Department of CSE – (IoT & CSBT)

Vision:

To be the foremost innovator and leader in the field of IoT and Cyber security, driving the evolution of secure and connected technologies, ensuring the trust and safety of digital ecosystems worldwide.

Mission:

M1: We are dedicated to advancing digital trust by pioneering cutting-edge solutions that secure IoT devices, networks, and data, guaranteeing the reliability and privacy of the connected world.

M2: Our mission is to continuously innovate and develop robust cyber security technologies that proactively anticipate and counter emerging threats, fostering a secure environment for IoT applications.

M3: We are committed to educating and empowering businesses, individuals, and communities through extensive training and awareness programs, equipping them with the knowledge to defend against cyber threats.

PEO's :

PEO 1: Graduates will have successful careers in IoT and Cybersecurity or related fields, demonstrating expertise and leadership in securing and managing interconnected systems.

PEO 2: Graduates will engage in lifelong learning and professional development, staying current with evolving technologies and security threats to adapt to changing industry demands.

PEO 3: Graduates will possess the skills to analyze and solve complex IoT and cybersecurity challenges, applying critical thinking, ethical decision-making, and innovative approaches.

PSO's :

PSO 1: Graduates will be proficient in understanding, configuring, and securing IoT devices, networks, and platforms, including familiarity with IoT protocols and technologies.

PSO 2: Graduates will have expertise in securing IoT devices, including hardware security, firmware integrity, and encryption of data at rest and in transit.

PSO 3: Graduates will possess the skills to conduct digital forensics investigations in IoT environments to trace and analyse security incidents.

PROGRAM OUTCOMES (PO's)

Engineering Graduates will able to:

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO8: Individual and Team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO9: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO10: Project management and finance: Demonstrate knowledge and understanding of the Engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO11: Life -long learning: Recognize the need for and have the preparation and ability to engage in independent and life -long learning in the broadest context of technological change.

EAST POINT COLLEGE OF ENGINEERING & TECHNOLOGY

Department of CSE (IoT & CSBT)

BE in Computer Science & Engineering (IOT & CSBT)
Scheme of Teaching VI Semester
Outcome Based Education and Choice Based Credit System (CBCS)
Effective from the academic year Batch - 2025–2029

Sl. No	Course	Course Code	Course Title	Dept	Teaching Hours / Week				Examination			
					Theory	Tutorial	Practical	SLC				
					L	T	P	S	CIE	SEE	Total	Credits
1	PCC	24IC61	Cryptography & Network Security	IoT	3	1	0	0	50	50	100	3
2	IPCC	24IC62	Block Chain Technology	IoT	3	0	2	0	50	50	100	4
3	PCCL	24ICL63	Advanced Network Security Lab	IoT	0	0	2	0	50	50	100	1
4	AEC	24IC64	Research Methodology and IPR	IoT	3	0	0	0	50	50	100	3
5	PEC	24IC65X	Professional Elective Course-III	IoT	4	0	0	0	50	50	100	4
6	OEC	24XX66X	Open Elective-I	Concerned Dept.	3	0	0	0	50	50	100	3
7	PROJ	24ICP67	Mini Project	IoT	0	0	4	3	100	-	100	2
8	NCMC	24NS68 / 24PE68 / 24YO68	NSS/PE/ YOGA		0	0	2	100	-	100	-	-
9	NCMC	24IKS69	IKS		1	0	0	100	-	100	-	-
Total									400	500	800	20

Sl. No	Career Path	PEC3
1	Cyber Security Analyst	Cyber Forensics
2	Penetration Tester	IOT Penetration Testing
3	IoT Engineer	IoT Automation

Cryptography & Network Security		Semester	6
Course Code	24IC61	**CIE Marks**	50
Teaching Hours/Week (L:T:P:S)	3:1:0:0	**SEE Marks**	50
Total Hours of Pedagogy	50	**Total Marks**	100
Credits	03	**Exam Hours**	3
Examination nature (SEE)	Theory		

Prerequisite:

Course objectives:

- Understand the basics of Cryptography concepts, Security and its principles.
- To analyse different Cryptographic Algorithms.
- To illustrate public and private key cryptography.
- To understand the key distribution scenario and certification.
- To understand approaches and techniques to build protection mechanism in order to secure computer networks.

Teaching-Learning Process (General Instructions):

These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) needs not to be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.
2. Use of Video/Animation to explain functioning of various concepts.
3. Encourage collaborative (Group Learning) Learning in the class.
4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.
6. Introduce Topics in manifold representations.
7. Show the different ways to solve the same problem with different circuits/logic and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.
9. Use any of these methods: Chalk and board, Active Learning, Case Studies.

MODULE-1 **8 Hours**

A model for Network Security, Classical encryption techniques: Symmetric cipher model, Substitution ciphers-Caesar Cipher, Monoalphabetic Cipher, Playfair Cipher, Hill Cipher, Polyalphabetic Ciphers, One time pad, Steganography. Block Ciphers and Data Encryption Standards: Traditional Block Cipher structures, Data Encryption Standard (DES), A DES Example, The strength of DES, Block cipher design principles. **TEXT BOOK: Chapter 1: 1.8 Chapter 3: 3.1, 3.2, 3.5 Chapter 4: 4.1, 4.2, 4.3, 4.4, 4.5**
MODULE-2 8 Hours
Pseudorandom number Generators: Linear Congruential Generators, Blum Blum Shub Generator. Public key cryptography and RSA: Principles of public key cryptosystems-Public key cryptosystems, Applications for public key cryptosystems, Requirements for public key cryptography, Public key Cryptanalysis, The RSA algorithm: Description of the Algorithm, Computational aspects, The Security of RSA. Diffie-Hellman key exchange: The Algorithm, Key exchange Protocols, Man-in-the-middle Attack. **TEXT BOOK: Chapter 8: 8.2 Chapter 9: 9.1, 9.2 Chapter 10: 10.1**
MODULE-3 8 Hours
Applications of Cryptographic Hash functions, Two simple Hash functions, Key management and distribution: Symmetric key distribution using symmetric encryption, Symmetric key distribution using asymmetric encryption, Distribution of public keys, X.509 Certificates, Public Key Infrastructures. **TEXT BOOK: Chapter 11: 11.1, 11.2 Chapter 14: 14.1, 14.2, 14.3, 14.4, 14.5**
MODULE-4 8 Hours
User Authentication: Remote user authentication principles, Kerberos, Remote user authentication using asymmetric encryption. Web security consideration, Transport layer security. Email Threats and comprehensive email security, S/MIME, Pretty Good Privacy. **TEXT BOOK: Chapter 15: 15.1, 15.3, 15.4 Chapter 17: 17.1, 17.2 Chapter 19: 19.3, 19.4, 19.5**
MODULE-5 8 Hours
Domainkeys Identified Mail. IP Security: IP Security overview, IP Security Policy, Encapsulating Security Payload, Combining security associations, Internet key exchange. **TEXT BOOK: Chapter 19: 19.9 Chapter 20: 20.1, 20.2, 20.3, 20.4, 20.5**
Course outcomes (Course Skill Set):

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

CO1: Understand the basic concepts of Cryptography, Security aspects and Classical encryption techniques.

CO2: Apply Cryptographic Algorithms for different applications.

CO3: Illustrate Cryptographic Hash functions, key management, key distribution and Certificates.

CO4: Analyze different methods for authentication and access control.

CO5: Develop IP Security mechanisms in the application areas of Electronic mail and Web services.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment, Test component, there are 25 marks.
- The first test will be administered after 40-50% of the syllabus has been covered, and the second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment. Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (duration 03 hours).

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored shall be proportionally reduced to 50 marks.

Suggested Learning Resources:

Text Book:

William Stallings, "Cryptography and Network Security", Pearson Publication, Seventh Edition.

References:

1. Keith M Martin, “Everyday Cryptography”, Oxford University Press.

2. V.K Pachghare, “Cryptography and Network Security”, PHI, 2nd Edition.

Web links and Video Lectures (e-Resources):

- https://auece.digimat.in/nptel/courses/video/106105031/L25.html
- https://dituniversity.digimat.in/nptel/courses/video/106105031/L40.html
- http://kcl.digimat.in/nptel/courses/video/106105031/L39.html
- http://kcl.digimat.in/nptel/courses/video/106105031/L22.html

Activity Based Learning (Suggested Activities in Class)/ Practical Based Learning

- Group (2 students] programming assignment to implement Cryptographic Algorithms [25 marks]

Blockchain Technology		Semester	6
Course Code	24IC62	**CIE Marks**	50
Teaching Hours/Week (L:T:P: S)	(3:0:2:0)	**SEE Marks**	50
Total Hours of Pedagogy	40 hours Theory + 12 Lab slots	**Total Marks**	100
Credits	04	**Exam Hours**	3
Examination nature (SEE)	Theory/Practical		

Prerequisite:

Course objectives:

- To understand basic concepts of blockchain.
- To provide knowledge about security mechanisms used in blockchain.
- To provide hands-on experience with the concepts.

Teaching-Learning Process (General Instructions):

1. **Interactive Learning:** Encouraging class participation through discussions, group activities, and question-answer sessions.
2. **Hands-on Experience:** Incorporating practical exercises, lab work, or coding tasks
3. **Use of Technology:** Employing e-resources, simulations, and other digital tools to enhance learning.
4. **Peer Learning:** Promoting collaborative learning through peer reviews and group assignments.

MODULE-1 **8 Hours**

Blockchain: Distributed systems, CAP theorem, Byzantine Generals problems, Consensus, Introduction to blockchain, various technical definitions of blockchains, Generic elements of a blockchain, The history of blockchain, Features of a blockchain, Applications of blockchain technology, Tiers of blockchain technology, Types of Blockchain Consensus in blockchain, CAP theorem and blockchain, Benefits and limitations of blockchain.

TEXT BOOK: Chapter 1, Pg. No.: 10-32

MODULE-2 **8 Hours**

Decentralization: Decentralization using blockchain, Blockchain and full ecosystem decentralization -Smart contract, organizations, autonomous organizations, autonomous corporations, autonomous societies, Platforms, Methods and Applications of decentralization.

Cryptography and Technical Foundations: Mathematics, Cryptography, Cryptographic primitives: Symmetric cryptography, DES, AES.

TEXT BOOK: Chapter 2: Pg. No.: 34-37, 40-48 & Ch3: Pg. No.: 51-53, 56-63

MODULE-3 **8 Hours**

Cryptographic primitives: Asymmetric cryptography, Hash functions, Secure Hash Algorithms (SHAs), Merkle trees, Patricia trees, Distributed hash tables (DHTs), Digital signatures. Public and private keys- RSA.
TEXT BOOK: Chapter 3: Pg. No.: 65-78, 87-98

MODULE-4 **8 Hours**

Bitcoin: Bitcoin definition, Transactions -life cycle, structure, Blockchain: The structure of a block, The structure of a block header, Wallets, Types of transaction
Smart Contracts: History, Definition, Ricardian contracts
TEXT BOOK: Chapter 4: Pg. No.: 112- 122, 127-129, 145-148 & Ch6

MODULE-5 **8 Hours**

Ethereum 101: Introduction - Ethereum clients and releases, Ethereum blockchain, Elements of the Ethereum blockchain, Ethereum virtual machine (EVM)- Execution Environment, Accounts, Block, Ether, Messages, Mining, The Ethereum stack.
TEXT BOOK: Chapter 7: 210-227, 235-238, 244-254

PRACTICAL COMPONENT OF IPCC

Sl. NO	Experiments
1	Write a program to generate public and private key using OpenSSL.
2	Write a program to create a simple Blockchain using Python.
3	Develop and test smart contract on local Blockchain.
4	Develop and test smart contract on Ethereum test networks.
5	Design and develop Cryptocurrency for multiple user using python.
6	Write and deploy chain code in Hyperledger Fabric.
7	Write a smart contract using a solidity program to perform the balance transfer from contract to other accounts.
8	Write a program to perform token Creation and Management on Ethereum.
9	Setup Metamask in the System and Create a wallet in the Metamask with Test Network.
10	Develop a program to implement blockchain in Merkle Trees.
11	Create multiple accounts in metamask and perform the balance transfer between the accounts and describe the transaction specification.
12	Setup the Hyperledger Fabric Network with 2 Organizations 1 Peer Each in the system.

Course outcomes (Course Skill Set):
At the end of the course, the student will be able to:
CO1: Understand the blockchain terminologies with its applications.
CO2: Examine the decentralization methods and its applications using blockchain.
CO3: Illustrate Cryptographic primitives and Hash functions.
CO4: Analyse the technology of Bitcoin and its transactions in blockchain.
CO5: Apply ethical principles and demonstrate a private blockchain using Ethereum Tool.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

CIE for the theory component of the IPCC (maximum marks 50):

- IPCC means practical portion integrated with the theory of the course.
- CIE marks for the theory component are **25 marks** and that for the practical component is **25 marks**.
- 25 marks for the theory component are split into **15 marks** for two Internal Assessment Tests (Two Tests, each of 15 Marks with 01-hour duration, are to be conducted) and **10 marks** for other assessment methods mentioned in 22OB4.2. The first test at the end of 40-50% coverage of the syllabus and the second test after covering 85-90% of the syllabus.
- Scaled-down marks of the sum of two tests and other assessment methods will be CIE marks for the theory component of IPCC (that is for **25 marks**).
- The student has to secure 40% of 25 marks to qualify in the CIE of the theory component of IPCC.

CIE for the practical component of the IPCC.

- **15 marks** for the conduction of the experiment and preparation of laboratory record, and **10 marks** for the test to be conducted after the completion of all the laboratory sessions.
- On completion of every experiment/program in the laboratory, the students shall be evaluated including viva-voce and marks shall be awarded on the same day.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to **15 marks**.
- The laboratory test **(duration 02/03 hours)** after completion of all the experiments shall be conducted for 50 marks and scaled down to **10 marks**.
- Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IPCC for **25 marks**.
- The student has to secure 40% of 25 marks to qualify in the CIE of the practical component of the IPCC.SEE for IPCC.

SEE for IPCC

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course **(duration 03 hours)**

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.

3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored by the student shall be proportionally scaled down to 50 Marks

The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only. Questions mentioned in the SEE paper may include questions from the practical component.

Suggested Learning Resources:

Text Book:

Imran Bashir, "Mastering Blockchain", Packt, 2017.

References:

1. Mastering Bitcoin: Programming the Open Blockchain Paperback-2017 by Andreas M. O'rielly.
2. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder. Bitcoin and cryptocurrency technologies: a comprehensive introduction. Princeton University Press, 2016.

Web links and Video Lectures (e-Resources):

- https://www.youtube.com/watch?v=6WG7D47tGb0
- https://www.youtube.com/watch?v=3681ZYbDSSk
- https://www.youtube.com/watch?v=3xGLc-zz9cA
- https://www.youtube.com/watch?v=aTDGJ4FSF8I
- https://www.youtube.com/watch?v=FEfLNYedUXc

Activity Based Learning (Suggested Activities in Class)/ Practical Based Learning

1. Develop a blockchain application for real-world use cases. - 5 marks
2. Write a code to create a genesis block. - 5 marks

Advanced Network Security Lab		Semester	6
Course Code	24ICL63	**CIE Marks**	50
Teaching Hours/Week (L: T: P: S)	0:0:2:0	**SEE Marks**	50
Credits	01	**Total Marks**	100
Contact Hours	24	**Exam Hours**	3
Examination type (SEE)	Practical		

Prerequisites:

Students enrolling in this laboratory course should have:

- **Fundamental knowledge of Computer Networks**
  1. Understanding of IP addressing, subnetting
  2. Basic knowledge of TCP/IP model and OSI model
  3. Familiarity with ports and common network protocols (HTTP, HTTPS, FTP, DNS, SMTP, SSH)
- **Basic Operating System Knowledge**
  1. Working knowledge of Linux and Windows operating systems
  2. File system structure and user management concepts
- **Command-Line Proficiency**
  1. Basic Linux commands (ls, cd, chmod, grep, netstat, ping, etc.)
  2. Basic Windows command prompt usage
- **Introductory Cyber Security Concepts**
  1. Understanding of malware, phishing, firewall, IDS/IPS
  2. Awareness of basic attack types and security principles
- **Virtualization Concepts**
  1. Knowledge of Virtual Machines (VMware / VirtualBox)
  2. Basic idea of network simulation environments
- **Basic Programming/Scripting Knowledge (Desirable but Optional)**
  1. Basic understanding of Python / Shell scripting
  2. Familiarity with simple cryptographic implementations

Course Objectives:

This course is designed to provide hands-on experience in advanced network security concepts, tools, and techniques. Upon completion of the course, students will be able to:

CO1: Identify and explain key cybercrime terminologies, concepts, and perspectives related to cyber security and cyber law.

CO2: Analyse different types of cyber offenses and assess their technical, social, and legal implications.

CO3: Apply appropriate tools and techniques commonly used in cybercrime investigation, penetration testing, and security analysis.

CO4: Demonstrate the fundamental principles and practices of computer forensics for digital evidence collection, preservation, and analysis.

CO5: Install, configure, and utilize Kali Linux and related security tools to perform controlled cyber security experiments and vulnerability assessments.

Teaching-Learning Process (General Instructions)

These are sample Strategies that teachers can use to accelerate the attainment of the various course outcomes.

1. Demonstration based teaching
2. ICT based learning using Simulation and Tools
3. Problem Based Learning

S. No	Experiments
1.	Design and implement a host-based firewall to filter network traffic based on IP addresses, ports, and protocols.
2.	Install, configure, and perform intrusion detection using an Intrusion Detection System (IDS).
3.	Develop a program to implement symmetric and asymmetric cryptographic algorithms and analyse their performance.
4.	Design and configure a secure Virtual Private Network (VPN) and verify encrypted data transmission.
5.	Configure and test secure network communication using TLS and IPsec protocols.
6.	Simulate a Distributed Denial-of-Service (DDoS) attack in a controlled environment and perform mitigation techniques.
7.	Design and deploy a Public Key Infrastructure (PKI) for secure certificate-based authentication.
8.	Configure and secure a wireless network using WPA3 and analyze potential wireless vulnerabilities.

9.	Perform penetration testing to identify vulnerabilities in network devices using scanning and enumeration techniques.
10..	Design and implement an Intrusion Prevention System (IPS) to detect and block malicious network traffic.
11.	Simulate a Man-in-the-Middle (MITM) attack and implement countermeasures to prevent traffic interception.
12.	Perform network traffic capture and analysis to detect anomalies and suspicious activities.

Course outcomes (Course Skill Set):

At the end of the course, students will be able to:

CO1: Explain fundamental cybercrime terminologies and demonstrate basic usage of Kali Linux tools.

CO2: Analyze various cyber offenses, botnet operations, and common network-based attacks in controlled environments.

CO3: Apply security tools and techniques such as firewall configuration, IDS/IPS deployment, VPN setup, and penetration testing for securing networks.

CO4: Perform simulated attacks (e.g., DDoS, MITM, phishing) ethically in a lab environment and implement appropriate countermeasures.

CO5: Conduct digital forensic investigation tasks including packet capture, traffic analysis using Wireshark, and secure evidence handling procedures.

Assessment Details (both CIE and SEE):

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

CIE marks for the practical course are 50 Marks.
The split-up of CIE marks for record/ journal and test are in the ratio 60:40.

- Each experiment is to be evaluated for conduction with an observation sheet and record write-up.
- Rubrics for the evaluation of the journal/write-up for hardware/software experiments are

designed by the faculty who is handling the laboratory session and are made known to students at the beginning of the practical session.

- Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.
- Total marks scored by the students are scaled down to 30 marks (60% of maximum marks).
- Weightage to be given for neatness and submission of record/write-up on time.
- Department shall conduct a test of 100 marks after the completion of all the experiments listed in the syllabus.
- In a test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce.
- The suitable rubrics can be designed to evaluate each student's performance and learning ability.
- The marks scored shall be scaled down to 20 marks (40% of the maximum marks).

The Sum of scaled-down marks scored in the report write-up/journal and marks of a test is the total CIE marks scored by the student.

Semester-End Examination:

- SEE marks for the practical course are 50 Marks.
- SEE shall be conducted jointly by the two examiners of the same institute, examiners are appointed by the Head of the Institute.
- The examination schedule and names of examiners are informed to the university before the conduction of the examination. These practical examinations are to be conducted between the schedule mentioned in the academic calendar of the University.
- All laboratory experiments are to be included for practical examination.
- (Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners. OR based on the course requirement evaluation rubrics shall be decided jointly by examiners.
- Students can pick one question (experiment) from the questions lot prepared by the examiners jointly.
- Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.

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

Change of experiment is allowed only once and 15% of Marks allotted to the procedure part are to be made zero. The minimum duration of SEE is 02 hours.

Suggested Learning Resources:

Books:

- **William Stallings**, *Network Security Essentials: Applications and Standards*, Pearson Education.
- **Charles P. Pfleeger & Shari Lawrence Pfleeger**, *Security in Computing*, Pearson Education.
- **Michael T. Simpson**, *Hands-On Ethical Hacking and Network Defense*, Cengage Learning.
- **Bill Nelson, Amelia Phillips & Christopher Steuart**, *Guide to Computer Forensics and Investigations*, Cengage Learning.
- **Jon Erickson**, *Hacking: The Art of Exploitation*, No Starch Press.
- **OccupyTheWeb**, *Linux Basics for Hackers*, No Starch Press.

Web links and Video Lectures (e-Resources):

- **Kali Linux Official Documentation**
  https://www.kali.org/docs/
- **OWASP (Open Web Application Security Project)**
  https://owasp.org
- **Wireshark Official Documentation**
  https://www.wireshark.org/docs/
- **NPTEL – Cyber Security Courses**
  https://nptel.ac.in
- **MIT OpenCourseWare – Computer & Network Security**
  https://ocw.mit.edu
- **EC-Council Learning Resources (Ethical Hacking)**
  https://www.eccouncil.org
- **Cisco Networking Academy – Cybersecurity Courses**
  https://www.netacad.com
- **SANS Reading Room (Security Research Papers)**
  https://www.sans.org/reading-room/

RESEARCH METHODOLOGY& IPR		Semester	6
Course Code	24IC64	**CIE Marks**	50
Teaching Hours/Week (L: T: P)	3:0:0	**SEE Marks**	50
Credits	03	**Total Marks**	100
Contact Hours	40	**Exam Hours**	3
Examination type (SEE)	Theory		

Prerequisites:

The students should have knowledge on;

- Understanding of your **core subject/discipline** (Engineering, Science, Commerce, Arts, etc.)
- Familiarity with **technical terminology** of your field
- Ability to read and understand **academic papers or textbooks**

Course Objectives:

- To understand the knowledge on basics of research and its types.
- To learn the concept of Literature Review, Technical Reading, Attributions and Citations.
- To learn Ethics in Engineering Research.
- To discuss the concepts of Intellectual Property Rights in engineering.
- To understand legal and ethical responsibilities in research

Teaching-Learning Process (General Instructions)

1. Lecture method (L) need not be only a traditional lecture method; alternative effective teaching methods may be adopted to attain the outcomes.
2. Use of video/animation to explain the functioning of various concepts.
3. Encourage collaborative (group learning) in the class.
4. Ask at least three HOT (Higher Order Thinking) questions in the class to promote critical thinking.
5. Adopt Problem Based Learning (PBL) to foster students' analytical and design thinking skills such as designing, evaluating, generalizing, and analyzing information rather than simple recall.
6. Use animations/videos to help students understand concepts.
7. Demonstrate concepts using a suitable programming language.

Module-1 **8 Hours**

Introduction: Meaning of Research, Objectives of Engineering Research, and Motivation in Engineering Research, Types of Engineering Research, Finding and Solving a Worthwhile Problem.

Ethics in Engineering Research, Ethics in Engineering Research Practice, Types of Research Misconduct, Ethical Issues Related to Authorship.
Text Book:1, Chapter-1

Module-2 **8 Hours**

Literature Review and Technical Reading, New and Existing Knowledge, Analysis and Synthesis of Prior Art Bibliographic Databases, Web of Science, Google and Google Scholar, Effective Search: The Way Forward Introduction to Technical Reading Conceptualizing Research, Critical and Creative Reading, Taking Notes While Reading, Reading Mathematics and Algorithms, Reading a Datasheet.
Text Book:1, Chapter-2

Attributions and Citations: Giving Credit Wherever Due, Citations: Functions and Attributes, Impact of Title and Keywords on Citations, Knowledge Flow through Citation, Citing Datasets, Styles for Citations, Acknowledgments and Attributions, What Should Be Acknowledged, Acknowledgments in, Books Dissertations, Dedication or Acknowledgments.
Text Book:1, Chapter-3

Module-3 **8 Hours**

Introduction To Intellectual Property: Role of IP in the Economic and Cultural Development of the Society, IP Governance, IPasa Global Indicator of Innovation, Origin of IP History of IP in India. Major Amendments in IP Laws and Acts in India. **Text Book:1, Chapter-4**

Patents: Conditions for Obtaining a Patent Protection, To Patent or Not to Patent an Invention. Rights Associated with Patents. Enforcement of Patent Rights. Inventions Eligible for Patenting. Non-Patentable Matters. Patent In fringements. Avoid Public Disclosure of an Invention before Patenting. Process of Patenting.

Text Book:1, Chapter-5

Process of Patenting. Prior Art Search. Choice of Application to be Filed. Patent Application Forms. Jurisdiction of Filing Patent Application. Publication. Pre-grant Opposition. Examination. Grant of a Patent. Validity of Patent Protection. Post-grant Opposition. Commercialization of a Patent. Need for a Patent Attorney/Agent. Can a Worldwide Patent be Obtained? Do I Need First to File a Patent in India? Patent Related Forms. Fee Structure. Types of Patent Applications. Commonly Used Terms in Patenting. National Bodies Dealing with Patent Affairs. Utility Models.
Text Book:1, Chapter-6

Module-4 **8 Hours**

Copyrights and Related Rights: Classes of Copyrights. Criteria for Copyright. Ownership of Copyright. Copyrights of the Author. Copyright Infringements. Copyright Infringement is a Criminal Offence. Copyright Infringement is a Cognizable Offence. Fair Use Doctrine. Copyrights and Internet. Non-Copyright Work. Copyright Registration. Judicial Powers of the Registrar of Copyrights. Fee Structure. Copyright Symbol.

Validity of Copyright. Copyright Profile of India. Copyright and the word 'Publish'. Transfer of Copyrights to a Publisher. Copyrights and the Word 'Adaptation'. Copyrights and the Word 'Indian Work'. Joint Authorship. Copyright Society. Copyright Board. Copyright Enforcement Advisory Council (CEAC). International Copyright Agreements, Conventions and Treaties. Interesting Copyrights Cases.

Text Book:1, Chapter-7

Trademarks: Eligibility Criteria. Who Can Apply for a Trademark? Act sand Laws. Designation of Trademark Symbols. Classification of Trademarks. Registration of a Trademark is Not Compulsory. Validity of Trademark. Types of Trademark Registered in India. Trademark Registry. Process for Trademarks

Registration. Prior Art Search. Famous Case Law: Coca-Cola Company vs. Bisleri International Pvt. Ltd.

Text Book:1, Chapter-8

Module-5 **8 Hours**

Industrial Designs: Eligibility Criteria. Acts and Laws to Govern Industrial Designs. Design Rights. Enforcement of Design Rights. Non-Protectable Industrial Designs India. Protection Term. Procedure for Registration of Industrial Designs. Prior Art Search. Application for Registration. Duration of the Registration of a Design. Importance of Design Registration. Cancellation of the Registered Design. Application Forms. Classification of Industrial Designs. Designs Registration Trend in India. International Treaties. Famous Case Law: Apple Inc. vs. Samsung Electronics Co.

Text Book:1, Chapter-9

Geographical Indications: Acts, Laws and Rules Pertaining to GI. Ownership of GI. Rights Granted to the Holders. Registered GI in India. Identification of Registered GI. Classes of GI. Non- Registerable GI. Protection of GI. Collective or Certification Marks. Enforcement of GI Rights. Procedure for GI Registration Documents Required for GI Registration. GI Ecosystem in India.

Text Book:1, Chapter-10

Case Studies on Patents. Case study of Curcuma (Turmeric) Patent, Case study of Neem Patent, Case study of Basmati patent. **IP Organizations In India. Schemes and Programmes**

Text Book:1, Chapter-11

Course outcomes(Course Skill Set):

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

CO1: To know the meaning of engineering research.

CO2: To know the procedure of the literature Review and Technical Reading

CO3: To understand the fundamentals of the patent laws and drafting procedure

CO4: Understand the copy right laws and subject matters of copyrights and designs

CO5: Understanding the basic principles of design rights

Assessment Details (both CIE and SEE)

The weight age of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks).A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination)taken together.

Continuous Internal Evaluation(CIE):

● For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.

● The first test will be administered after 40-50% of the syllabus has been covered, and the second test will be administered after 85-90% of the syllabus has been covered

● Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.

● For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.

Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination: Theory SEE will be conducted as per the scheduled timetable, with common question papers for the course (**duration 03 hours).**

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module. Marks scored shall be proportionally reduced to 50 marks

Suggested Learning Resources:

Textbook:

1. Dr. Santosh M Nejakar, Dr. Harish Bendigeri "Research Methodology and Intellectual Property Rights", ISBN978-93-5987-928-4, Edition: 2023-24.

Reference Book:

1. **1** David V. Thiel "Research Methods for Engineers" Cambridge University Press, 978-1-107-03488-4
2. Intellectual Property Rights by N.K.Acharya Asia Law House 6th Edition.ISBN:978-93-81849-30-9

Activity Based Learning (Suggested Activities in Class)/Practical Based Learning

- Quizzes
- Assignments
- Seminars

Cyber Forensics		Semester	6
Course Code	24IC65A	**CIE Marks**	50
Teaching Hours/Week (L: T: P: S)	4:0:0:0	**SEE Marks**	50
Total Hours of Pedagogy	50	**Total Marks**	100
Credits	04	**Exam Hours**	3
Examination Nature (SEE)	Theory		

Prerequisite:

Course objectives:

- Understand the principles and processes of cyber forensics.
- Gain expertise in operating system forensics.
- Explore specialized forensic domains like mobile devices, cloud environments, and malware.
- Investigate forensic techniques for web attacks, emails, and solid-state devices.
- Learn legal and technical aspects of cyber forensics.

These are sample strategies; which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) does not mean only the traditional lecture method, but different types of teaching methods may be adopted to achieve the outcomes.
2. Utilize video/animation films to illustrate the functioning of various concepts.
3. Promote collaborative learning (Group Learning) in the class.
4. Pose at least three HOT (Higher Order Thinking) questions in the class to stimulate critical thinking.
5. Incorporate Problem-Based Learning (PBL) to foster students' analytical skills and their ability to evaluate, generalize, and analyse information rather than merely recalling it.
6. Introduce topics through multiple representations.
7. Demonstrate various ways to solve the same problem and encourage students to devise their own creative solutions.
8. Discuss the real-world applications of every concept to enhance student's comprehension.
9. Use any of these methods: Chalk and board, Active Learning, Case Studies.

MODULE-1 — 10 Hours

Introduction to Digital Forensics

Definition of Digital Forensics, Goals of Digital Forensics, Cybercrime, Cybercrime Attack Modes, Use of Computers in Cybercrime, Examples of Cybercrime, Categories of Digital Forensics, Users of Digital Forensics, Types of Investigations, Forensic Readiness, Importance of Forensic Readiness Digital Evidence, Types of Digital Evidence, Locations of Digital Evidence, Challenges in Evidence Acquisition, Digital Forensic Examination Process, Chain of Custody.

TEXT BOOK: Chapter 1, Pg. No.: 1 – 26

MODULE-2	10 Hours
Computer & File System Forensics Data Representation, Character Encoding, File Structure, File Metadata, Hashing & Integrity, Memory Types, Storage Media Types, Hidden Areas (HPA, DCO), NTFS File System, FAT File System. Volatile Data Acquisition, Non-volatile Data Acquisition, Disk Imaging. **TEXT BOOK: Chapter 2, Pg. No.: 10 -32, Chapter 5, Pg.No.:114 -124,135 -137**	
MODULE-3	**10 Hours**
Forensic Process & Legal Handling Search and Seizure, Consent to Search, Subpoena, Search Warrant, First Responder Toolkit, First Responder Tasks, Order of Volatility, Documenting the Crime Scene, Packaging & Transporting. **TEXT BOOK: Chapter 4, Pg. No.: 94 - 106**	
MODULE-4	**10 Hours**
Windows, Web & Email Forensics Windows Registry Analysis, Timeline Analysis, Prefetch Files, LNK Files, Windows Event Logs, Web Browser Forensics, Browser Artifacts, Email Forensics, Email Communication Process, Email Protocols, Email Header Analysis. **TEXT BOOK: Chapter 7, Pg. No.: 173 -203, Chapter 8 ,Pg. No.: 205 –220**	
MODULE-5	**10 Hours**
Anti-Forensics, OSINT & Reporting Anti-forensics Overview, Classification of Anti-forensics, Steganography, Data Destruction Encryption, Anonymity Techniques, Attacks on Forensic Tools, OSINT Overview, OSINT Categories, OSINT Cycle, OSINT Challenges, Digital Forensic Report, Automated Reporting. **TEXT BOOK: Chapter 9, Pg. No.: 221 –245, Chapter 10 ,Pg. No.: 247 –268, Chapter 11 ,Pg. No.: 270 –285**	
Course outcome (Course Skill Set): At the end of the course, the student will be able to: CO1: Understand cybercrimes and digital evidence concepts CO2: Analyse computer, network, and mobile data CO3: Apply forensic investigation procedures CO4: Use forensic tools for cybercrime investigation CO5: Interpret legal and ethical issues in cyber forensics	
Suggested Learning Resources: **Text Book 1. Digital Forensics Basics: A Practical Guide Using Windows OS**, by Nihad A Hassan New York, New York, USA, ISBN-13 (pbk): 978-1-4842-3837-0, ISBN-13 (electronic): 978-1-4842-3838-7	

References:

- **Cyber Forensics** by Albert J. Marcella Jr. & Doug Menendez, CRC Press/Auerbach, ISBN: 978-0849383281.
- **Digital Forensics and Cyber Crime** by Eoghan Casey, Academic Press (Elsevier), ISBN: 978-0123742681.
- **Guide to Computer Forensics and Investigations** by Bill Nelson, Amelia Phillips & Christopher Steuart, Cengage Learning, ISBN: 978-1284075091.
- **Cyber Crime and Cyber Law** by Pavan Duggal, Oxford University Press, ISBN: 978-0199491600.

Web links and Video Lectures (e-Resources):

- https://www.youtube.com/watch?v=vD7uJ8aP0zA
- https://www.youtube.com/watch?v=u2zgEFm5RHQ
- https://www.youtube.com/watch?v=eekzaI0UFDA
- https://www.youtube.com/watch?v=JNIUeGMax-U
- https://www.youtube.com/watch?v=W14c4iO0QxI
- https://www.youtube.com/playlist?list=PLJu2iQtpGvv-2LtysuTTka7dHt9GKUbxD

Activity Based Learning (Suggested Activities in Class)/ Practical Based Learning

- Preparing legally admissible forensic reports and address challenges in cryptocurrency and cyber law
- Assignment

IoT Penetration Testing		Semester	6
Course Code	24IC65B	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	(4:0:0:0)	SEE Marks	50
Total Hours of Pedagogy	50	Total Marks	100
Credits	04	Exam Hours	03
Examination nature (SEE)	Theory		

Prerequisite:

- Computer Networks
- Operating Systems
- Programming Fundamentals
- CyberSecurity Basics
- Web Technologies
- Fundamentals of IoT

Course objectives:

- Understand IoT architecture, protocols, and attack surfaces
- Identify vulnerabilities in IoT devices, networks, and cloud layers
- Apply penetration testing methodologies specific to IoT ecosystems
- Analyze firmware, hardware, and communication security issues
- Use industry tools for IoT security assessment and reporting

Teaching-Learning Process (General Instructions):

These are sample strategies; which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) does not mean only the traditional lecture method, but different types of teaching methods may be adopted to achieve the outcomes.
2. Utilize video/animation films to illustrate the functioning of various concepts.
3. Promote collaborative learning (Group Learning) in the class.
4. Pose at least three HOT (Higher Order Thinking) questions in the class to stimulate critical thinking.
5. Incorporate Problem-Based Learning (PBL) to foster students' analytical skills and develop their ability to evaluate, generalize, and analyze information rather than merely recalling it.
6. Introduce topics through multiple representations.
7. Demonstrate various ways to solve the same problem and encourage students to devise their own creative solutions.
8. Discuss the real-world applications of every concept to enhance students' comprehension.
9. Use any of these methods: Chalk and board, Active Learning, Case Studies.

MODULE-1

10 Hours

Introduction to IoT Security & Threat Landscape: Overview of IoT ecosystem (Devices, Gateways, Cloud) , IoT architecture and communication models, IoT protocols: MQTT, CoAP, HTTP, Zigbee, BLE , IoT threat landscape and attack surfaces, OWASP IoT Top 10 vulnerabilities, Risk assessment in IoT environments

Textbook 1: Chapter 1,2,3

MODULE-2

10 Hours

IoT Device and Hardware Security Testing: IoT hardware components and interfaces, Firmware extraction and analysis basics, Debugging interfaces: UART, JTAG, Hardware-based attacks ,Secure boot and device authentication ,Reverse engineering of IoT devices

Textbook 1: Chapter 4,5,6

MODULE-3

10 Hours

Network and Communication Penetration Testing: IoT network architecture and traffic analysis ,Sniffing and interception techniques ,Attacks on wireless protocols (Wi-Fi, BLE, Zigbee) ,Man-in-the-Middle (MITM) attacks ,Replay and spoofing attacks ,Secure communication practices

Textbook 1: Chapter 7,8

MODULE-4

10 Hours

Cloud, API, and Application Layer Testing: IoT cloud platforms and security concerns ,API security testing , Mobile app interaction with IoT devices ,Web interface vulnerabilities in IoT dashboards ,Data storage and privacy issues ,Cloud misconfiguration risks

Textbook 2: Chapter 6,7,8

MODULE-5

10 Hours

IoT Penetration Testing Methodology & Tools: IoT penetration testing lifecycle, Reconnaissance and footprinting for IoT , Vulnerability scanning and exploitation techniques, Tools-Firmware analysis tools, Network analyzers (Wireshark),IoT-specific tools (Firmwalker, Binwalk, Shodan)

Textbook 2: Chapter 1,2,3,4

Course outcome (Course Skill Set):

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

CO1: Explain IoT architecture and identify potential security threats
CO2: Analyze vulnerabilities in IoT devices and embedded systems
CO3: Perform network-level penetration testing in IoT environments
CO4: Evaluate security of IoT cloud platforms and APIs
CO5: Apply penetration testing tools and methodologies to secure IoT systems

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment
  Test component, there are 25 marks.
- The first test will be administered after 40-50% of the syllabus has been covered, and the second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment. Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for
the course (duration 03 hours).

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored shall be proportionally reduced to 50 marks.

Suggested Learning Resources:

Text Books:

1. **Practical IoT Hacking"** – Fotios Chantzis, Ioannis Stais
2. **"IoT Penetration Testing Cookbook"** – Aaron Guzman, Aditya Gupta

Reference Books

1. The Internet of Things: Key Applications and Protocols"- Olivier Hersent
2. "Security in Computing and IoT"

Web links and Video Lectures (e-Resources):

- https://owasp.org/www-project-internet-of-things
- https://www.iotpentestingguide.com
- https://owasp.org/www-project-internet-of-things

Activity Based Learning (Suggested Activities in Class)/ Practical Based Learning

- Group(4 students) to perform hands-on activities like basic IoT device scanning, traffic monitoring using Wireshark, and identifying common vulnerabilities through guided step-by-step exercises.

IoT Automation		Semester	6
Course Code	24IC65C	**CIE Marks**	50
Teaching Hours/Week (L: T:P: S)	4:0:0:0	**SEE Marks**	50
Total Hours of Pedagogy	50	**Total Marks**	100
Credits	04	**Exam Hours**	03
Examination type (SEE)	Theory		

PREREQUISITES

Students should have basic knowledge of:

- **Fundamentals of IoT**
  IoT architecture, sensors, actuators, communication protocols.
- **Industrial Automation**
  Basics of DCS, SCADA, PLC systems.
- **Computer Networks**
  TCP/IP, Cloud computing, Edge computing concepts.
- **Embedded Systems**
  Microcontrollers and interfacing.
- **Cyber Security Basics**
  Authentication, encryption, secure communication.
- **Control Systems**
  Basic feedback and automation principles.

Course objectives:

CLO1: Understand the evolution of industrial automation from traditional systems to modern IoT and System of Systems (SoS) architectures

CLO2 : Grasp the foundational concepts of Local Automation Clouds, including their properties, establishment and application engineering

CLO3: Study engineering methodologies for designing and implementing IoT automation systems

CLO4: Learn application automation systems for complex industrial and societal Challenges

Teaching-Learning Process (General Instructions)

These are sample strategies; which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) does not mean only the traditional lecture method, but different types of teaching methods may be adopted to achieve the outcomes.
2. Utilize video/animation films to illustrate the functioning of various concepts.
3. Promote collaborative learning (Group Learning) in the class.
4. Pose at least three HOT (Higher Order Thinking) questions in the class to stimulate critical thinking.
5. Incorporate Problem-Based Learning (PBL) to foster students' analytical skills and develop their ability to evaluate, generalize, and analyze information rather than merely recalling it.
6. Introduce topics through multiple representations.
7. Demonstrate various ways to solve the same problem and encourage students to devise their own creative solutions.
8. Discuss the real-world applications of every concept to enhance students' comprehension.

Use any of these methods: Chalk and board, Active Learning, Case Studies.

Module-1 **10 Hours**

Towards Industrial and Societal Automation and Digitization: The Need of New Technology, From DCS and SCADA to IoT and System of Systems, Automation System Architectures, Current Trends in Automation Systems, Future Automation System Requirements, Next Generation Automation and Digitization Technology-IoT and SoS, The Local Automation Cloud Approach.

Local Automation Clouds: The Local Cloud Concept, Local Cloud Properties, Local Cloud Establishment, Automation Support, Automation Application Engineering in Local Clouds, Latency in Local Clouds, Security in Local Clouds, SoS Scalability.

Textbook: Ch. 1.1-1.7, Ch. 2.1-2.8

Module-2 **10 Hours**

Engineering of IoT Automation Systems: Introduction, Component-based Engineering Methodology, Safety and Security Engineering of IoT Automation Systems, Engineering

Scenarios: Efficient Deployment of a Large Number of IoT Sensors, Swift Deployment and Configuration.

Textbook: Ch. 6.1, 6.3, 6.4, 6.5.1, 6.5.2

Module-3 **10 Hours**

Application System Design–Energy Optimization: Introduction, Market as an Energy Optimizing Method, Optimizations Based on a Virtual Market of Energy, Energy Optimization on Lifts, Context Aware Streets, Optimization of Municipal Service Systems.

Textbook: Ch. 7.1-7.7

Module-4 **10 Hours**

Application System Design-Complex Systems Management and Automation: Introduction, Vision from an Automation Perspective, Electromobility Systems of Systems, Electric Vehicles and Recharge Infrastructure, Arrowhead SOA EM Solution, Systems and Services, Arrowhead EM Services and Related Automation Aspects, Co-simulation Platform.

Textbook: Ch. 9.1-9.9

Module-5 **10 Hours**

Application System Design-High Security: Introduction, Smart Maintenance Use Case, Authentication and Certification Service, ISO/IEC 20922 Support for the Smart Service Architecture, Safety and Security Analysis for Identifying System Vulnerabilities.
Application System Design-Smart Production: Automotive Manufacturing, Manufacturing of Electrical Cabinets, Asset localization in Mines.
Textbook 1: Ch 10.1-10.5, Ch 11.1-11.3

Course Outcomes (Course Skill Set)

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

1. Compare traditional automation architectures (DCS, SCADA) and modern approaches like IoT and System of Systems (SoS). (PO: 1, 2, 5)
2. Explain the architecture and functionalities of Local Automation Clouds to evaluate their applicability and limitations in various automation contexts. (PO: 1, 2)
3. Develop strategies for the safe and secure engineering of IoT automation systems, including efficient deployment and configuration of sensors and devices. (PO: 2, 3, 4)
4. Identify solutions for energy optimization in industrial and urban environments by applying concepts like virtual energy markets and context-aware systems. (PO: 2, 3, 6, 7)
5. Outline case studies related to complex systems management and high-security Automation etc., demonstrating the ability to integrate advanced automation concepts for real-world problems. (PO: 1, 2, 6)

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
- The first test will be administered after 40-50% of the syllabus has been covered, and the second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods shall be planned, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.

Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours).**

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored shall be proportionally reduced to 50 marks

Suggested Learning Resources:

Text Book:

1. Jerker Delsing, "IoT Automation: Arrowhead Framework", CRC Press, Taylor & Francis Group.

Reference Books:

1. The Internet of Things in the Industrial Sector, Mahmood, Zaigham (Ed.)(Springer Publication).
2. Industrial Internet of Things: Cyber manufacturing System, Sabina Jeschke, Christian Brecher, Houbing Song, Danda B. Rawat (Springer Publication).

Web links and Video Lectures (e-Resources):
• https://www.youtube.com/watch?v=HmbUJEShA-8 • https://www.youtube.com/watch?v=eidD14dXW8s • https://www.udemy.com/course/iot-internet-of-things-automation-with-esp8266/?srsltid=AfmBOoqqKDLk_fKye1CPIO9QjctFfgHOf1F_Zkmtze8uNRUvmq_9s1-3 • https://onlinecourses.nptel.ac.in/noc20_cs69/preview
Activity Based Learning (Suggested Activities in Class)/ Practical Based learning • Course project (Group of two): Develop real-time applications of IoT Automation in various fields like home automation, healthcare, environmental monitoring, agriculture, smart cities etc. (25 marks)

Introduction to Data Structures		Semester	6
Course Code	24XX66X	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
Examination type (SEE)	Theory		

Prerequisites

1. Basic knowledge of C programming
2. Understanding of variables, data types, and operators
3. Knowledge of control statements (if, switch, loops)
4. Basic understanding of functions in C
5. Familiarity with arrays and simple problem-solving techniques

Course Objectives:

CLO1: Introduce primitive and non-primitive data structures
CLO2: Understand the various types of data structure along their operations
CLO3: Study various searching and sorting algorithms
CLO4: Assess appropriate data structures during program development / problem solving

Teaching-Learning Process (General Instructions)

These are sample strategies; which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) does not mean only the traditional lecture method, but different types of teaching methods may be adopted to achieve the outcomes.
2. Utilize video/animation films to illustrate the functioning of various concepts.
3. Promote collaborative learning (Group Learning) in the class.
4. Pose at least three HOT (Higher Order Thinking) questions in the class to stimulate critical thinking.
5. Incorporate Problem-Based Learning (PBL) to foster students' analytical skills and develop their ability to evaluate, generalize, and analyze information rather than merely recalling it.
6. Introduce topics through multiple representations.
7. Demonstrate various ways to solve the same problem and encourage students to devise their own creative solutions.
8. Discuss the real-world applications of every concept to enhance students' comprehension.
9. Use any of these methods: Chalk and board, Active Learning, Case Studies.

Module-1	8 Hours

Arrays: Introduction, One-Dimensional Arrays, Two-Dimensional Arrays, Initializing Two Dimensional Arrays, Multidimensional arrays. Pointers: Introduction, Pointer Concepts, Accessing Variables through Pointers, Pointer Applications, Dynamic Memory Allocation Functions. Structures and Unions: Introduction, Declaring Structures, Giving Values to Members, Structure Initialization, Comparison of Structure Variables, Arrays of Structures, Arrays within Structures, Nested Structures, Unions, Size of Structures.

Textbook 1: Ch. 8.1 to 8.5, Ch. 12.1 to 12.8, 12.10, 12.11. Textbook 2: Ch. 2.1 to 2.3, 2.5, 2.9.

Module-2	8 Hours

Stacks: Introduction, Stack Operations, Stack Implementation using Arrays, Applications of Stacks. Queues: Introduction, Queue Operations, Queue Implementation using Arrays, Different Types of Queues: Circular Queues, Double-Ended Queues, Priority Queues, Applications of Queues.
Textbook 2: Ch. 6.1 to 6.3, Ch. 8.1 to 8.2.

Module-3	8 Hours

Linked Lists: Introduction, Singly Linked List, Self-Referential Structures, Operations on Singly Linked Lists: Insert-Delete-Display, Implementation of Stacks and Queues using Linked List, Concatenate two Lists, Reverse a List without Creating a New Node, Static Allocation Vs Linked Allocation. Circular Singly Linked List: Introduction, Operations: Insert-Delete-Display.

Textbook 2: Ch. 9.1 to 9.2, 9.3 (Only 9.3.1 to 9.3.5, 9.3.11 to 9.3.12), 9.4 to 9.5.

Module-4	8 Hours

Trees: Introduction, Basic Concepts, Representation of Binary Trees, Operations on Binary Trees: Insertion-Traversals-Searching-Copying a Tree, Binary Search Trees, Operations on Binary Search Trees: Insertion-Searching-Find Maximum and Minimum Value-Count Nodes, Expression Trees.

Textbook 2: Ch. 10.1 to 10.4, 10.5 (Only 10.5.1, 10.5.2, 10.5.3.1, 10.5.3.2, 10.5.3.4), 10.6.3

Module-5	8 Hours

Sorting: Introduction, Bubble Sort, Selection Sort, Insertion Sort. Searching: Introduction, Linear Search, Binary Search.

Textbook 1: Ch. 17.1, 17.2.6, 17.3.2. Textbook 2: Ch. 11.1 to 11.3, 11.10.1.

Course outcome (Course Skill Set)

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

CO1: Develop C programs utilizing fundamental concepts such as arrays, pointers and structures.

CO2: Apply data structures like stacks and queues to solve problems.

CO3: Develop C programs using linked lists and their various types.

CO4: Explain the fundamental concepts of trees and their practical applications.

CO5: Demonstrate different sorting and searching algorithms and determine their algorithmic complexities.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
- The first test will be administered after 40-50% of the syllabus has been covered, and the second

test will be administered after 85-90% of the syllabus has been covered

● Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.

● For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.

Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (duration 03 hours).

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored shall be proportionally reduced to 50 marks.

Suggested Learning Resources:

Text Book:

1. E Balagurusamy, "C Programming and Data Structures", 4th Edition, McGraw-Hill, 2007
2. A M Padma Reddy, "Systematic Approach to Data Structures using C", 9th Revised Edition, Sri Nandi Publications, 2009.

Reference Books:

1. 1. Ellis Horowitz and Sartaj Sahni, "Fundamentals of Data Structures in C", 2nd Edition, Universities Press, 2014.
2. Seymour Lipschutz, "Data Structures Schaum's Outlines", Revised 1st Edition, McGraw-Hill, 2014.

Web links and Video Lectures (e-Resources):

- https://www.youtube.com/watch?v=DFpWCl_49i0
- https://www.youtube.com/watch?v=x7t_-ULoAZM
- https://www.youtube.com/watch?v=I37kGX-nZEI
- https://www.youtube.com/watch?v=XuCbpw6Bj1U
- https://www.youtube.com/watch?v=R9PTBwOzceo @#@10012025
- https://www.youtube.com/watch?v=qH6yxkw0u78
- https://archive.nptel.ac.in/courses/106/105/106105085/
- https://onlinecourses.swayam2.ac.in/cec19_cs04/preview

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Develop C programs that focus on Data Structure concepts such as arrays, pointers, structures, stacks, queues, linked lists, trees as well as, sorting and searching algorithms (25 Marks).

Fundamentals of Operating Systems		Semester	6
Course Code	24XX66X	**CIE Marks**	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	**SEE Marks**	50
Total Hours of Pedagogy	40	**Total Marks**	100
Credits	03	**Exam Hours**	03
Examination nature (SEE)	Theory		

Prerequisite:

Students should have basic knowledge of:

- Programming Fundamentals
- Data Structures
- Computer Organization Basics
- Discrete Mathematics (Introductory)

Course objectives:

- To demonstrate the need and different types of OS
- To discuss suitable techniques for management of different resources
- To analyse different memory, storage, and file system management strategies.

Teaching-Learning Process (General Instructions):

These are sample strategies; which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) does not mean only the traditional lecture method, but different types of teaching methods may be adopted to achieve the outcomes.
2. Utilize video/animation films to illustrate the functioning of various concepts.
3. Promote collaborative learning (Group Learning) in the class.
4. Pose at least three HOT (Higher Order Thinking) questions in the class to stimulate critical thinking.
5. Incorporate Problem-Based Learning (PBL) to foster students' analytical skills and develop their ability to evaluate, generalize, and analyze information rather than merely recalling it.
6. Introduce topics through multiple representations.
7. Demonstrate various ways to solve the same problem and encourage students to devise their own creative solutions.
8. Discuss the real-world applications of every concept to enhance students' comprehension.
9. Use any of these methods: Chalk and board, Active Learning, Case Studies.

MODULE-1 — 8 Hours

Introduction: What operating systems do; Computer System organization; Computer System Organization, Computer System architecture; Operating System operations; Resource Management

Operating System Structures: Operating System Servies, User and Operating System interface; System calls, Application Program Interface, Types of system calls;

Textbook 1: Chapter 1: 1.1, 1.2, 1.3,1.4, 1.5 Chapter 2: 2.1, 2.2 (2.2.1, 2.2.2), 2.3 (2.3.2, 2.3.3
MODULE-2 8 Hours
Process Management: Process concept; Process scheduling; Operations on processes; Interprocess Communication **Multi-threaded Programming**: Overview; Multithreading models, Thread Libraries **Textbook 1: Chapter 3: 3.1-3.4, Chapter 4: 4.1, 4.3 5, 4.4**
MODULE-3 8 Hours
CPU Scheduling: Basic Concepts, Scheduling criteria, Scheduling algorithms, Thread Scheduling, **Process Synchronization**: Synchronization: The critical section problem; Peterson's solution; Semaphores; Classical problems of synchronization; **Textbook 1: Chapter 5: 5.1, 5.2,5.3.1, 5.3.2, 5.3.3, 5.3.4, 5.4 Chapter 6: 6.1, 6.2.,6.3, 6.6**
MODULE-4 8 Hours
Deadlocks: System model; Deadlock characterization; Methods for handling deadlocks; Deadlock prevention; Deadlock avoidance; Deadlock detection and recovery from deadlock. **Memory Management:** Background; Contiguous memory allocation; Paging; Structure of page table **Textbook 1: Chapter 8: 8.1-8.8 Textbook 1: Chapter 9: 9.1-9.4 (9.4.1, 9.4.2)**
MODULE-5 8 Hours
Virtual Memory Management: Background; Demand paging; Copy-on-write; Page replacement; **File System Interface:** File concept; Access methods; Directory Structure, Protection, **File System Implementation:** File System Structure, File System Operations, File System Internals: File Systems, File System Mounting; Partition and Mounting, File sharing; **Textbook 1: Chapter 10: 10.1-10.3, 10.4 (10.4.1, 10.4.2, 10.4.4.) Chapter 13: 13.1, 13.2, 13.3 (13.3.1, 13.3.2, 13.3.3), 13.4 (13.4.1, 13.4.2) Chapter 15: 15.1-15.4**
Course outcome (Course Skill Set): At the end of the course, the student will be able to: 1. Explain the fundamentals of operating systems. 2. Apply appropriate CPU scheduling algorithm for the given scenarios. 3. Analyse the various techniques for process synchronization and deadlock handling. 4. Apply the various techniques for memory management **5.** Analyse the importance of File System Mounting and File Sharing
Suggested Learning Resources: **Text Books:**

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, Operating System Principles 10th edition, Wiley-India, 2015

Reference Books

1. Ann McHoes Ida M Fylnn, Understanding Operating System, Cengage Learning, 6th Edition, 2010
2. D.M Dhamdhere, Operating Systems: A Concept Based Approach 3rd Ed, McGrawHill, 2013, P.C.P. Bhatt, An Introduction to Operating Systems: Concepts and Practice 4th Edition, PHI(EEE), 2014.
3. William Stallings Operating Systems: Internals and Design Principles, 6th Edition, Pearson, 2008

Reference Books:

1. Akshay Kulkarni, Adarsha Shivananda, "Natural Language Processing Recipes - Unlocking Text Data with Machine Learning and Deep Learning using Python", Apress, 2019.
2. T V Geetha, "Understanding Natural Language Processing – Machine Learning and Deep Learning Perspectives", Pearson, 2024. @#$ 4 3. Gerald J. Kowalski and Mark.T. Maybury, "Information Storage and Retrieval systems", Kluwer Academic Publishers..

Web links and Video Lectures (e-Resources):

1. https://archive.nptel.ac.in/courses/106/105/106105214/
2. https://archive.nptel.ac.in/courses/106/102/106102132/

Activity Based Learning (Suggested Activities in Class)/ Practical Based Learning

- Students are expected to prepare animated PPT to illustrate the different types of Process Scheduling and Paging. (10 Marks)
- Students are required to prepare detailed case study report on Deadlocks OR Students can illustrate deadlock using any programming language (15 Marks)

EAST POINT COLLEGE OF ENGINEERING & TECHNOLOGY

Department of CSE (IoT & CSBT)

Blockchain Technology Basics		Semester	6
Course Code	24XX66X	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	(4:0:0:0)	SEE Marks	50
Total Hours of Pedagogy	50	Total Marks	100
Credits	03	Exam Hours	3
Examination nature (SEE)	Theory		

Course objectives:

- To introduce the fundamentals of blockchain technology
- To understand cryptographic concepts used in blockchain
- To explore different blockchain platforms and applications
- To analyse real-world use cases in IoT and other domains

Teaching-Learning Process (General Instructions):

These are sample Strategies which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) needs not to be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.
2. Use of Video/Animation to explain functioning of various concepts.
3. Encourage collaborative (Group Learning) Learning in the class.
4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyse information rather than simply recall it.
6. Introduce Topics in manifold representations.
7. Show the different ways to solve the same problem with different approaches and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.

MODULE-1 **10 Hours**

Foundations: Evolution of digital systems, distributed systems and decentralization, introduction to blockchain, comparison of blockchain with traditional databases, types of blockchain including public, private and consortium, basic structure of a block.

Textbook 1: chapter 1,2,3,4

MODULE-2 **10 Hours**

Cryptography: Basics of cryptography, hash functions and their properties, public key and private key cryptography, digital signatures, Merkle trees and their role in blockchain.

Textbook 2: chapter 1,2,4,6

MODULE-3 **10 Hours**

Network & Consensus: Structure of blockchain network, nodes and transactions, consensus mechanisms including Proof of Work, Proof of Stake and Delegated Proof of Stake, mining and validators, forks and common attacks such as 51% attack and double spending.

Textbook 2: chapter 5,8

MODULE-4 **10 Hours**

Smart Contracts: Introduction to smart contracts, working of smart contracts, overview of blockchain platforms such as Ethereum and Hyperledger, basics of Solidity and simple contract development, use cases of smart contracts.

Textbook 3: chapter 1,2,7,8

MODULE-5 **10 Hours**

Applications: Integration of blockchain with IoT, security challenges in IoT, use of blockchain for IoT security and data integrity, applications in smart cities, supply chain management and healthcare, future trends and challenges in blockchain and IoT.

Textbook 3: chapter 4,5

Course outcome (Course Skill Set):

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

1. Understand the core concepts of blockchain and distributed systems
2. Apply cryptographic techniques used in blockchain
3. Analyse different blockchain architectures and platforms
4. Develop basic smart contracts
5. Evaluate blockchain applications in IoT and other industries

Assessment Details (both CIE and SEE) The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
- The first test will be administered after 40-50% of the syllabus has been covered, and the second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment. Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination: Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (duration 03 hours).

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored shall be proportionally reduced to 50 marks.

Suggested Learning Resources:

1. *Blockchain Basics* – Daniel Drescher
2. *Mastering Bitcoin* – Andreas M. Antonopoulos
3. *Mastering Ethereum* – Andreas M. Antonopoulos

Reference:

4. *Hyperledger Fabric Documentation*
5. *Blockchain Revolution* – Don Tapscott

Web links and Video Lectures (e-Resources):

- https://www.slainstitute.com/blockchain-technology-syllabus/
- https://codescracker.com/syllabus/blockchain-syllabus.htm
- https://www.softlogicsys.in/blockchain-course-syllabus/

Activity Based Learning (Suggested Activities in Class)/ Practical Based Learning

- Concept mapping activity
- Case Study
- Assignments

IoT Security and Privacy		Semester	6
Course Code	24XX66X	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	(4:0:0:0)	SEE Marks	50
Total Hours of Pedagogy	50	Total Marks	100
Credits	03	Exam Hours	3
Examination nature (SEE)	Theory		

Course objectives:

- To introduce IoT architecture and ecosystem
- To understand security challenges in IoT systems
- To explain basic cryptographic and security mechanisms
- To analyse privacy issues in connected environments
- To study legal and ethical aspects of IoT

Teaching-Learning Process (General Instructions):
These are sample Strategies which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) needs not to be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.
2. Use of Video/Animation to explain functioning of various concepts.
3. Encourage collaborative (Group Learning) Learning in the class.
4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyse information rather than simply recall it.
6. Introduce Topics in manifold representations.
7. Show the different ways to solve the same problem with different approaches and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.

MODULE-1 **10 Hours**

Introduction to IoT and Applications: Definition and evolution of IoT, IoT architecture (3-layer, 5-layer models), Components: sensors, actuators, gateways, cloud, IoT applications: smart homes, healthcare, agriculture, industry, Resource constraints in IoT devices

Textbook 1:chapter 1,2 , Textbook 2:chapter 1,2 ,

MODULE-2 **10 Hours**

Fundamentals of Security in IoT: Confidentiality, Integrity, Availability, Authentication, Authorization, Accountability, Basics of cryptography: Symmetric and asymmetric encryption, Hash functions, Secure communication concepts

Textbook 1:chapter 3,4,
MODULE-3 **10 Hours**
IoT Threats and Attacks: Physical attacks (device tampering), Network attacks: Man-in-the-Middle, spoofing, DoS, Malware and botnets (e.g., Mirai), Vulnerabilities in IoT systems, Case studies of IoT security breaches **Textbook 1:chapter 5**
MODULE-4 **10 Hours**
Basic Security Mechanisms in IoT: Lightweight cryptography, Secure communication protocols (MQTT, CoAP basics), Device authentication techniques, Firmware security and updates, Secure boot and hardware-level security **Textbook 1:chapter 6**
MODULE-5 **10 Hours**
Privacy and Ethical Issues in IoT: Concept of privacy in IoT, Data collection, storage, and sharing issues, Privacy risks in smart environments, Data minimization and anonymization, User consent and transparency **Textbook 1:chapter 7**
Course outcome (Course Skill Set): At the end of the course, the student will be able to: 1. Explain IoT architecture and components. 2. Identify security threats and vulnerabilities in IoT 3. Describe basic cryptographic techniques used in IoT. 4. Analyse privacy risks in IoT applications 5. Discuss legal, ethical, and security practices
Assessment Details (both CIE and SEE) The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together. Continuous Internal Evaluation: • For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks. • The first test will be administered after 40-50% of the syllabus has been covered, and the second test will be administered after 85-90% of the syllabus has been covered

- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment. Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination: Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (duration 03 hours).

5. The question paper will have ten questions. Each question is set for 20 marks.
6. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.
7. The students have to answer 5 full questions, selecting one full question from each module.
8. Marks scored shall be proportionally reduced to 50 marks.

Suggested Learning Resources:

Text Books 1. Fei Hu, *Security and Privacy in Internet of Things*

Text Books 2. Arshdeep Bahga, Vijay Madisetti, *Internet of Things: A Hands-On Approach*

Reference:

- Brian Russell, Drew Van Duren, *Practical Internet of Things Security*
- David Hanes et al., *IoT Fundamentals*

Web links and Video Lectures (e-Resources):

- https://iotclass.org/content/privacy-and-security/security-and-privacy-overview.html
- https://www.coursera.org/learn/iot-security-privacy-software-physical-security-cnx0006
- https://www.coursera.org/specializations/internet-of-things-iot-security-its110
- https://ep.jhu.edu/courses/695624-introduction-to-internet-of-things-security-and-privacy/
- https://www.bsigroup.com/en-IN/training-courses/isoiec-274002022-cybersecurity---iot-security-and-privacy---guidelines--on-demand-introduction/

Activity Based Learning (Suggested Activities in Class)/ Practical Based Learning

- Open source tools (like JFLAP) to make teaching and learning more interactive [https://www.jflap.org/]
- Case Study
- Assignments

Mini Project		Semester	6
Course Code	24ICP67	**CIE Marks**	100
Teaching Hours/Week (L: T: P)	0:0:4	**SEE Marks**	-
Credits	02	**Total Marks**	100
Contact Hours	-	**Exam Hours**	-
Examination type (SEE)	-		

Prerequisites: Nil

Course Contents

Guidelines:

In order to address challenges within the realm of cutting-edge technologies, students are required to collaborate in groups of three or four. Each group focuses on solving a problem within a specific domain. To provide guidance and oversight of project advancement, an Internal Guide is assigned to each batch. These guides possess expertise in the relevant domain. Should the need arise, the Internal Guide is capable of organizing clarification sessions to address any uncertainties raised by the students working on the project. These interactions are duly documented for future reference.

Relevance of Project:

Students are expected to articulate the significance of their project within the current IT landscape and broader society.

Literature Survey:

Students must conduct a thorough review of research articles and existing projects to pinpoint gaps within the identified problem statement.

Design:

Students are required to formulate a comprehensive design document encompassing class, use case, component diagrams, state models, sequence models, activity diagrams, and interaction models.

Implementation:

Students should execute the designed model using appropriate techniques.

Presentation:

Regularly, students are to present their progress to the evaluation committee. The committee evaluates

based on the quality of the presentation, depth of content coverage, adeptness in addressing raised questions, and the evident division of teamwork. Scores are determined within this criterion for individual students.

Report:

Each group must compose a project report and submit it to the department. Reports are expected to adhere to the standardized format set by the department.

Course outcomes (Course Skill Set):

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

CO1: Conduct a systematic literature review to synthesize current knowledge, identify gaps, and justify a focused problem statement in the chosen AIML area. (PO - 1,11, PSO - 1, 2, 3)

CO2: Formulate specific objectives and select appropriate methods/tools (e.g., theoretical analysis, simulations, model development, hardware/edge deployment) aligned to the problem context. (PO – 8,9,10,11, PSO – 1,2,3)

CO3: Design and implement a working solution (code/simulation/prototype), following sound engineering practices, reproducible workflows, and version control. (PO – 1,2,3,4,5,6,7,8,9,10,11, PSO – 1,2,3)

CO4: Plan tasks and milestones; maintain a professional journal/progress reports that evidence work completed, decisions taken, and a schedule for remaining tasks within the allotted timeline. (PO – 1,2,3,4,5,6,7,8,9,10,11, PSO – 1,2,3)

CO5: Deliver a structured technical presentation demonstrating individual contributions, and produce a formal report that clearly documents methodology, results, and conclusions. (PO – 1,2,4,8,9,10,11, PSO – 1,2,3)

Assessment Details (CIE):

The CIE marks shall be awarded by a committee consisting of the Head of the concerned Department and two faculty members of the Department, one of them being the Guide. The CIE marks awarded for the Mini-project work shall be based on the evaluation of the project report, project presentation skill, and question and answer session in the ratio of 50:25:25.

EAST POINT COLLEGE OF ENGINEERING & TECHNOLOGY

Department of CSE (IoT & CSBT)

National Service Scheme (NSS)		Semester	6
Course Code	24NS68	**CIE Marks**	100
Teaching Hours/Week (L: T:P)	0:0:2	**SEE Marks**	-
Credits	NCMC – Non-Credit Mandatory Course (Completion of the course shall be mandatory for the award of degree)	**Total Marks**	100
Contact Hours	28	**Exam Hours**	-
Examination type (SEE)	NA		

Course objectives: National Service Scheme (NSS) will enable the students to:

- Understand the community in general in which they work.
- Identify the needs and problems of the community and involve them in problem –solving.
- Develop among themselves a sense of social & civic responsibility & utilize their knowledge
- in finding practical solutions to individual and community problems.
- Develop competence required for group-living and sharing of responsibilities & gain skills
- In mobilizing community participation to acquire leadership qualities and democratic attitudes.
- Develop capacity to meet emergencies and natural disasters & practice national integration and social harmony in general.

General Instructions - Pedagogy:

These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.

- In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the activities will develop students' theoretical and applied social and cultural skills.
- State the need for NSS activities and its present relevance in the society and Provide real-life examples.
- Support and guide the students for self-planned activities.
- You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress in real activities in the field.
- Encourage the students for group work to improve their creative and analytical skills.

National Service Scheme (NSS) – Contents

1. Organic farming, Indian Agriculture (Past, Present and Future) Connectivity for marketing.
2. Waste management– Public, Private and Govt organization, 5 R's.
3. Setting of the information imparting club for women leading to contribution in social and economic issues.
4. Water conservation techniques – Role of different stakeholders– Implementation.
5. Preparing an actionable business proposal for enhancing the village income and approach for implementation.
6. Helping local schools to achieve good results and enhance their enrolment in Higher/technical/ vocational education.
7. Developing Sustainable Water management system for rural areas and implementation approaches.

8. Contribution to any national level initiative of Government of India. For eg. Digital India, Skill India, Swatch Bharat, Atmanirbhar Bharath, Make in India, Mudra scheme, Skill development programs etc.
9. Spreading public awareness under rural outreach programs.(minimum5 programs).
10. Social connect and responsibilities.
11. Plantation and adoption of plants. Know your plants.
12. Organize National integration and social harmony events /workshops /seminars. (Minimum 02 programs).
13. Govt. school Rejuvenation and helping them to achieve good infrastructure.

NOTE:

- Student/s in individual or in a group Should select any one activity in the beginning of each semester till end of that respective semester for successful completion as per the instructions of NSS officer with the consent of HOD of the department.

At the end of every semester, activity report should be submitted for evaluation.

Distribution of Activities - Semester wise for 6th semester

Sem	Topics / Activities to be Covered
6th Sem for 25 Marks	• Plantation and adoption of plants. Know your plants. • Organize National integration and social harmony events/workshops /seminars. (Minimum 02 programs). • Govt. school Rejuvenation and helping them to achieve good infrastructure

Pedagogy – Guidelines, it may differ depending on local resources available for the study as well as environment and climatic differences, location and time of execution.

Sl No	Topic	Group size	Location	Activity execution	Reporting	Evaluation Of the Topic
1.	Organic farming, Indian Agriculture (Past, Present and Future) Connectivity for marketing.	May be individual or team	Farmersland/Villages/ roadside/ community area/ College campus etc…..	Site selection /proper consultation/Continu ous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics Of scheme and syllabus by NSS officer

2.	Waste management– Public, Private and Govt organization, 5 R's.	May be individual or team	Villages/ City Areas / Grama panchayat/ public associations/Government Schemes officers/campus etc…..	Site selection /proper consultation/Continu ous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics Of scheme and syllabus by NSS officer
3.	Setting of the information imparting club for women leading to contribution in social and economic issues.	May be individual or team	Women empowerment groups/ Consulting NGOs & Govt Teams / College campus etc…..	Group selection/pro per consultation/Continu ous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics Of scheme and syllabus by NSS officer
4.	Water conservation techniques – Role of different stakeholders– Implementation.	May be individual or team	Villages/ City Areas / Gramapanchayat/ public associations/Government Schemes officers/campus etc…..	site selection / proper consultation/Continu ous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics Of scheme and syllabus by NSS officer
5.	Preparing an actionable business proposal for enhancing the village income and approach for implementation.	May be individual or team	Villages/ City Areas / Gramapanchayat/ public associations/Government Schemes officers/campus etc…..	Group selection/pro per consultation/Continu ous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics Of scheme and syllabus by NSS officer
6.	Helping local schools to achieve good results and enhance their enrolment in Higher/ technical/ vocational education.	May be individual or team	Local government / private/ aided schools/Government Schemes officers/ etc…..	School selection/proper consultation/Continuous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics Of scheme and syllabus by NSS officer

7.	Developing Sustainable Water management system for rural areas and implementation approaches.	May be individual or team	Villages/ City Areas / Grama panchayat/ public associations/Government Schemes officers/ campus etc…..	site selection/proper consultation/Continuous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics Of scheme and syllabus by NSS officer
8.	Contribution to any national level initiative of Government of India. For eg. Digital India, Skill India, Swachh Bharat, Atmanirbhar Bharath, Make in India, Mudra scheme, Skill development programs etc.	May be individual or team	Villages/ City Areas / Grama panchayat/ public associations/Government Schemes officers/ campus etc…..	Group selection/pro per consultation/Continuous monitoring / Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics Of scheme and syllabus by NSS officer
9.	Spreading public awareness under rural outreach programs.(minimum 5 programs). ///// Social connect and responsibilities.	May be individual or team	Villages/ City Areas / Grama panchayat/ public associations/Government Schemes officers/ campus etc…..	Group selection/pro per consultation/Continuous monitoring / Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics Of scheme and syllabus by NSS officer
10.	Plantation and adoption of plants. Know your plants.	May be individual or team	Villages/ City Areas / Grama panchayat/ public associations/Government Schemes officers/campus etc…..	Place selection/proper consultation/Continuous monitoring / Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by NSS officer
11.	Organize National integration and social harmony events /workshops/seminars. (Minimum 02 programs).	May be individual or team	Villages/ City Areas Grama panchayat/ public associations/Government Schemes officers/ campus etc…..	Place selection/proper consultation/Continuous monitoring / Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics Of scheme and syllabus by NSS officer

12.	Govt. school Rejuvenation and helping them to achieve good infrastructure.	May be individual or team	Villages/ City Areas / Grama panchayat/ public associations/Gover nment Schemes officers/ campus etc…..	Place selection/proper consultation/Conti n uous monitoring / Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics Of scheme and syllabus by NSS officer

Plan of Action (Execution of Activities for Each Semester)

Sl.No	Practice Session Description
1	**Lecture session by NSS Officer**
2	**Students Presentation on Topics**
3	**Presentation - 1 , Selection of topic, PHASE – 1**
4	**Commencement of activity and its progress - PHASE – 2**
5	**Execution of Activity**
6	**Execution of Activity**
7	**Execution of Activity**
8	**Execution of Activity**
9	**Execution of Activity**
10	**Case study based Assessment, Individual performance**
11	**Sector wise study and its consolidation**
12	**Video based seminar for 10 minutes by each student At the end of semester with Report.**

- In every semester from 3rd semester to 6th semester, Each student should do activities according to the scheme and syllabus.
- At the end of every semester student performance has to be evaluated by the NSS officer for the assigned activity progress and its completion.
- At last in 6th semester consolidated report of all activities from 3rd to 6th semester, compiled report should be submitted as per the instructions.

Course outcomes (Course Skill Set):

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

- CO1: Understand the importance of his / her responsibilities towards society.
- CO2: Analyse the environmental and societal problems/issues and will be able to design solutions for the same.
- CO3: Evaluate the existing system and to propose practical solutions for the same for sustainable development.
- CO4: Implement government or self-driven projects effectively in the field.
- CO5: Develop capacity to meet emergencies and natural disasters & practice national integration and social harmony in general.

Assessment Details for CIE (both CIE and SEE)

Weightage	**CIE – 100%**	• Implementation strategies of the project (NSS work). • The last report should be signed by NSS Officer, the HOD and principal. • At last report should be evaluated by the NSS officer of the institute. • Finally, the consolidated marks sheet should be sent to the university and also to be made available at LIC visit.
Presentation - 1 Selection of topic, PHASE - 1	10 Marks	
Commencement of activity and its progress - PHASE - 2	10 Marks	
Case study-based Assessment Individual performance	10 Marks	
Sector wise study and its consolidation	10 Marks	
Video based seminar for 10 minutes by each student At the end of semester with Report.	10 Marks	
Total marks for the course in each semester	**50 Marks**	

Marks scored for 50 by the students should be Scale down to 25 marks. In each semester for CIE entry in the VTU portal.

25 marks CIE entry will be entered in University IA marks portal at the end of each semester 3rd to 6thsem, Report and assessment copy should be made available in the department semester wise.

Students should present the progress of the activities as per the schedule in the prescribed practical session in the field. There should be positive progress in the vertical order for the benefit of society in general.

Suggested Learning Resources:

Books:

- NSS Course Manual**,** Published by NSS Cell, VTU Belagavi.
- Government of Karnataka, NSS cell, activities report and its manual.
- Government of India, NSS cell, Activities reports and its manual.

PHYSICAL EDUCATION (SPORTS & ATHLETICS) – IV		Semester	6
Course Code	24PE68	**CIE Marks**	100
Teaching Hours/Week (L: T:P)	0:0:2	**SEE Marks**	-
Credits	NCMC – Non Credit Mandatory Course (Completion of the course shall be mandatory for the award of degree)	**Total Marks**	100
Contact Hours	28	**Exam Hours**	--
Examination type (SEE)	NA		

Course objectives:

- To understand the importance of Physical Education, including postural deformities and stress management in sports.
- To develop general fitness and improve key components such as strength, endurance, flexibility, and coordination.
- To acquire fundamental skills in Throw ball, Table Tennis, and athletic field events (Jumps).
- To develop proficiency in a selected specific game of the student's choice.
- To understand and perform Aerobics exercises for improving cardiovascular fitness and body coordination.
- To promote teamwork, discipline, leadership, and sportsmanship through active participation in physical activities.

MODULE 1 **6 Hours**

Orientation

A. Postural deformities.
B. Stress management

MODULE 2 **6 Hours**

General Fitness & Components of Fitness

A. Throw ball
B. Table Tennis
C. Athletics (Field Events- Jumps) – Any event as per availability of Ground.

MODULE 3 **16 Hours**

Specific games (Any one to be selected by the student)

1. Aerobics

Course outcomes (Course Skill Set):

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

CO1: Understand postural deformities and stress management techniques in sports and athletics

CO2: Demonstrate skills and actively participate in competitions at regional, state, national, and international levels

CO3: Understand and practice specific games and athletic jumping events with proper techniques and rules

CO4: Understand and perform basic techniques and movements of Aerobics for physical fitness and endurance.

Assessment Details for CIE (both CIE and SEE)

Sl. No.	Activity	Marks
1.	Participation of student in all the modules	20
2.	Quizzes – 2, each of 15 marks	30
3.	Final presentation / exhibition / Participation in competitions/ practical on specific tasks assigned to the students	50
	Total	**100**

YOGA		Semester	6
Course Code	24YO68	**CIE Marks**	100
Teaching Hours/Week (L: T:P)	0:0:2	**SEE Marks**	-
Credits	NCMC – Non-Credit Mandatory Course (Completion of the course shall be mandatory for the award of degree)	**Total Marks**	100
Contact Hours	28	**Exam Hours**	-
Examination type (SEE)	NA		

Course objectives:

- To enable the student to have good health.
- To practice mental hygiene.
- To possess emotional stability.
- To integrate moral values.
- To attain higher level of consciousness.

The Health Benefits of Yoga

The benefits of various yoga techniques have been supposed to improve

- body flexibility,
- performance,
- stress reduction,
- attainment of inner peace, and
- self-realization.

The system has been advocated as a complementary treatment to aid the healing of several ailments such as

- coronary heart disease,
- depression,
- anxiety disorders,
- asthma, and
- extensive rehabilitation for disorders including musculoskeletal problems and traumatic brain injury.

The system has also been suggested as behavioral therapy for smoking cessation and substance abuse (including alcohol abuse).

If you practice yoga, you may receive these physical, mental, and spiritual benefits:

- Physical
1. Improved body flexibility and balance
2. Improved cardiovascular endurance (stronger heart)
3. Improved digestion
4. Improved abdominal strength
5. Enhanced overall muscular strength
6. Relaxation of muscular strains
7. Weight control
8. Increased energy levels
9. Enhanced immune system
- Mental
1. Relief of stress resulting from the control of emotions
2. Prevention and relief from stress-related disorders
3. Intellectual enhancement, leading to improved decision-making skills
- Spiritual
1. Life with meaning, purpose, and direction
2. Inner peace and tranquility
3. Contentment

SEMESTER VI

Ashtanga Yoga 1. Dharana 2. Dhyana (Meditation) 3. Samadhi

Asana by name, technique, precautionary measures and benefits of each asana

Different types of Asanas

a. Sitting
1. Bakasana
2. Hanumanasana
3. Ekapada Rajakapotasana
4. Yogamudra in Vajrasana

b. Standing
1. Vatayanasana
2. Garudasana

c. Balancing
3. Veerabhadrasana
4. Sheershasana

d. Supine line 1. Sarvangasana
2. Setubandha Sarvangasana
3. Shavasanaa (Relaxation poisture).

Revision of Kapalabhati practice 80 strokes/min - 3 rounds

Different types. Meaning by name, technique, precautionary measures and benefits of each Pranayama 1. Bhastrika 2. Bhramari

Meaning, Need, importance of Shatkriya. Different types. Meaning by name, technique, precautionary measures and benefits of each Kriya 1. Jalaneti & sutraneti 2. Nouli (only for men) 3. Sheetkarma Kapalabhati

Course outcomes (Course Skill Set):

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

CO1: Understand the meaning, aim and objectives of Yoga.

CO2: Perform Suryanamaskar and able to Teach its benefits.

CO3: Understand and teach different Asanas by name, its importance, methods and benefits.

CO4: Instruct Kapalabhati and its need and importance.

CO5: Teach different types of Pranayama by its name, precautions, procedure and uses

CO6: Coach different types of Kriyas, method to follow and usefulness.

Assessment Details for CIE (both CIE and SEE)

Students will be assessed with internal test by

a. Multiple choice questions

b. Descriptive type questions

(Two internal assessment tests with 25 marks/test)

Final test shall be conducted for whole syllabus for 50 marks.

Continuous Internal Evaluation shall be for 100 marks (including IA test)

Suggested Learning Resources:

Books:

- Yogapravesha in Kannada by Ajitkumar
- Light on Yoga by BKS Iyengar
- Teaching Methods for Yogic practices by Dr. M L Gharote & Dr. S K Ganguly
- Yoga Instructor Course hand book published by SVYASA University, Bengaluru
- Yoga for Children –step by step – by Yamini Muthanna

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

- https://youtu.be/KB-TYlgd1wE
- **https://youtu.be/aa-TG0Wg1Ls**

Indian Knowledge System			
Course Code	24IKS69	**CIE Marks**	100
Teaching Hours/Week (L: T: P)	1:0:0	**SEE Marks**	-
Credits	NCMC – Non Credit Mandatory Course (Completion of the course shall be mandatory for the award of degree)	**Total Marks**	100
Contact Hours	28	**Exam Hours**	-
Examination type (SEE)	NA		

Course objectives:

- To facilitate the students with the concepts of Indian traditional knowledge and to make them understand the Importance of roots of knowledge system.
- To make the students understand the traditional knowledge and analyse it and apply it to their day-to-day life.

Module-1	**5 Hours**
Introduction to Indian Knowledge Systems (IKS): Overview, Vedic Corpus, Philosophy, Character scope and importance, traditional knowledge vis-a-vis indigenous knowledge, traditional knowledge vs. western knowledge.	
Module-2	**5 Hours**
Traditional Knowledge in Humanities and Sciences: Lingistics, Number and measurements-Mathematics, Chemistry, Physics, Art, Astronomy, Astrology, Crafts and Trade in India and Engineering and Technology.	
Module-3	**5 Hours**
Traditional Knowledge in Professional domain: Town planning and architecture- Construction, Health, wellness and Psychology-Medicine, Agriculture, Governance and public administration, United Nations Sustainable development goals.	

Course outcomes (Course Skill Set)

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

CO1. Provide an overview of the concept of the Indian Knowledge System and its importance.PO-1,7,11 CO2. Appreciate the need and importance of protecting traditional knowledge. PO6 CO3. Recognize the relevance of Traditional knowledge in different domains.PO-3,4 CO4. Establish the significance of Indian Knowledge systems in the contemporary world.PO6

Reference Books

1	**Introduction to Indian Knowledge System- concepts and applications**, B Mahadevan, Vinayak Rajat Bhat, Nagendra Pavana R N, 2022, PHI Learning Private Ltd, ISBN-978-93-91818-21-0
2	**Traditional Knowledge System in India**, Amit Jha, 2009, Atlantic Publishers and Distributors (P) Ltd., ISBN-13: 978-8126912230,
3	**Knowledge Traditions and Practices of India**, Kapil Kapoor, Avadesh Kumar Singh, Vol. 1, 2005, DK Print World (P) Ltd., ISBN 81-246-0334,

Suggested Web Links:

1.	https://www.youtube.com/watch?v=LZP1StpYEPM
2.	http://nptel.ac.in/courses/121106003/
3.	http://www.iitkgp.ac.in/department/KS;jsessionid=C5042785F727F6EB46CBF432D7683B63 (Centre of Excellence for Indian Knowledge System, IIT Kharagpur)
4.	https://www.wipo.int/pressroom/en/briefs/tk_ip.html
5.	https://unctad.org/system/files/official-document/ditcted10_en.pdf
6.	http://nbaindia.org/uploaded/docs/traditionalknowledge_190707.pdf
7.	https://unfoundation.org/what-we-do/issues/sustainable-development goals/?gclid=EAIaIQobChMInp-Jtb_p8gIVTeN3Ch27LAmPEAAYASAAEgIm1vD_BwE

ASSESSMENT AND EVALUATION PATTERN	
WEIGHTAGE	**100% (CIE)**
QUIZZES	
Quiz-I	Each quiz is evaluated for 10 marks adding up to **20 Marks**
Quiz-II	

THEORY COURSE - (Bloom's Taxonomy Levels: Remembering, Understanding, Applying, Analyzing, Evaluating, and Creating)	
Test – I	Each test will be conducted for 25 Marks adding upto 50 marks. Final test marks will be reduced to **40 Marks**
Test – II	
EXPERIENTIAL LEARNING	**40**
Case Study-based Teaching-Learning	--
Sector wise study & consolidation (viz., Engg. Semiconductor Design, Healthcare & Pharmaceutical, FMCG, Automobile, Aerospace and IT/ ITeS)	--
Video based seminar (4-5 minutes per student)	--
Maximum Marks for the Theory	--
Practical	--
Total Marks for the Course	**100**