initializer, Spring Boot Annotations & Auto Configuration, Spring Data JPA and H2 setup, Serving HTML pages and static content, Handling HTTP methods, Project Lombok.

Module 5	**JPA**	**16 hours**

JPA: Introduction to ORM & JPA, JPA Annotations, JPA Relationships, RESTful API, CRUD with Spring Data JPA, Repository Interfaces: JpaRepository, CrudRepository, JSON/XML handling, Postman testing and deployment, Introduction to spring AI**, Case Study 2:** Build A Netflix-like system to manage users, content, and viewing behavior using JPA.

	Total Lecture Hours	**80 hours**

Textbook:

S.No	**Book Title**	**Author**
1.	Head First Servlets and JSP, O'Reilly Media, 2nd Edition (2008).	Bryan Basham, Kathy Sierra, Bert Bates
2.	Java Server Pages, O'Reilly Media, 3rd Edition (2003).	Hans Bergsten
3.	Spring in Action, Manning, 6th Edition (2022).	Craig Walls
4.	Spring Boot in Action, Manning, 1st Edition (2016).	Craig Walls
5.	Spring Data: Modern Data Access for Enterprise Java, O'Reilly Media, 1st Edition (2012)	Mark Pollack, Oliver Gierke

Reference Books:

S.No	**Book Title**	**Author**
1.	Core Servlets and JavaServer Pages, Volume 1: Core Technologies, Prentice Hall, 2nd Edition (2003).	Marty Hall and Larry Brown
2.	Core Servlets and JavaServer Pages, Volume 2: Advanced Technologies, Prentice Hall, 2nd Edition (2004).	Marty Hall and Larry Brown
3.	Pro Spring 6, Apress, 1st Edition (2023)	Clarence Ho, Rob Harrop, Chris Schaefer
4.	Pro JPA 2 in Java EE 8, Apress, 3rd Edition (2018).	Mike Keith, Merrick Schincariol

NPTEL/ Youtube/ Faculty Video Link:

Unit 1	https://www.youtube.com/playlist?list=PLlhM4lkb2sEjVsbbZ_kiixY5CcR84IQUg
Unit 2	https://www.youtube.com/playlist?list=PL-XjHn7CHrmQhMkVC6KCfmsPHdklvUlQr
Unit 3	https://www.youtube.com/playlist?list=PL9ooVrP1hQOEfi91PCFQMawtBJrPpir7y
Unit 4	https://www.youtube.com/playlist?list=PL-XjHn7CHrmQhMkVC6KCfmsPHdklvUlQr
Unit 5	https://www.youtube.com/playlist?list=PLGRDMO4rOGcNSBOJOlrgQqGpIgo6_VZgR

Mode of Evaluation

CIE							**ESE**	**Total**
ST1	**ST2**	**ST3**	**TA1** 5	**TA2** 5	**TA3** 5	**Attendance** 5		
30			**20**				**100**	**150**

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY

GREATER NOIDA-201306

(An Autonomous Institute)

School of Computer Science in Emerging Technologies

Course Code: BCSCY0612	**Course Name: Blockchain And Cryptocurrency Security**	**L**	**T**	**P**	**C**
Course Offered in: B. Tech in CSE and emerging branches as department elective, offered by CSE(CYS)		**3**	**0**	**0**	**3**

Pre-requisite: Computer Networks, Cryptography and Network Security, Operating Systems, Programming skills

Course Objectives: To explore the foundational concepts of blockchain technology and its architecture to develop secure blockchain-based applications and assess their resilience to cyber threats.

Course Outcome: After completion of the course, the student will be able to	Bloom's Knowledge Level (KL)
CO1: Understand the core architecture, types, and applications of blockchain technology.	K1,K2
CO2: Apply cryptographic techniques to ensure security and integrity in blockchain systems.	K3, K4
CO3: Analyze and implement consensus mechanisms and secure smart contracts.	K3, K4
CO4: Evaluate the working, risks, and attacks associated with cryptocurrency platforms.	K3, K4
CO5: Assess real-world applications, privacy solutions, and legal implications of blockchain technology.	K5

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	**3**	**3**	**3**	**2**	-	**3**	1	-	-	**2**	**2**	-
CO2	3	3	2	2	2	2	1	3	1	**1**	-	**2**	**2**	**2**
CO3	3	3	3	2	3	2	1	3	2	1	-	**3**	**2**	**2**
CO4	3	2	2	2	2	2	1	3	2	2	-	**2**	**2**	**3**
CO5	2	2	2	1	2	2	2	3	2	2	-	**3**	**2**	**3**

Course Contents / Syllabus

Unit 1	**Introduction to Blockchain Technology**	**09 hours**

Evolution and history of blockchain, Structure and components of a blockchain (blocks, chain, nodes), Types of blockchains: Public, Private, Consortium,Distributed ledger technology (DLT) vs. traditional databases,Use cases beyond cryptocurrency: supply chain, identity management, healthcare

Unit 2	**Cryptographic Foundations**	**09 hours**

Hash functions and Merkle trees,Digital signatures and public-key cryptography,Cryptographic puzzles and Proof-of-Work (PoW), Wallets: types and key management, Blockchain addresses and transactions

Unit 3	**Consensus Mechanisms and Cryptocurrency Basics**	**09 hours**

Need for consensus in distributed systems,Proof-of-Work (PoW), Proof-of-Stake (PoS), Delegated PoS, Practical Byzantine Fault Tolerance (PBFT),Mining and its role in blockchain security,Introduction to cryptocurrencies: Bitcoin, Ethereum, and altcoins,Transaction lifecycle and UTXO model vs. account-based model

Unit 4	**Smart Contracts and Blockchain Security**	**09 hours**

What are smart contracts and how they work, Smart contract development (e.g., using Solidity),Common vulnerabilities: reentrancy, overflow/underflow, denial of service,Tools for auditing smart contracts (Mythril, Slither, Oyente), Attacks on blockchain systems: 51% attack, Sybil attack, double-spending, Eclipse attack

Unit 5	**Applications, Privacy, and Legal Aspects**	**09 hours**

Blockchain in cybersecurity, IoT, and identity verification,Privacy-enhancing technologies: Zero-Knowledge Proofs, Ring Signatures, zk-SNARKs,Regulatory and legal frameworks for cryptocurrencies (global and national perspectives),Blockchain compliance and governance challenges,Emerging trends: Layer 2 solutions, cross-chain interoperability, quantum threats to blockchain

	Total Lecture Hours	**45 hours**

Textbook:

1.Mastering Bitcoin: Unlocking Digital Cryptocurrencies by Andreas M. Antonopoulos
2."Blockchain Basics: A Non-Technical Introduction in 25 Steps" by Daniel Drescher
3.Mastering Ethereum: Building Smart Contracts and Dapps by Andreas M. Antonopoulos, Gavin Wood

Reference Books:

1. Blockchain Technology and Applications by Pethuru Raj, Anupama C. Raman
2. The Basics of Bitcoins and Blockchains by Antony Lewis
3. Bitcoin and Cryptocurrency Technologies by Arvind Narayanan, Joseph Bonneau

NPTEL/ Youtube/ Faculty Video Link

Unit 1	Blockchain and its Applications - Course,
Unit 2	: Introduction to Blockchain Technology and Applications - Course
Unit 3	Cryptography and Network Security - Course
Unit 4	Introduction to Blockchain – I (Basics)
Unit 5	(1851) NPTEL Blockchain and its Applications Week 9 Assignment Solution January - April 2025 IIT Kharagpur - YouTube

Mode of Evaluation

CIE						**ESE**	**Total**
ST1	**ST2**	**ST3**	**TA1**	**TA2**	**Attendance**		
			5	**5**	**5**		
30			**20**			**100**	**150**

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY

GREATER NOIDA-201306

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School of Computer Science in Emerging Technologies

LAB Course Code:	**LAB Course Name: Blockchain and Cryptocurrency Security Lab**	**L**	**T**	**P**	**C**
Course Offered in: All CS Emerging Branches		**0**	**0**	**2**	**1**

Pre-requisite: NA

Course Objectives:

1. To provide hands-on experience in setting up blockchain environments and understanding their structure. And expose students to real-world blockchain applications and privacy-enhancing technologies.

Course Outcome: After completion of the course, the student will be able to

1. CO1: Set up and configure a basic blockchain environment using tools like Ethereum or Hyperledger.
2. CO2: Apply cryptographic techniques such as hashing and digital signatures in blockchain applications.
3. CO3: Simulate and evaluate consensus mechanisms like Proof-of-Work and analyze cryptocurrency transactions.
4. CO4: Design, deploy, and test smart contracts for security vulnerabilities using appropriate tools.
5. CO5: Demonstrate the use of blockchain in practical scenarios such as secure voting, digital identity, and document verification.
6. CO6: Analyze and compare blockchain platforms with respect to performance, scalability, and security.

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	2	2	3	2	3	1	-	**2**	1	1	-	**3**	**3**	**3**
CO2	3	2	3	2	2	**2**	-	2	1	1	-	**3**	3	**2**
CO3	3	2	3	2	3	2	-	2	1	1	-	**3**	**2**	**2**
CO4	3	2	3	3	3	1	-	2	2	1	**1**	**2**	**2**	**3**
CO5	3	2	3	3	3	1	-	2	2	1	1	**3**	**2**	**3**
CO6	3	3	3	3	2	1		2	2	2	1	3	3	3

List Of Practical's (Indicative & Not Limited To)

a. Lab 1: Set up a private Ethereum or Hyperledger Fabric blockchain network.
b. Lab 2: Create and inspect a basic blockchain using Python or JavaScript.
c. Lab 3: Simulate peer-to-peer communication and transaction broadcasting in a blockchain.
d. Lab 4: Implement SHA-256 hashing and demonstrate Merkle Tree construction.
e. Lab 5: Generate and verify digital signatures using RSA/ECDSA in Python.
f. Lab 6: Create a simple wallet system using public-private key pairs.
g. Lab 7: Simulate Proof-of-Work (PoW) consensus using Python.
h. Lab 8: Analyze Bitcoin transactions using a blockchain explorer (e.g., Blockchair).
i. Lab 9: Use a cryptocurrency wallet (e.g., MetaMask) to perform test transactions on the Ethereum testnet.
j. Lab 10: Write and deploy a simple smart contract using Solidity on Remix IDE.
k. Lab 11: Identify and exploit a reentrancy vulnerability in a sample smart contract.

l. Lab 12: Perform static analysis of smart contracts using tools like Mythril or Slither.
m. Lab 13: Demonstrate a blockchain use case (e.g., document verification or voting system).
n. Lab 14: Simulate a privacy transaction using Monero or Zcash testnet.
o. Lab 15: Conduct a comparative analysis of blockchain platforms (Ethereum vs. Hyperledger vs. Solana) on parameters like security, scalability, and governance.

Mode of Evaluation

CIE			PE (If mentioned in curriculum)	Total
PS1 10	PS2 20	PS3 20		
50			50	100

NIET Greater Noida Autonomous Institute	**NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY** **GREATER NOIDA-201306** **(An Autonomous Institute)** **School of Computer Science in Emerging Technologies**

B. TECH THIRD YEAR	
Subject Code: BCSE0614	**L T P** 3-0-0
Subject Name: WEB DEVELOPMENT USING MEAN STACK	**Credits** 3

Pre- requisites: Basic knowledge of HTML, CSS and ES6 required.

Course Contents/Syllabus

Unit-1	**Introduction to Nodejs :**Installing Nodejs, Node in-built packages (buffer, fs, http, os, path, util, url) Node.js modules, File System Module, Json data, Http Server and Client, Error handling with appropriate HTTP, Callback function, asynchronous programing REST API's(GET, POST PUT, DELETE UPDATE), GraphQL, Promises, Promise Chaining, Introduction to template engine (EJS).	8 hours
Unit-2	**Express Framework:** Configuring Express, Postman configuration, Environment Variables, Routing, Defining pug templates, HTTP method of Express, URL binding, middleware function, Serving static files, Express sessions, REST full API's, FORM data in Express, document modeling with Mongoose.	8 hours
Unit-3	**Basics of Angular js :** Typescript, Setup and installation, Power of Types, Functions, Function as types Optional and default parameters, Arrow functions, Function overloading, Access modifiers, Getters and setters, Read-only & static, Abstract classes, Interfaces, Extending and Implementing Interface, Import and Export modules.	8 hours
Unit-4	**Building Single Page App with Angular js:** MVC Architecture, One-way and Two-way data binding, AngularJS Expressions, AngularJS Controllers, AngularJS Modules, adding controller to a module, Component, Dependency Injection, Filters, Tables, AngularJS Forms and Forms validation, Select using ng-option, AngularJS AJAX.	8 hours
Unit-5	**Connecting Angular js with MongoDB :** Environment Setup of Mongodb, data modeling, The current SQL/NoSQL landscape, Create collection in Mongodb, CRUD Operations in MongoDB. Mongo's feature set, Introduction to Mongoose, understanding mongoose schemas and datatypes, Connecting Angular with mongoDB using API.	8 hours

Course Outcomes – After completion of this course students will be able to:

CO 1	Explain, analyze and apply the role of server-side scripting language like Nodejs in the workings of the web and web applications.	K2, K3
CO2	Demonstrate web application framework i.e., Express is to design and implement typical dynamic web pages and interactive web based applications.	K3, K6
CO3	Apply the knowledge of Typescript that are vital in understanding angular is, and analyze the concepts, principles and methods in current client-side technology to implement angular application over the web.	K3, K6

CO4	Analyze, build and develop single page application using client-side programming i.e. angular js and also develop a static web application.	K3, K4
CO5	Understand the impact of web designing by database connectivity with Mongodb in the current market place where everyone use to prefer electronic medium for shoping, commerce, and even social life also.	K2, K3

Text Books:

1. Amos Q. Haviv (Author), Adrian Mejia (Author), Robert Onodi (Author), "Web Application Development with MEAN",3rdIllustrated Edition 2017,Packt Publications.
2. Simon Holmes (Author), Clive Herber (Author), "Getting MEAN with Mongo, Express, Angular, and Node", 2nd Edition 2016, Addison Wesley Publication.
3. Dhruti Shah, "Comprehensive guide to learn Node.js", 1st Edition, 2018 BPB Publications.
4. Christoffer Noring, Pablo Deeleman, "Learning Angular", 3rd Edition,2017 Packt publications.

Reference Books:

1. Anthony Accomazzo, Ari Lerner, and Nate Murray, "Fullstack Angular: The Complete Guide to AngularJS and Friends",4th edition, 2020 International Publishing.
2. David Cho, "Full-Stack Angular, Type Script, and Node: Build cloud-ready web applications using Angular 10 with Hooks and GraphQL",2nd edition, 2017 Packt Publishing Limited.
3. Richard Haltman & Shubham Vernekar, "Complete node.js: The fast guide: Learn complete backend development with node.js"5th edition, 2017 SMV publication.
4. Glenn Geenen,Sandro Pasquali , Kevin Faaborg, "Mastering Node.js: Build robust and scalable real-time server-side web applications efficiently" 2nd edition Packt Publishing Limited.
5. Greg Lim,"Beginning Node.js, Express & MongoDB Development, kindle edition, international publishing.
6. Daniel Perkins, "AngularJS Master Angular.js with simple steps, guide and instructions" 3rd edition, 2015 SMV publication.
7. Peter Membrey, David Hows, Eelco Plugge, "MongoDB Basics", 2nd edition, 2018 International Publication.

Links: NPTEL/You Tube/Web Link

https://youtu.be/BLl32FvcdVM

https://youtu.be/fCACk9ziarQ

https://youtu.be/YSyFSnisip0

https://youtu.be/mGVFltBxLKU

https://youtu.be/bWaucYA1YRI

https://youtu.be/7H_QH9nipNs
https://youtu.be/AX1AP83CuK4
https://youtu.be/SccSCuHhOw0
https://youtu.be/lY6icfhap2o
https://youtu.be/z7ikpQCWbtQ

https://youtu.be/0LhBvp8qpro https://youtu.be/k5E2AVpwsko https://youtu.be/SQJkj0WYWOE?list=PLvQjNLQMdagP3OzoBMfBT48uJ-SPfSsWj https://youtu.be/0eWrpsCLMJQ?list=PLC3y8-rFHvwhBRAgFinJR8KHIrCdTkZcZ https://youtu.be/ZSB4JcLLrIo
https://youtu.be/0LhBvp8qpro https://youtu.be/k5E2AVpwsko https://youtu.be/SQJkj0WYWOE?list=PLvQjNLQMdagP3OzoBMfBT48uJ-SPfSsWj https://youtu.be/0eWrpsCLMJQ?list=PLC3y8-rFHvwhBRAgFinJR8KHIrCdTkZcZ https://youtu.be/ZSB4JcLLrIo
https://youtu.be/Kvb0cHWFkdc https://youtu.be/pQcV5CMara8 https://youtu.be/c3Hz1qUUIyQ https://youtu.be/Mfp94RjugWQ https://youtu.be/SyEQLbbSTWg

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY
GREATER NOIDA-201306
(An Autonomous Institute)
School of Computer Science in Emerging Technologies

Course Code: BCSCY0652	Course Name: Penetration Testing	L	T	P	C
Course Offered in: CSE(CYS)		0	0	6	3

Pre-requisite: Networking basics (TCP/IP, OSI model), Operating systems (Linux & Windows), Programming/scripting (Python, Bash), Cybersecurity fundamentals

Course Objectives:

The course aims to provide students with a comprehensive understanding of penetration testing in cybersecurity with hands-on practical exercises to understand the methodologies associated with penetration testing.

Course Outcome: After completion of the course, the student will be able to	Bloom's Knowledge Level (KL)
CO1: Understand the importance and ethical considerations of penetration testing in cybersecurity.	K2
CO2: Demonstrate proficiency in conducting network reconnaissance.	K3
CO3: Identify, assess, and exploit vulnerabilities in web applications.	K4
CO4: Acquire the skills to perform mobile application reconnaissance ensuring secure mobile development practices.	K4
CO5: Analyze the advanced penetration testing methodologies to develop comprehensive penetration testing reports.	K5

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	-	1	1	2	-	3	-	2	-	2	-	2	1
CO2	3	3	2	2	3	-	-	2	1	2	1	1	2	3	2
CO3	3	3	3	2	3	-	-	2	1	2	1	1	3	3	3
CO4	3	3	2	2	3	1	-	2	1	2	1	1	-	3	3
CO5	3	3	3	2	3	2	-	2	2	3	2	1	-	2	3

Course Contents / Syllabus

Unit 1	**Introduction to Penetration Testing**	**14 Hours**

Overview of Penetration Testing, Importance and Scope, Legal and Ethical Considerations

Unit 2	**Network Penetration Testing**	**14 Hours**

Network Reconnaissance, Scanning and Enumeration, Exploitation Techniques

Unit 3	**Web Application Penetration Testing**	**14 Hours**

OWASP Top 10, Web Application Scanning, SQL Injection, XSS, CSRF

Unit 4	**Mobile Application Penetration Testing**	**15 Hours**

Android and iOS Security Fundamentals, Reverse Engineering, Secure Coding Practices

Unit 5	**Advanced Techniques and Reporting**	**15 Hours**

Advanced Exploitation Techniques, Reporting and Documentation, Post-Exploitation Techniques

	Total Lecture Hours	**72 hours**

Textbook:

1."Kali Linux Revealed: Mastering the Penetration Testing Distribution" by Raphael Hertzog
2."Metasploit: The Penetration Tester's Guide" by David Kennedy et al.
3."Wireshark Network Analysis: The Official Wireshark Certified Network Analyst Study Guide" by Laura Chappell

Reference Books:

4. "The Web Application Hacker's Handbook: Finding and Exploiting Security Flaws" by Dafydd Stuttard et al
5. "Nmap Network Scanning: The Official Nmap Project Guide to Network Discovery and Security Scanning" by Gordon Fyodor Lyon

NPTEL/ Youtube/ Faculty Video Link:

Unit 1	Kali Linux Official Website
Unit 2	Metasploit Framework GitHub Repository
Unit 3	Wireshark Official Website
Unit 4	Burp Suite Official Website
Unit 5	Nmap Official Website

Mode of Evaluation

CIE	ESE	Total
PS		
50	100	150

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY

GREATER NOIDA-201306

(An Autonomous Institute)

School of Computer Science in Emerging Technologies

Subject Name: Machine Learning and It's Applications **LTP: 0 0 6**

Subject Code:

Applicable in Department: CSE (IoT)

Pre-Understanding/Requirement of Subject: Python libraries (Numpy, Pandas, Matplotlib, Seaborn)

1. **Course Objective**: The course objective is to apply foundational machine learning concepts, including data preprocessing, supervised and unsupervised learning algorithms (regression, classification, clustering), and ensemble methods, to address real-world problems, evaluate model performance critically, and implement practical solutions, particularly in areas like IoT applications.
2. **Course Outcomes:**

Course Outcomes (CO)		
Course outcome: After completion of this course students will be able to:		**Bloom's Knowledge Level(KL)**
CO 1	Apply the fundamental concepts, types, and applications of Machine Learning, particularly within the context of IoT and various data preprocessing and dimensionality reduction techniques to prepare datasets for Machine Learning models.	K2
CO2	**Evaluate** linear regression models, optimizing them with Gradient Descent and improving their robustness using regularization techniques.	K4
CO3	Explore and utilize various classification algorithms, including Logistic Regression, Decision Trees, Support Vector Machines, and K-Nearest Neighbors, to solve binary and multiclass classification problems.	K4
CO4	Apply probabilistic methods (Naive Bayes) and advanced ensemble techniques (Random Forest, AdaBoost, Gradient Boosting, XGBoost) to build robust classification models.	K4
CO5	Implement diverse unsupervised learning techniques, including K-Means, hierarchical, and DBSCAN clustering along with anomaly detection systems.	K4

3. Syllabus:

Unit	Module	Topic covered	Pedagogy	No of Hours Required		CO Mapping
Unit-I	**Introduction to Machine Learning and Feature Engineering**	**Introduction to Machine Learning:** Motivation, Definition, Applications of Machine Learning focusing on IoT **Types of Machine Learning:** Supervised, Unsupervised and Reinforcement Learning **Datasets and Features:** Features and their types, handing missing data, Dealing with categorical features, Feature Scaling, Feature selection, outlier detection and removal **Dimensionality reduction:** Curse of Dimensionality, Principal Component Analysis (PCA) Algorithm.	LCC Mode (Lab Classroom) Smart Board	6	5 Lab experiments (1.1-1.3)	CO1
Unit-II	**Regression and Regularization**	**Introduction to Regression:** Regression Problem**,** Linear regression model (Simple, Multiple and Polynomial) **Errors :** Mean Squared Error (MSE), Root Mean Squared Error (RMSE),	LCC Mode (Lab Classroom) Smart Board	8	6 Lab experiments (2.1-2.6)	CO2

Unit	Module	Topic covered	Pedagogy	No of Hours Required		CO Mapping
		Mean Absolute Error (MAE) **Cost function:** formula, intuition and visualization **Gradient Descent:** Algorithm, intuition, learning rate and Gradient Descent for linear regression. **Evaluating the Accuracy of Linear Regression Model:** R^2 and Adjusted R^2 **Regularization:** Bias and Variance, Overfitting and Underfitting, L1 and L2 Regularization, Regularize cost function, Regularized Linear Regression				
Unit III	**Classification Algorithms**	**Classification:** Classification problem, Binary and Multiclass Classification, Decision Boundary Logistic regression model for binary classification, Cost function of logistic regression model, Regularized logistic regression, One Vs. All strategy for multiclass classification using logistic regression.	LCC Mode (Lab Classroom) Smart Board	1 2	7 Lab experiments (3.1-3.7)	CO3

Unit	Module	Topic covered	Pedagogy	No of Hours Required		CO Mapping
		Measuring Performance of Classification Model: Accuracy, Precision, Recall, F1-Score, ROC-AUC curve, Confusion matrix **Decision Trees:** Decision Tree Classification Algorithm, Attribute Selection Measures, Variants of Decision Trees (ID3, C4.5, CART) **Large Margin Classifier:** Support Vector Machines **Instance Based Learning:** K Nearest Neighbor Algorithm				
Unit IV	**Probabilistic Models and Ensembles**	**Probabilistic Methods for Classification:** Bayesian Learning, Naive Bayes Classifier, Bayesian belief networks **Tree Ensembles:** Using multiple decision trees, Bagging Vs. Boosting, Sampling with replacement, Random Forest Algorithm, Adda boost, Gradient Boosting, Xgboost Algorithm.	LCC Mode (Lab Classroom) Smart Board	6	4 Lab experiments (4.1-4.4)	CO4
Unit V	**Clustering Algorithms and Anomaly Detection**	**Unsupervised Learning &Clustering:** The problem of clustering, Distance measures **Partition Based Methods:**	LCC Mode (Lab Classroom) Smart Board	10	6 Lab experiments (5.1-5.6)	CO5

Unit	Module	Topic covered	Pedagogy	No of Hours Required		CO Mapping
		K-Means Clustering (Intuition, Algorithm, Optimization objective, Initializing K-Means, Choosing number of clusters) K-Medoids and K-Mode clustering algorithms. **Hierarchical Clustering** (Single Linkage, Complete Linkage, AGNES (Agglomerative Nesting), DIANA (Divisive Analysis). **Density-based Clustering:** DBSCAN Algorithm **Anomaly Detection:** Finding unusual events, Gaussian Distribution and Gaussian Mixture Model, Anomaly Detection Algorithm**,** Developing and evaluating anomaly detection system.				
Total				**42**	**28**	**70**

4.List of Practical:

Lab No.	Unit	Topic		CO Mapping
1	1		1. Introduction to Anaconda and Jupyter Notebooks, Sklearn library, Datasets available in Sklearn library, Kaggle Datasets to develop basic understanding of features and applications of Machine Learning. 2. Perform the following on an IoT based dataset: a) Basic data exploration, Check for missing values, Remove rows with missing values, Fill missing numerical values with mean or median, Fill in categorical values with mode or a specific value, Handling duplicate rows, Removing outliers. b) Dealing with categorical Variables: one-hot encoding, label encoding, ordinal encoding, and target encoding c) Feature Scaling: MinMaxScaler, StandardScaler, MaxAbsScaler, RobustScaler, Normalizer d) Correlation Analysis 3. Implement Principal Component Analysis (PCA) algorithm for dimensionality reduction.	CO1
2	2		1. Implementing a class having functions for Mean Absolute Error, Root Mean Square Error, Log loss, R-square and Adjusted R Square 1. Fit a linear regression model to predict housing prices based on the size of the house. 2. Implement linear regression model to predict PM2.5 concentrations based on various air quality features using Air Quality Index (AQI) dataset. 3. Forecasting Stock Closing Prices with Polynomial Regression and Bias-Variance Trade-off Analysis. 4. Implement Gradient Descent algorithm and analyse the effect of learning rate and derivatives. 5. Demonstrate effect of underfitting and overfitting and hyper parameters in already implemented regression algorithms along with Hyper-parameter tuning.	CO2

			6. Implementation of regularized linear regression: Lasso and Ridge regression	
3	3		1. Implement logistic regression for binary classification on IoT-23: A l dataset with malicious and benign IoT network traffic 2. Implement logistic regression model for Handwritten digit classification. 3. Sentiment Analysis of Product Reviews Using One-Hot Encoding and Logistic Regression 4. Implement K-Nearest Neighbor regression from scratch for classification. 5. Credit Card Fraud Detection Using KNN and ROC-AUC Evaluation 6. Use the ID3 algorithm to build a decision tree to predict whether a customer will purchase a product based on their browsing behaviour on an e-commerce website. 7. Use a support vector machine (SVM) to classify images into different categories using the CIFAR-10 dataset.	CO3
4	4		1. Implement Email Spam Classifier using Naïve Bayes Algorithm. 2. Implementation of Naïve Bayes Classifier for Titanic Dataset. 3. Implement Random Forest algorithm and Xgboost algorithm for Telco Customer Churn Prediction and compare the performance of both the algorithms. 4. Implement Random Forest algorithm and Xgboost algorithm for Credit Card Fraud Detection and compare the performance of both the algorithms.	CO4
5	5		1. Customer Segmentation for a Retail Store Using K-Means Clustering.	CO5

			2. Grouping News Articles by Topics Using K-Medoids Clustering. 3. Document Clustering Using Hierarchical Clustering and Dendrograms. 4. Fraud Pattern Detection in Transactions Using DBSCAN Clustering. 5. Clustering City Temperature Patterns Using Gaussian Mixture Models. 6. Implementation of anomaly detection system.	

5. Required software and Tools

i. Anaconda
ii. Jupyter Notebook
iii. Google Colab
iv. Kaggle

6. Textbooks:

S.No	Book Title
1	Marco Gori , Machine Learning: A Constraint-Based Approach, Morgan Kaufmann. 2017
2	Ethem Alpaydin, Machine Learning: The New AI, MIT Press-2016

7. Reference Books:

S.No	Book Title
1	Ryszard, S., Michalski, J. G. Carbonell and Tom M. Mitchell, Machine Learning: An Artificial Intelligence Approach, Volume 1, Elsevier. 2014
2	Stephen Marsland, Taylor & Francis 2009. Machine Learning: An Algorithmic Perspective.