Shri Vile Parle Kelavani Mandal's

Dwarkadas J. Sanghvi College of Engineering

(Autonomous College Affiliated to the University of Mumbai)

Scheme and Detailed Syllabus (DJS22)

Final Year B. Tech

in

COMPUTER SCIENCE AND ENGINEERING

(IoT and Cybersecurity with Block Chain Technology)

(Semester VII)

With effect from the Academic Year: 2025-2026

Shri Vile Parle Kelavani Mandal's
DWARKADAS J. SANGHVI COLLEGE OF ENGINEERING
(Autonomous College Affiliated to the University of Mumbai)
NAAC Accredited with "A" Grade (CGPA: 3.18)

Scheme for Final Year Undergraduate Program in Computer Science and Engineering (IoT and Cyber Security with Block Chain Technology) : Semester VII (Autonomous) Academic Year (2025-2026)

Sr. No.	Course Code	Course	Teaching Scheme			Continuous Assessment (A)					Semester End Examination (B)						Aggregate (A+B)	Credits
			Theory (hrs.)	Practical (hrs.)	Tutorial (hrs.)	Term Test 1 (TT1) -a	Term Test 2 (TT2) - b	Total (a+b)	Term work	CA Total	Duration	Theory	Oral	Pract	Oral & Pract	SEE Total		
1	DJS22ICC701	Blockchain for Cybersecurity	3	--	--	20	15	35	--	35	2	65	--	--	--	65	100	3
	DJS22ICL701	Blockchain for Cybersecurity Laboratory	--	2	--	--	--	--	25	25	2	--	25	--	--	25	50	1
2	DJS22ICC702	Industrial Internet of Everything	3	--	--	20	15	35	--	35	2	65	--	--	--	65	100	3
	DJS22ICL702	Industrial Internet of Everything Laboratory	--	2	--	--	--	--	25	25	2	--	25	--	--	25	50	1
3 @	DJS22ICEC7011	Deep Learning	3	--	--	20	15	35	--	35	2	65	--	--	--	65	100	3
	DJS22ICEL7011	Deep Learning Laboratory	--	2	--	--	--	--	25	25	2	--	25	--	--	25	50	1
	DJS22ICEC7012	Malware Analysis	3	--	--	20	15	35	--	35	2	65	--	--	--	65	100	3
	DJS22ICEL7012	Malware Analysis Laboratory	--	2	--	--	--	--	25	25	2	--	25	--	--	25	50	1
	DJS22ICEC7013	Software Testing and Quality Assurance	3	--	--	20	15	35	--	35	2	65	--	--	--	65	100	3
	DJS22ICEL7013	Software Testing and Quality Assurance Laboratory	--	2	--	--	--	--	25	25	2	--	25	--	--	25	50	1
4 #	DJS22ILO7011	Product Lifecycle Management	3	--	--	20	15	35	--	35	2	65	--	--	--	65	100	3
	DJS22ILO7012	Management Information System																
	DJS22ILO7013	Operations Research																
	DJS22ILO7014	Cyber Security and Laws																
	DJS22ILO7015	Personal Finance Management																
	DJS22ILO7016	Energy Audit and Management																
	DJS22ILO7017	Disaster Management and Mitigation Measures																
	DJS22ILO7018	Science of Well-being																
	DJS22ILO7019	Research Methodology																
	DJS22ILO7020	Public Systems and Policies																
5	DJS22ICP703	Project Stage I	--	4	--	--	--	--	50	50	2	--	--	--	50	50	100	2
		Total	**12**	**10**	**0**	**80**	**60**	**140**	**125**	**265**	**16**	**260**	**75**	**0**	**50**	**385**	**650**	**17**

Prepared by | Checked by | Head of Department | Vice Principal | Principal

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Program: B.Tech in Computer Science and Engineering (IoT and Cybersecurity with Block chain Technology)	Final Year Btech	Semester : VII
Course : Blockchain for Cybersecurity	Course Code: DJS22ICC701	
Course Laboratory: Blockchain for Cybersecurity Laboratory	Course Code: DJS22ICL701	

Teaching Scheme (Hours / week)				Evaluation Scheme						
				Continuous Assessment Marks (A)			Semester End Examination Marks (B)			Total marks (A+B)
Lectures	Practical	Tutorial	Total Credits	Term Test 1	Term Test 2	Total	Theory			
				20	15	35	65			100
				Term Work			Laboratory Examination			
3	2	--	4	Laboratory Work	Tutorial / Mini project / presentation/ Journal/ Practical	Total Term work	Oral	Practical	Oral & Practical	50
				15	10	25	25	–	–	

Prerequisite:

1. Introduction to Blockchain technology
2. Applied Cryptography
3. Network Security

Course Objectives: The objective of the course is

1. To understand how blockchain can be utilized for cybersecurity and privacy.
2. To analyze the potential utility of blockchain in digital forensic applications.
3. To explore emerging trends and innovations in blockchain technology and their implications for cybersecurity practices.
4. To identify future research direction to implement secure blockchain technology system.

Course Outcomes: On completion of the course, learner will be able to:

1. Understand the taxonomy of blockchain threats and vulnerabilities.
2. Develop blockchain based PKI solutions and apps for storing DNS entries.
3. Review existing blockchain based data sharing frameworks and identify strengths and weaknesses.
4. Evaluate decentralized distributed data sharing platform architecture using blockchain.
5. Design applications of blockchain in digital forensics.
6. Enable learners to detect, assess, and remediate smart contract vulnerabilities, ensuring robust and secure smart contract development

Detailed Syllabus:

Unit	Description	Duration
1	**Blockchain Threats and Vulnerabilities:** Cybersecurity threats and incidents on blockchain network, Classification of blockchain threats and vulnerabilities, **Clients vulnerabilities:** Digital signature, Hash function, Mining malware, software's Flaw, User's address vulnerabilities **Consensus mechanism vulnerabilities:**51% Vulnerability, Alternative History Attack, Finney Attack, Race Attack,Vector76 Attack **Mining pool vulnerabilities: Block Withholding Attack**, Bribery Attack, Pool Hopping Attack, Block Discarding Attack, Selfish Mining Attack, Fork-After-Withholding Attack **Network vulnerabilities**: Partition Attacks, Delay Attacks, Distributed Denial-of-Service Attack, Sybil Attack, Time-Jacking Attack, Transaction Malleability Attack **Smart contract vulnerabilities:** Ethereum Virtual Machine Bytecode Vulnerabilities, Solidity Vulnerabilities,	10
2	**Cybersecurity with Blockchain:** Security services, Blockchain on the CIA Security Triad, Authentication mechanisms, Two-Factor Authentication with Blockchain, PKI Infrastructure, Deploying PKI Based Identity with Blockchain, Blockchain-Based DNS Security Platform, Deploying Blockchain-Based DDoS Protection, EIP Block for DDoS attacks	06
3	**Blockchain based Secure data sharing:** Issues with existing data sharing framework, Requirements for secure blockchain based data sharing framework, blockchain based data sharing platforms and protocols: Case studies on Inter Planetary File System (IPFS), Ocean Protocol, and Enigma, Privacy-enhancing technologies (PETs): zero-knowledge proofs, homomorphic encryption, and ring signatures	06
4	**Ensuring Data integrity in Blockchain based platform:** Architecture of decentralized platform: Data encryption and distribution, Data decryption and verification, Data provider, Data requester Privacy-preserving searching model, Security analysis and evaluation: tamper proofing, reliable storage and security	06
5	**Blockchain based Digital Forensics Framework:** Overview of Digital forensics process and Blockchain technology, Challenges in digital forensics and Feasible Solution Using Blockchain, Blockchain-based evidence management and access control, Benefits of blockchain based digital forensics framework	06
6	**Smart Contract Security Auditing:** Types of Smart Contract Audits: Manual Code Review vs. Automated Security Analysis Automated Security Analysis Tools: Mythril, Slither, Echidna, Manticore, Manual Code Review Techniques, Threat Modeling and Risk Assessment, Static and Dynamic Analysis of Smart Contracts, Audit Report Writing and Remediation Strategies	05
	Total	39

List of Laboratory Experiments:	
Sr. No.	**Suggested Experiments**
1	Conduct code reviews and static analysis to identify potential security flaws such as reentrancy bugs, integer overflows, or unchecked user inputs in smart contract
2	Demonstrate how to use penetration testing tools (Metasploit, Burp Suite) to identify vulnerabilities in blockchain nodes, wallets, or communication channels
3	Deploy the public key infrastructure (PKI) with an Ethereum blockchain
4	Implement Ethereum based secure DNS infrastructue
5	Deploy the blockchain-based DDoS protection platform
6	Develop Blockchain-based PKI solutions and apps for storing DNS entries
7	Create smart contracts for tasks such as data validation or access control.
8	Install Mythril, Slither, Echidna, and Manticore in a Linux-based environment. Deploy vulnerable smart contract. Compare the effectiveness of different security analysis tools
9	Perform a threat modeling exercise on a deployed smart contract.
10	Conduct a complete smart contract audit and generate a professional audit report.
11	Design and implement a blockchain-based secure data sharing solution for a specific use case
12	Write Smart Contracts with Hyperledger Composer
13	Design transaction model and chaincode with Golang.
14	Deploy Composer REST Gateway
15	Access the Composer transactions Maintain, monitor, and govern blockchain solutions

Any other experiment based on syllabus may be included, which would help the learner to understand topic/concept.

Books Recommended:

Text Books:

1. Yassine Maleh, Mohammad Shojafar, Mamoun Alazab, Imed Romdhani, Blockchain for Cybersecurity and Privacy: Architectures, Challenges, and Application, 1st Edition, CRC Press, Taylor & Francis Group, ISBN: 9781000060164, 2020.
2. R. Gupta, Hands-on cybersecurity with blockchain, 1st Edition Packt Publishing, ISBN: 978788990189, 2018.
3. Rajneesh Gupta, Hands-on Cybersecurity with Blockchain. Implement DDoS Protection, PKI-based Identity, 2FA and DNS Security using Blockchain, Packt Publishing, 2018.
4. Richard Ma, Jan Gorzny, Edward Zulkoski, Kacper Bak, Olga Mack, Fundamentals of Smart Contract Security,1st Edition, Momentum Press, ISBN:978-1949449372, 2019
5. Ghassan Karame, Elli Androulaki, Bitcoin and Blockchain Security, Artech Publisher, 2017.

Reference Books:

1. Alessandro Parisi , Securing Blockchain Networks like Ethereum and Hyperledger Fabric, Packt Publishing, ISBN: 9781838646486, 2020.
2. Nitin Gaur, Hands-On Blockchain with Hyperledger: Building decentralized applications with Hyperledger Fabric and Composer, Packt Publishing, 2018.
3. Richard Ma, Jan Gorzny, Edward Zulkoski, Kacper Bak, Olga V. Mack, Fundamentals of Smart Contract Security, Momentum Press, 2019.
4. Kevin Werbach, the Blockchain and the New Architecture of Trust, the MIT Press, 2018.

Web resources:

1. Blockchain and Cybersecurity: https://www2.deloitte.com/content/dam/Deloitte/tr/Documents/technology-media-telecommunications/Blockchain-and-Cyber.pdf
2. Blockchain Security : https://www.edx.org/course/blockchain-andfintech-basics-applications-and-limitations
3. Best Practices for Smart Contracts Security: https://www.leewayhertz.com/smart-contracts-security/
4. Blockchain Security: https://www.ibm.com/topics/blockchain-security

Online Courses: NPTEL / Swayam

1. Blockchain and its Applications, By Prof. Sandip Chakraborty, Prof. Shamik Sural, IIT Kharagpur https://onlinecourses.nptel.ac.in/noc23_cs47/preview
2. Blockchain Architecture Design and Use Cases, By Prof. Sandip Chakraborty & Dr. Praveen Jayachandran | IIT Kharagpur and IBM, https://onlinecourses.nptel.ac.in/noc19_cs63/preview
3. Blockchain, By Dr.Mayank Aggarwal ,Gurukul Kangri Vishwavidyalaya,Haridwar https://onlinecourses.swayam2.ac.in/aic21_ge01/preview
4. Cyber Security and Privacy, By Prof. Saji K Mathew, IIT Madras https://onlinecourses.nptel.ac.in/noc23_cs127/preview
5. Cyber Security, By Dr.G.Padmavathi, Avinashilingam Institute for Home Science & Higher Education for Women,Coimbatore https://onlinecourses.swayam2.ac.in/cec20_cs15/preview

Continuous Assessment (A):

Theory:

1. One term test of 20 marks and one term test/presentation/assignment/course project/Group discussion/ any other of 15 marks will be conducted during the semester.
2. Total duration allotted for writing Term Test 1 paper is 1 hr.
3. Total duration allotted for writing Term Test 2 paper is 45 minutes.

Laboratory: (Term work)

Term work shall consist of minimum 8 experiments.

The distribution of marks for term work shall be as follows:

i. Laboratory work (Performance of Experiments): 15 Marks

ii. Journal documentation (Write-up and/or Assignments): 10 marks

The final certification and acceptance of term work will be subject to satisfactory performance of laboratory work, and upon fulfilling minimum passing criteria in the term work.

Semester End Examination (B):

Theory:

1. Question paper will be based on the entire syllabus summing up to 65 marks.
2. Total duration allotted for writing the paper is 2 hrs.

Laboratory:

Oral examination will be based on the entire syllabus including, the practical's performed during laboratory sessions

Prepared by | Checked by | Head of the Department | Vice Principal | Principal

Program: B. Tech in Computer Science and Engineering (IoT and Cybersecurity with Block chain Technology)	Final Year B.Tech	Semester : VII
Course: Industrial Internet of Everything	Course Code: DJS22ICC702	
Course Laboratory: Industrial Internet of Everything Laboratory	Course Code: DJS22ICL702	

Teaching Scheme (Hours/week)				Evaluation Scheme							
				Continuous Assessment Marks (A)			Semester End Examination Marks (B)			Total marks (A+B)
Lectures	Practical	Tutorial	Total Credits	Term Test 1	Term Test 2	Total	Theory			
				20	15	35	65			100
				Term Work			Laboratory Examination			
3	2	--	4	Laboratory Work	Tutorial / Mini project / presentation/ Journal/ Practical	Total Term work	Oral	Practical	Oral & Practical	50
				15	10	25	25	--	--	

Prerequisite:

1. Embedded System and IoT
2. Internet of Things with Real Time Applications

Course Objectives: The objectives of the course are:

1. To understand the key skills of Industrial IoT and Applications.
2. To analyse the suitable Industrial Internet Architecture Framework with modern communicational protocols.
3. To explore IP, Non-IP IOT protocols and Business models used in IIoT deployments.
4. To Implement IIoT Data Analytics and Applications of IIoT in robotics.

Course Outcomes: On completion of the course, learner will be able to:

1. Present key skills used in the IIoT manufacturing and Embedded systems applications.
2. Design suitable network architecture with Industrial Ethernet and Gateways.
3. Examine various operating systems, Networking and wireless communication protocols used in IIoT deployments.
4. Comprehend different protocols and Business models for Industrial Internet of Everything.
5. Discussed IIoT Data Analytics basic aspects by using Machine Learning algorithms.
6. Demonstrate cloud-enabled robotics Applications of IIoT in robotics.

Detailed Syllabus:

Unit	Description	Duration
1	**Introduction of IIoT:** Market Size and Potential Definition IoT v IIoT, Next Generation Sensors, Sensor's calibration and validate sensor measurements, placement of IoT devices, Industrial Internet, Impact of Industrial Internet, Industrial Sensing, low-cost communication system design, Top application areas include manufacturing, oil & gas, Embedded systems in the Automotive and Transportation market segment.	07
2	**Industrial Internet Architecture Framework** Functional Viewpoint, Operational Domain, Information Domain, Application Domain, Business Domain, Implementation View point, Architectural Topology, Three Tier Topology, Data Management, Field Bus Technologies, Modern Communication Protocols, Industrial Ethernet, Industrial Gateways.	07
3	**IIoT Methodology** Industrial Processes-Features of IIoT for Industrial processes, Top operating systems used in IIoT deployments, Networking and wireless communication protocols used in IIoT deployments. Smart Remote Monitoring Unit, components of monitoring system, control and management, Wireless Sensor Network (WSN).	06
4	**Protocols and Architecture of IIoT** WPAN, NFC, WebSockets, Wireless HART Protocol, IP and Non-IP Protocols, Z-Wave, NB-IoT, Business Models of IIoT, Categorization of reference architecture in IIoT, introduction to Interoperable Industrial Internet of Things (IIRA), IIRA-Framework.	06
5	**IIoT Data Analytics** Categorization of analytics- IIoT and Industry 4.0 context, Usefulness of IIoT analytics, implementation of industrial IoT Data flow, Deployment of analytics, big data and how to prepare data for machine learning algorithms, Applications of ML in Industries, Healthcare Applications in industries.	07
6	**Internet of Robotic Things (IoRT)** Introduction to stationary and mobile robots, Brief introduction to localization, mapping, planning, and control of robotic systems; Introduction to cloud- enabled robotics; Applications of IIoT in robotics; Architectures for IoRT, Examples and case studies: Open issues and challenges.	06
	Total	**39**

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List of Laboratory Experiments:	
Sr. No.	**Suggested Experiments**
1	To implement an Autonomous Inventory Management System Using IIoT.
2	To Design a Smart Warehouse System using Industrial IoT and RFID.
3	To Perform Monitoring and Controlling Industrial Equipment using IIoT Sensors.
4	To design Smart Factory Automation with IIoT-Based Wireless Sensor Networks.
5	To analyse cybersecurity risk assessment for safeguarding industrial IoT (IIoT) environments.
6	To develop an Edge Computing Solution for Industrial IoT Applications.
7	To perform Predictive Analytics for Industrial Energy Management using IoT Data.
8	To perform IIoT-Based Environmental Monitoring in Manufacturing Plants.
9	To deploy sensors to monitor machine health parameters (vibration, temperature, pressure).
10	To analyse Industrial IoT Device Calibration and Data Transmission using MQTT.
11	To analyse Fault Detection in Industrial Systems Using IoT and AI Techniques.
12	To analyse Remote Condition Monitoring of Power Grids using IIoT Solutions.
13	To perform a system to monitor the location and condition of products in real-time application using Technologies like Wi-Fi (Indoors: 30–50 meters), Bluetooth (10 meters) and LoRaWAN (Urban areas: 3–5 kilometers).
14	To perform Industrial Robotics Control through IoT-Based Network using protocols like MQTT or HTTP.
15	Mini Project(Students with group of 3/4 will develop application based on Industrial Internet of Thing along with Report).

Any other experiment based on syllabus may be included, which would help the learner to understand topic/concept.

Books Recommended:

Text Books:

1. Michael Peppler and Peter Domsch, Hands-On Industrial Internet of Things: Create a powerful Industrial IoT infrastructure using Industry 4.0 , Packt Press, ISBN: 1789537223, 2018.
2. K. V. S. Murthy and V. S. Kumar, Industrial Internet of Things: Design, Implementation, and Applications, 1st Edition, CRC Press, ISBN: ISBN 9780367608675, 2024.
3. Shrey Sharma, Mastering IoT for Industrial Environments, 1st Edition Packt Publishing, ISBN: 9788197081972, 2024
4. Shriram K Vasudevan, Abhishek S. Natarajan, RMD Sundaram, Internet of Things, Wiley Publishing, ISBN: 9789388991018, 2020.

Reference Books:

1. Alasdair Gilchrist, Industry 4.0: The Industrial Internet of Things, Apress, 2020, ISBN: 9781484220467.
2. Sudip Misra, Chandana Roy, Anadarup Mukherjee, Introduction to Industrial Internet of Things and Industry 4.0, CRC Press,2021, ISBN: 9780367897581.
3. Giacomo Veneri, Antonio Capasso, Hands on Industrial Internet of Things, Packt Press, 2021, ISBN NO: 978-1789537222.
4. Yashavant Kanetkar, Shrirang Korde, IoT Experiments, BPB Publications, ISBN: 9789386551832, 2020.

Web resources:

1. Introduction of IIoT:https://www.trendmicro.com/vinfo/in/security/definition/industrial-internet-of-things-iiot.
2. IIoT Architecture: https://www.spiceworks.com/tech/iot/articles/what-is-iiot/ .
3. Industrial Internet of Things: https://www.coretigo.com/what-is-the-industrial-internet-of-things-iiot-and-what-are-its-benefits/ .
4. IOT Technologies and Protocols:https://azure.microsoft.com/en-us/solutions/iot/iot-technology-protocols.
5. Industrial IIOE:https://www.techtarget.com/iotagenda/definition/Industrial-Internet-of-Things-IIoT
6. Robotics Platform for IIOE https://thinkpalm.com/blogs/what-is-the-internet-of-robotic-things-does-this-concept-help-in-improving-the-connectivity-and-functioning-of-platforms/

Online Courses: NPTEL / Swayam

1. Introduction to Industry 4.0 and Industrial Internet of Things, By Prof. Sudip Misra, IIT Kharagpur.
   https://nptel.ac.in/courses/106105195
2. ACM India Summer School on IoT and Embedded Systems, By prof. Debabrata Das, IIT Madras.
   https://archive.nptel.ac.in/courses/128/106/128106020/
3. Fundamentals of sensors, including their classification, By Prof. Mitradip Bhattacharjee, IISER Bhopal.
   https://onlinecourses.nptel.ac.in/noc23_ee95/preview
4. Internet of Things (IoT) and Embedded Systems: By Prof. Sudip Misra, IIT Kharagpur.
   https://onlinecourses.nptel.ac.in/noc22_cs53/preview.
5. Advanced Sensors and Transducers by Prof. Ankur Gupta, IIT Delhi.
   https://onlinecourses.nptel.ac.in/noc23_ee105/preview
6. Internet of Things (IoT) for Smart Cities, By Sudip Misra, IIT Kharagpur.
   https://onlinecourses.nptel.ac.in/noc23_cs82/preview

Continuous Assessment (A):

Theory:

1. One term test of 20 marks and one term test/presentation/assignment/course project/Group discussion/any other of 15 marks will be conducted during the semester.
2. Total duration allotted for writing Term Test 1 paper is 1 hr.
3. Total duration allotted for writing Term Test 2 paper is 45 minutes.

Laboratory: (Term work)

Term work shall consist of minimum 8 experiments.

The distribution of marks for term work shall be as follows:

i. Laboratory work (Performance of Experiments): 15 Marks
ii. Journal documentation (Mini-Project/Write-up and/or Assignments) : 10 marks

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Semester End Examination (B):

Theory:

1. Question paper will be based on the entire syllabus summing up to 65 marks.
2. Total duration allotted for writing the paper is 2 hrs.

Laboratory:

Oral examination will be based on the entire syllabus including, the practical's performed during laboratory sessions

Prepared by Checked by Head of the Department Vice Principal Principal

Program: B. Tech in Computer Science and Engineering (IoT and Cybersecurity with Block chain Technology)								Final Year B.Tech		Semester : VII
Course : Deep Learning								Course Code: DJS22ICC7011		
Course Laboratory: Deep Learning Laboratory								Course Code: DJS22ICL7011		
Teaching Scheme (Hours / week)				Evaluation Scheme						
				Continuous Assessment Marks (A)				Semester End Examination Marks (B)		Total marks (A+B)
Lectures	Practical	Tutorial	Total Credits	Term Test 1	Term Test2	Total Term Test		Theory		
				20	15	35		65		100
				Laboratory Examination				Term work		Total Term work
3	2	——	4	Oral	Practical	Oral & Practical		Laboratory Work	Tutorial / Mini project / presentation/ Journal	50
				25	–	–		15	10	25

Pre-requisite:

1. Linear Algebra and Optimization techniques.
2. Probability and Statistical Inference.
3. Python Programming.

Course Objective: The course aims:

1. To introduce fundamental concepts of artificial neural network and different learning algorithms: supervised and unsupervised neural networks
2. Develop in-depth understanding of the key techniques in designing Deep Network and GAN.
3. To expose Deep Network based methods to solve real world complex problems.
4. To explore applications and challenges in deep learning.

Course Outcomes: At the End of the course, students will be able to

1. Proficient in the basic principles of the fundamental concepts of neural networks and deep learning.
2. Apply supervised and unsupervised deep learning algorithms
3. Implement deep network training and design concepts.
4. Build solution using appropriate neural network models.
5. Illustrate performance of deep learning models.
6. Understanding of the fundamental concepts about different types of GANs.

Detailed Syllabus: (unit wise)		
Unit	**Description**	**Duration**
1	**Introduction to Neural Networks and Deep Learning** Fundamentals of Neural Network and Deep Learning, Machine Learning vs Deep Learning, Deep Learning applications, **Artificial Neural Network (ANN):** Association of biological neuron with artificial network, activation functions, weights, bias, threshold, learning rate, momentum factor; McCulloch Pitts Neuron: Theory and architecture; linear separability; Hebb Network: Theory and algorithm, ANN architectures. Hyperparameter tuning and batch normalization	05
2	**Supervised Learning Networks:** Perceptron, Multilayer Perceptrons (MLPs), Representational power of Perceptron and MLPs, Training rule, Sigmoid neurons, Gradient Descent and Delta Rule, Multilayer Networks: A differentiable threshold Unit, Feedforward Neural Networks, Representation Power of Feedforward Neural Networks; **Backpropagation Algorithm**: EBPTA, Convergence and local minima, Regularization for Deep Learning: Parameter Norm Penalties, Dataset Augmentation, Noise Robustness, Early Stopping, Sparse Representation, Dropout. Principal Component Analysis and its interpretations, Singular Value Decomposition.	08
3	**Convolutional Neural Networks:** The Convolution Operation, sparse interactions, parameter sharing, Pooling, Convolution and Pooling as an Infinity Strong Prior, Variants of Basic Convolution Function, Efficient Convolution Algorithms. **Convnet architectures:** Discussions on famous convnet architectures: AlexNet, VGG, GoogleNet, ResNet InceptionNets, DenseNets.	06
4	**Sequence Modelling:** Recurrent Neural Networks (RNN), Bidirectional RNNs, Deep recurrent Networks, Recursive Neural Networks, and the challenges of Long-Term Dependencies, Echo State Networks, Leaky Units, and The Long Short-Term Memory.	07
5	**Unsupervised Learning Networks:** Kohonen Self-Organizing Feature Maps – architecture, training algorithm, Kohonen Self- Organizing Motor Map. **Autoencoders:** Independent Component Analysis, Sparse Coding; Undercomplete Autoencoders, Regularized Autoencoders, Stochastic Encoders and Decoders, Denoising Autoencoders, Contractive Autoencoders, Applications of Autoencoders.	07
6	**Generative Adversarial Networks:** Generative Adversarial Networks (GAN), GAN challenges: Oscillation Loss, Mode Collapse, Uninformative Loss, Hyper parameters, Tackling GAN challenges, Wasserstein GAN, Cycle GAN, Neural Style Transfer.	06
	Total	39

List of Laboratory Experiments:	
Sr. No	**Suggested Experiments**
1	Implement Boolean gates using perceptron.
2	Implement backpropagation algorithm from scratch.
3	Monitoring and evaluating deep learning models using Tensor flow and Keras.
4	Evaluate and analyze Prediction performance using appropriate optimizers for deep learning
5	Implement to build CNN models for image categorization.
6	Implement Visualizing Convolutional Neural Network using Tensor Flow with Keras Data.
7	Implement Optical Character Recognition (OCR) Performance Analysis Using Tesseract.
8	Implement Object detection using RNN using YOLO and Tensor Flow
9	Implement Anomaly detection using Self-Organizing Network.
10	Implement to compare the performance of PCA and Autoencoders on a given dataset.
11	Build Generative adversarial model for fake (news/image/audio/video) prediction.
12	Implement Transfer Learning using Pre-trained Models (e.g., VGG16, ResNet) for Image Classification
13	Implement Sequence-to-Sequence Model for Text Generation (e.g., using LSTM or GRU)

Books Recommended:

Text Book

1. Dive into Deep Learning: Asaton Zhang, Zhacary Lipton, Mu Li and Alex Smola, December 2022.
2. Understanding Deep Learning, Simon Prince, MIT Press, Dec2023.
3. Simon Haykin, "Neural Networks and Learning Machines", Pearson Prentice Hall, 3rd Edition, 2010.
4. S. N. Sivanandam and S. N. Deepa, "Introduction to Soft Computing", Wiley India Publications, 3rd Edition, 2018.
5. David Foster, "Generative Deep Learning", O'Reilly Media, 2019.
6. Denis Rothman, "Hands-On Explainable AI (XAI) with python", Packt, 2020.

Reference Books:

1. Ian Goodfellow and Yoshua Bengio and Aaron Courville, "Deep Learning", An MIT Press, 2016 .
2. François Chollet, "Deep Learning with Python", Manning Publication, 2017.
3. Josh Patterson, Adam Gibson, "Deep Learning: A Practitioner's Approach", O'Reilly Publication, 2017.
4. Andrew W. Trask, Grokking, "Deep Learning", Manning Publication, 2019.
5. John D. Kelleher, "Deep Learning", MIT Press Essential Knowledge series, 2019.

Web resources:

1. **Coursera:**
   Deep Learning Specialization
   https://www.coursera.org/specializations/deep-learning#courses.

Online Courses: NPTEL / Swayam

1. Deep Learning, By Prof. Prabir Kumar Biswas, IIT Kharagpur
   https://onlinecourses.nptel.ac.in/noc22_cs22/preview

Evaluation Scheme:

Continuous Assessment (A):

Theory:

1. One term test of 20 marks and one term test/presentation/assignment/course project/Group discussion/any other of 15 marks will be conducted during the semester.
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Laboratory: (Term work)

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i. Laboratory work (Performance of Experiments): 15 Marks
ii. Journal documentation (Write-up and/or Assignments): 10 marks

The final certification and acceptance of term work will be subject to satisfactory performance of laboratory work, and upon fulfilling minimum passing criteria in the term work.

Semester End Examination (B):

Theory:

1. Question paper will be based on the entire syllabus summing up to 65 marks.
2. Total duration allotted for writing the paper is 2 hrs.

Laboratory:

Oral examination will be based on the entire syllabus including, the practical's performed during laboratory sessions

Prepared by | Checked by | Head of the Department | Vice Principal | Principal

Program: B.Tech in Computer Science and Engineering (IoT and Cybersecurity with Block chain Technology)											Final Year Bech	Semester : VII
Course : Malware Analysis											Course Code: DJS22ICC7012	
Course Laboratory: Malware Analysis Laboratory											Course Code: DJS22ICL7012	
Teaching Scheme (Hours / week)				Evaluation Scheme								
				Continuous Assessment Marks (A)			Semester End Examination Marks (B)				Total marks (A+B)	
Lectures	Practical	Tutorial	Total Credits	Term Test 1	Term Test 2	Total	Theory					
				20	15	35	65				100	
				Term Work			Laboratory Examination					
3	2	--	4	Laboratory Work	Tutorial / Mini project / presentation/ Journal/ Practical	Total Term work	Oral	Practical	Oral & Practical		50	
				15	10	25	25	–	–			

Prerequisite:

1. Applied Cryptography
2. Network Security
3. Vulnerability Assessment and Penetration Testing

Course Objectives: The objective of the course is

1. To introduce the fundamentals of malware, types and its effects.
2. To learn basic and advanced malware analysis techniques.
3. To analyze malware samples using static, dynamic analysis, and reverse engineering techniques.
4. To detect and analyze obfuscation and anti-malware techniques.

Course Outcomes: On completion of the course, learner will be able to:

1. Identify different types of malware and understand their functionalities.
2. Apply static and dynamic analysis techniques to analyze sophisticated malware threats
3. Use appropriate tools and techniques to analyze malicious code.
4. Explore advanced obfuscation methods.

Detailed Syllabus:		
Unit	**Description**	**Duration**
1	**Introduction Malware Analysis:** Introduction, Techniques, Types of malware, General rules for Malware Analysis. Malware Taxonomy - Malware Attack Life Cycle - The Combat Teams - Anti-malware Products- Reverse Engineering for Windows and Linux systems.	06
2	**Basic Static Techniques:** Antivirus Scanning, Hashing, Finding Strings, Packed and Obfuscated Malware, Portable Executable Malware, Portable executable File Format, Linked Libraries and Functions, Static Analysis, The PE file headers and sections.	06
3	**Advanced Static Analysis:** The Stack, Conditionals, Branching, Rep Instructions, Disassembly, Global and local variables, Arithmetic operations, Loops, Function Call Conventions, C Main Method and Offsets. Portable Executable File Format, The PE File Headers and Sections, IDA Pro, Function analysis, Graphing, The Structure of a Virtual Machine, Analyzing Windows programs, Anti-static analysis techniques, obfuscation, packing, metamorphism, polymorphism.	07
4	**Advanced Dynamic Analysis:** Live malware analysis, dead malware analysis, analyzing traces of malware, system calls, api calls, registries, network activities. Anti-dynamic analysis techniques, VM detection techniques, Evasion techniques, , Malware Sandbox, Monitoring with Process Monitor, Packet Sniffing with Wireshark, Kernel vs. User-Mode Debugging, OllyDbg, Breakpoints, Tracing, Exception Handling, Patching	07
5	**Malware Functionality:** Downloaders and Launchers, Backdoors, Credential Stealers, Persistence Mechanisms, Handles, Mutexes, Privilege Escalation, Covert malware launching-Launchers, Process Injection, Process Replacement, Hook Injection, Detours, APC injection.	07
6	**Obfuscation Techniques:** File Obfuscation - Binary Obfuscation Techniques - Assembly of data - Encrypted data identification - Decrypting with x86dbg - Control flow flattening obfuscation - Garbage code insertion - Dynamic library loading	06
	Total	39

List of Laboratory Experiments:	
Sr. No.	**Suggested Experiments**
1	Setting up a malware analysis environment using VirtualBox, VMware, and Remnux
2	Identify malware using file hashing techniques (MD5, SHA-256) to verify integrity and detect tampering.
3	Examine malware using Portable Executable (PE) analysis tools such as PEiD and Exeinfo PE to gather insights into executable file structures.
4	Execute malware safely in a sandboxed environment (Cuckoo Sandbox) to observe its runtime behavior and interactions.
5	Monitor malware activities using Process Monitor and Process Explorer to track system changes and detect malicious operations.
6	Investigate malware persistence mechanisms using Autoruns to analyze auto-starting entries and registry modifications.
7	Analyze memory dumps using the Volatility framework to extract forensic artifacts and detect hidden malware.
8	De-obfuscate malware through XOR decryption to reveal hidden payloads and bypass encoding mechanisms.
9	Debug and analyze packed malware samples using OllyDbg to unpack and examine malicious binaries.
10	Study real-world ransomware samples in a secure environment to understand their encryption techniques and impact.
11	Reverse-engineer malware binaries using tools like Radare2 and Ghidra to analyze their internal structure and functionality.
12	Implement malware workflow orchestration using Apache Airflow or Jenkins to automate the analysis pipeline.
13	Utilize VirusTotal API for online scanning and reputation analysis of suspicious files and URLs.
14	Develop and apply basic YARA rules for signature-based malware detection.
15	Conduct Android malware analysis using MobSF to examine malicious applications and identify security threats.

Any other experiment based on syllabus may be included, which would help the learner to understand topic/concept.

Books Recommended:

Text Books:

1. Abhijit Mohanta, Anoop Saldanha, Malware Analysis and Detection Engineering a Comprehensive Approach to Detect and Analyze Modern Malware, 1st edition, Apress ISBN 978-1-4842-6192-7, 2020.
2. S. Oriyano and M. Solomon, Hacker Techniques, Tools, and Incident Handling, 3rd Edition, J B Learning, 2020.
3. Michael Sikorski and Andrew Honig, Practical Malware Analysis No Starch Press, ISBN: 9781593272906 2012
4. Alexey Kleymenov, Amr Thabet Mastering Malware Analysis Packt Publishing 2019

Reference Books:

1. Jamie Butler and Greg Hoglund, "Rootkits: Subverting the Windows Kernel" by 2005, Addison-Wesley Professional.
2. Bruce Dang, Alexandre Gazet, Elias Bachaalany, SébastienJosse, "Practical Reverse Engineering: x86, x64, ARM, Windows Kernel, Reversing Tools, and Obfuscation", 2014.
3. Victor Marak, "Windows Malware Analysis Essentials" Packt Publishing, O'Reilly, 2015.
4. Ken Dunham, Shane Hartman, Manu Quintans, Jose Andre Morales, Tim Strazzere, "Android Malware and Analysis",CRC Press, Taylor & Francis Group, 2015.
5. Windows Malware Analysis Essentials by Victor Marak, Packt Publishing, 2015.

Web resources:

1. OWASP (Open Web Application Security Project) – https://owasp.org/ https://www.coursera.org/learn/malware-analysis-and-assembly
2. Penetration Testing Execution Standard (PTES) – http://www.pentest-standard.org/
3. SANS Institute - https://www.sans.org/
4. Metasploit Unleashed - https://www.metasploitunleashed.com/ .
5. CERT (Computer Emergency Response Team) - https://www.cert.org/

Online Courses: NPTEL / Swayam

1. Ethical Hacking: NPTEL :: Computer Science and Engineering - NOC:Ethical Hacking
2. Cyber Security: https://nptel.ac.in/courses/108/106/108106069/
3. Malware Analysis and Introduction to Assembly Language by IBM Skills Network Team https://www.coursera.org/learn/malware-analysis-and-assembly#modules

Continuous Assessment (A):

Theory:

1. One term test of 20 marks and one term test/presentation/assignment/course project/Group discussion/ any other of 15 marks will be conducted during the semester.
2. Total duration allotted for writing Term Test 1 paper is 1 hr.
3. Total duration allotted for writing Term Test 2 paper is 45 minutes.

Laboratory: (Term work)

Term work shall consist of minimum 8 experiments.

The distribution of marks for term work shall be as follows:

i. Laboratory work (Performance of Experiments): 15 Marks
ii. Journal documentation (Write-up and/or Assignments): 10 marks

The final certification and acceptance of term work will be subject to satisfactory performance of laboratory work, and upon fulfilling minimum passing criteria in the term work.

Semester End Examination (B):

Theory:

1. Question paper will be based on the entire syllabus summing up to 65 marks.
2. Total duration allotted for writing the paper is 2 hrs. Laboratory:

Oral examination will be based on the entire syllabus including, the practical's performed during laboratory sessions

Prepared by | Checked by | Head of the Department | Vice Principal | Principal

Program: B.Tech in Computer Science and Engineering (IoT and Cybersecurity with Block chain Technology)	Final Year BTech	Semester : VII
Course : Software Testing and Quality Assurance	Course Code: DJS22ICC7013	
Course Laboratory: Software Testing and Quality Assurance Laboratory	Course Code: DJS22ICL7013	

Teaching Scheme (Hours / week)				Evaluation Scheme							
				Continuous Assessment Marks (A)			Semester End Examination Marks(B)			Total marks (A+B)
Lectures	Practical	Tutorial	Total Credits	Term Test 1	Term Test 2	Total	Theory			
				20	15	35	65			100
				Term Work			Laboratory Examination			
3	2	--	4	Laboratory Work	Tutorial / Mini project / presentation/ Journal/ Practical	Total Term work	Oral	Practical	Oral & Practical	50
				15	10	25	25	–	–	

Pre-requisite: Secure Software Engineering

Course Objectives: The objectives of the course are:

1. Practices that support the production of quality software
2. Software testing techniques and quality models
3. Life-cycle models for requirements, defects, test cases, and test results
4. Process models for units, integration, system, and acceptance testing

Course Outcomes: On completion of the course, learners will be able to:

1. Use various Software testing techniques to produce quality software.
2. Design process models for units, integration, system, and acceptance testing
3. Construct and Analyze Control Flow Graphs and Data Flow Graph.
4. Apply System Testing and Functional Testing Techniques
5. Design and develop automated test case.
6. Identify various Quality Models.

Detailed Syllabus:		
Unit	**Description**	**Duration**
1	**Introduction:** Software Quality, Role of testing, verification and validation, objectives and issues of testing, testing activities and levels, Sources of Information for Test Case Selection, Introduction to Testing techniques, Introduction to Testing strategies, Test Planning and Design, Monitoring andMeasuring Test Execution, Test Tools and Automation, Test TeamOrganization and Management.	04
2	**System testing techniques and strategies:** **Unit Testing:** Concept of Unit Testing, Static Unit Testing, Defect Prevention, Dynamic Unit Testing, Mutation Testing, Debugging, Unit Testing in eXtremeProgramming **System Integration Testing:** Concept of Integration Testing, Different Types of Interfaces and Interface Errors, **Introduction:** Granularity of System Integration Testing, System Integration Techniques, Software and Hardware Integration, Test Plan for System Integration, Off-the-Shelf Component Integration, Off-the-Shelf Component Testing, Built-in Testing. **Acceptance Testing:** Types of Acceptance Testing, Acceptance Criteria, Selection of Acceptance Criteria, Acceptance Test Plan, Acceptance Test Execution, Acceptance Test Report, Acceptance Testing in eXtreme Programming.	08
3	**Control Flow Testing:** Outline of Control Flow Testing, Control Flow Graph, Paths in a Control Flow Graph, Path Selection Criteria, All-Path Coverage Criterion, Statement Coverage Criterion, Branch Coverage Criterion, Predicate Coverage Criterion, Generating Test Input, Examples of Test Data Selection. **Data Flow Testing:** Data Flow Anomaly, Overview of Dynamic Data Flow Testing, Data Flow Graph, Data Flow Terms, Data Flow Testing Criteria, Comparison of Data Flow Test Selection Criteria, Feasible Paths and Test Selection Criteria, Comparison of Testing Techniques.	07
4	**System Test Categories:** Introduction to Basic Tests, Functionality Tests, Robustness Tests, Interoperability Tests, Performance Tests, Scalability Tests, Stress Tests, Loadand Stability Tests, Reliability Tests, Regression Tests, Documentation Tests. **System Test Execution:** Introduction to Preparedness to Start System Testing, Metrics for Tracking System Test, Metrics for Monitoring Test Execution, Beta Testing, First Customer Shipment, System Test Report, Product Sustaining, Measuring Test Effectiveness. **Functional Testing:** Equivalence Class Partitioning, Boundary Value Analysis, Decision Tables, Random Testing, Error Guessing, Category Partition. **System Test Design:** Test Design Factors, Requirement Identification, Characteristics of Testable Requirements, Test Design Preparedness Metrics,Test Case Design Effectiveness.	08

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5	**System Test Planning and Automation:** Structure of a System Test Plan, Introduction and Feature Description, Assumptions, Test Approach, Test Suite Structure, Test Environment, Test Execution Strategy, Test Effort Estimation, Scheduling and Test Milestones, System Test Automation, Evaluation andSelection of Test Automation Tools, Test Selection Guidelines for Automation, Characteristics of Automated Test Cases, Structure of an Automated Test Case, Test Automation Infrastructure	06
6	**Software Quality:** Five Views of Software Quality, McCall's Quality Factors and Criteria, Quality Factors Quality Criteria, Relationship between Quality Factors and Criteria, Quality Metrics, ISO 9126 Quality Characteristics, ISO 9000:2000 Software Quality Standard ISO 9000:2000 Fundamentals, ISO 9001:2000 Requirements	06
	Total	**39**

Suggested List of Experiments:

Sr. No.	Title of Experiments
1.	Detailed Test Plan in IEEE format for given case study.
2.	Design test cases and prepare test case verification document for given scenario.
3.	Prepare Defect tracker database.
4.	Perform White Box Testing or control flow testing for an application.
5.	Write test scripts for system using automation tool katalon studio.
6.	Create test suite and generate reports using katalon studio.
7.	Integrate Jira tool with katalon studio for generating defect tracker.
8.	Study different software quality standards.
9.	To study software Automation Testing with JMeter
10.	To study software Automation Testing tool WinRunner for Setting Up the GUI Map
11.	To study software Automation Testing tool WinRunner for Checking GUI Objects
12.	To study software Automation Testing tool WinRunner Creating Data-Driven Tests

Any other experiment based on syllabus may be included, which would help the learner to understand topic/concept.

Books Recommended:

Text books:

1.Sagar Naik , Piyu Tripathy .Software Testing and Quality Assurance: Theory and Practice, , University of Waterloo,, Wiley, 2008.

2.Roger Pressman, Software Engineering: A Practitioners Approach. McGraw-HillPublications,2011

3.William Perry,Effective methods for Software Testing , Wiley. Third Edition. 2006.

4.Matthew Heusser, Michael Larsen ,Software Testing Strategies: A testing guide for the 2020s, , Packt Publishing Ltd, 2023.

Reference Books:

1. Paul C. Jorgensen ,Software Testing - A Craftsman's Approach, , CRC Press, 1995.
2. Srinivasan Desikan and Gopalaswamy Ramesh ,Software Testing,– Pearson Education 2006.

Web resources:

1. Software Testing- https://www.ibm.com/topics/software-testing
2. Software Testing Tutorial- https://www.guru99.com/software-testing.html

Online Courses: NPTEL / Swayam

1. Software Testing, By Prof. Meenakshi D'souza ,IIIT Bangalore
https://onlinecourses.nptel.ac.in/noc22_cs61/preview

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Continuous Assessment (A):

Theory:

1. One term test of 20 marks and one term test/presentation/assignment/course project/Group discussion/ Case study of 15 marks will be conducted during the semester.
2. Total duration allotted for writing Term Test 1 paper is 1 hr.
3. Total duration allotted for writing Term Test 2 paper is 45 minutes.

Laboratory: (Term work):

Term work shall consist of minimum 8 experiments.

The distribution of marks for term work shall be as follows:

i. Laboratory work (Performance of Experiments): 15 Marks

ii. Journal documentation (Write-up and/or Assignments): 10 marks

The final certification and acceptance of term work will be subject to satisfactory performance of laboratory work, and upon fulfilling minimum passing criteria in the term work.

Semester End Examination (B):

Theory:

1. Question paper will be based on the entire syllabus summing up to 65 marks.
2. Total duration allotted for writing the paper is 2 hrs.

Laboratory:

Oral examination will be based on the entire syllabus including, the practical's performed during laboratory sessions

Prepared by | Checked by | Head of the Department | Vice Principal | Principal

Program: B.Tech in Computer Science and Engineering (IoT and Cybersecurity with Block chain Technology)	Final Year B.Tech	Semester : VII
Course: Product Lifecycle Management	Course Code: DJS22ILO7011	

Teaching Scheme (Hours / week)				Evaluation Scheme							
				Continuous Assessment Marks (A)			Semester End Examination Marks (B)			Total marks (A+B)
Lectures	Practical	Tutorial	Total Credits	Term Test 1	Term Test 2	Total	Theory			
				20	15	35	65			100
				Term Work			Laboratory Examination			
3	–	--	3	Laboratory Work	Tutorial / Mini project / presentation/ Journal/ Practical	Total Term work	Oral	Practical	Oral & Practical	–
				–	–	–	–	–	–	

Prerequisite: Knowledge of basic concepts of Management.

Course Objectives: The objective of the course is:

1. To familiarize the students with the need, benefits and components of PLM
2. To acquaint students with Product Data Management & PLM strategies
3. To give insights into new product development program and guidelines for designing and developing a product
4. To familiarize the students with Virtual Product Development

Course Outcomes: On completion of the course, learner will be able to:

1. Gain knowledge about phases of PLM, PLM strategies and methodology for PLM feasibility study and PDM implementation.
2. Illustrate various approaches and techniques for designing and developing products.
3. Apply product engineering guidelines / thumb rules in designing products for moulding ,machining, sheet metal working etc.
4. Acquire knowledge in applying virtual product development tools for components, machining and manufacturing plant

Detailed Syllabus (Unit wise)		
Unit	**Description**	**Duration in Hours**
1	**Introduction to Product Lifecycle Management (PLM):** Product Lifecycle Management (PLM), Need for PLM, Product Lifecycle Phases, Opportunities of Globalization, Pre-PLM Environment, PLM Paradigm, Importance & Benefits of PLM, Widespread Impact of PLM, Focus and Application, A PLM Project, Starting the PLM Initiative, PLM Applications **PLM Strategies:** Industrial strategies, Strategy elements, its identification, selection and implementation, Developing PLM Vision and PLM Strategy, Change management for PLM	09
2	**Product Design:** Product Design and Development Process, Engineering Design, Organization and Decomposition in Product Design, Typologies of Design Process Models, Reference Model, Product Design in the Context of the Product Development Process, Relation with the Development Process Planning Phase, Relation with the Post design Planning Phase, Methodological Evolution in Product Design, Concurrent Engineering, Characteristic Features of Concurrent Engineering, Concurrent Engineering and Life Cycle Approach, New Product Development (NPD) and Strategies, Product Configuration and Variant Management, The Design for X System, Objective Properties and Design for X Tools, Choice of Design for X Tools and Their Use in the Design Process	08
3	**Product Data Management (PDM):** Product and Product Data, PDM systems and importance, Components of PDM, Reason for implementing a PDM system, financial justification of PDM, barriers to PDM implementation **Virtual Product Development Tools:** For components, machines, and manufacturing plants, 3D CAD systems and realistic rendering techniques, Digital mock-up, Model building, Model analysis, Modelling and simulations in Product Design, Examples/Case studies	08
4	**Integration of Environmental Aspects in Product Design:** Sustainable Development Design for Environment, Need for Life Cycle Environmental Strategies, Useful Life Extension Strategies, End-of-Life Strategies, Introduction of Environmental Strategies into the Design Process, Life Cycle Environmental Strategies and Considerations for Product Design.	07
5	**Life Cycle Assessment and Life Cycle Cost Analysis:** Properties, and Framework of Life Cycle Assessment, Phases of LCA in ISO Standards, Fields of Application and Limitations of Life Cycle Assessment, Cost Analysis and the Life Cycle Approach, General Framework for LCCA, Evolution of Models for Product Life Cycle Cost Analysis	07
	Total	39

Books Recommended:

Text books:

1. Product Lifecycle Management: Paradigm for 21st Century Product Realization, John Stark,Springer-Verlag, 2004.
2. Product Design for the environment-A life cycle approach, Fabio Giudice, Guido La Rosa,Antonino Risitano, Taylor & Francis 2006.

Reference Books:

1. Product Life Cycle Managementl, Saaksvuori Antti, Immonen Anselmie, Springer, Dreamtech.
2. Product Lifecycle Management: Driving the next generation of lean thinking, Michael Grieve, TataMcGraw Hill, 2006.
3. Product Life-Cycle Management: Geometric Variations, François Villeneuve, Luc Mathieu, MaxGiordano, Wiley, 2010.

Continuous Assessment (A):

Theory:

1. One term test of 20 marks and one term test/presentation/assignment/course project/Group discussion/any other of 15 marks will be conducted during the semester.
2. Total duration allotted for writing Term Test 1 paper is 1 hr.
3. Total duration allotted for writing Term Test 2 paper is 45 minutes.

Semester End Examination (B):

Theory:

1. Question paper will be based on the entire syllabus summing up to 65 marks.
2. Total duration allotted for writing the paper is 2 hrs.

Prepared by Checked by Head of the Department Vice Principal Principal

Program: B.Tech in Computer Science and Engineering (IoT and Cybersecurity with Block chain Technology)	Final Year B.Tech	Semester : VII
Course: Management Information System	Course Code: DJS22ILO7012	

Teaching Scheme (Hours / week)				Evaluation Scheme							
				Continuous Assessment Marks (A)			Semester End Examination Marks (B)			Total marks (A+B)
Lectures	Practical	Tutorial	Total Credits	Term Test 1	Term Test 2	Total	Theory			
				20	15	35	65			100
				Term Work			Laboratory Examination			
3	–	--	3	Laboratory Work	Tutorial / Mini project / presentation/ Journal/ Practical	Total Term work	Oral	Practical	Oral & Practical	--
				--	–	–	–	–	–	

Course Objectives: The objective of the course is:

1. The course is blend of Management and Technical field.
2. Discuss the roles played by information technology in today's business and define various technology architectures on which information systems are built
3. Define and analyze typical functional information systems and identify how they meet the needs of the firm to deliver efficiency and competitive advantage
4. Identify the basic steps in systems development

Course Outcomes: Learner will be able t

1. Explain how information systems Transform Business
2. Identify the impact information systems have on an organization
3. Describe IT infrastructure and its components and its current trends
4. Understand the principal tools and technologies for accessing information from databases to improve business performance and decision making
5. Identify the types of systems used for enterprise-wide knowledge management and how they provide value for businesses

Detailed Syllabus (Unit wise)		
Unit	**Description**	**Duration in Hours**
1	**Foundation Concepts:** Information Systems in Business, Functional Area Information System, The Components of Information Systems, Impact of IT on organizations and society, Organizational Strategy, Information systems for strategic advantage.	03
2	**Information Technologies:** Hardware and Software **Computer Systems:** End User and Enterprise Computing **Computer Peripherals:** Input, Output, and Storage Technologies **Application Software:** End User Applications **System Software:** Computer System Management **Data Resource Management:** Technical Foundations of Database Management, Managing Data Resources, Big data, Data warehouse and Data Marts, Knowledge Management **Networks:** The Networked Enterprise (Wired and wireless), Pervasive computing, Cloud Computing models	07
3	**MIS Tools and applications for Decision making:** ERP and ERP support of Business Process Reengineering, **Business intelligence (BI):** Managers and Decision Making, BI for Data analysis and Visualization **Artificial Intelligence Technologies in Business**	08
4	**Security and Ethical Challenges:** Security, Ethical, and Societal Challenges of IT Security Management of Information Technology	06
5	**Social Computing (SC):** Web 2.0 and 3.0, SC in business-shopping, Marketing, Operational and Analytic CRM, E-business and E-commerce – B2B B2C, Mobile commerce.	07
6	**Information System within Organization:** Acquiring Information Systems and Applications: Various System development life cycle models. **Enterprise and Global Management of Information Technology:** Managing Information Technology, Managing Global IT.	08
	Total	39

Books Recommended:

Reference Books:

1. Management Information Systems, 11th edition by James A O'Brien, George M., RameshBehl.
2. Kelly Rainer, Brad Prince, Management Information Systems, Wiley.
3. K.C. Laudon and J.P. Laudon, Management Information Systems: Managing theDigital Firm, 10th Ed., Prentice Hall, 2007.
4. D. Boddy, A. Boonstra, Managing Information Systems: Strategy and Organization,Prentice Hall, 2008

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Evaluation Scheme:

Continuous Assessment (A):

Theory:

1. One term test of 20 marks and one term test/presentation/assignment/course project/Group discussion/any other of 15 marks will be conducted during the semester.
2. Total duration allotted for writing Term Test 1 paper is 1 hr.
3. Total duration allotted for writing Term Test 2 paper is 45 minutes.

Semester End Examination (B):

Theory:

1. Question paper will be based on the entire syllabus summing up to 65 marks.
2. Total duration allotted for writing the paper is 2 hrs.

Prepared by Checked by Head of the Department Vice Principal Principal

Program: B.Tech in Computer Science and Engineering (IoT and Cybersecurity with Block chain Technology)	Final Year B.Tech	Semester : VII
Course: Operations Research	Course Code: DJS22ILO7013	

Teaching Scheme (Hours / week)				Evaluation Scheme							
				Continuous Assessment Marks (A)			Semester End Examination Marks (B)				Total marks (A+B)
Lectures	Practical	Tutorial	Total Credits	Term Test 1	Term Test 2	Total	Theory				
				20	15	35	65				100
				Term Work			Laboratory Examination				
3	--	--	3	Laboratory Work	Tutorial / Mini project / presentation/ Journal/ Practical	Total Term work	Oral	Practical	Oral & Practical		--
				--	--	--	--	--	--		

Prerequisites: Basic Knowledge of Algebra, Probability and Statistics.

Course Objectives: The objective of the course is:

1. To formulate a real-world decision problem as a mathematical programming model.
2. To learn the mathematical tools that are employed to solve mathematical programmingmodels.

Course Outcomes: On completion of the course, learner will be able to:

1. Convert a real-world problem in to a Linear Programming Problem and analyse the solutionobtained using Simplex method or other algorithms.
2. Identify real-world problems as Transportation Problem and Assignment Problem and Solve the decision problem by choosing appropriate algorithm.
3. Identify the decision situations which vary with time and analyse them using principle ofdynamic programming to real life situations.
4. Explain reasons of formation of queues, classify various queuing systems and apply parameters defined for various queuing systems for decision making in real life situations.
5. Understand the concept of decision making in situation of competition and recommend strategies in case of two-person zero sum games.
6. Describe concept of simulation and apply Monte Carlo Simulation technique to systems suchas inventory, queuing and recommend solutions for them.
7. Understand need for right replacement policy and determine optimal replacement age.

Detailed Syllabus (Unit wise)		
Unit	**Description**	**Duration in Hours**
1	**Introduction to Operations Research:** Concept of decision making. Definition of OR. Formulation of decision problem as OR model, Concept of Optimization, **Linear Programming Problem:** Mathematical Formulation. Finding optimal solution - Graphical method, Simplex Method, Big M-method, Two Phase Method. Duality, Primal – Dual construction, Symmetric and Asymmetric Dual. Dual Simplex Method.	10
2	**Assignment Problems:** Mathematical Formulation, Finding optimal solution - Hungarian Method **Transportation problem:** Mathematical Formulation, Finding initial basic feasible solution – Northwest corner rule, row minima, column minima, least cost method and Vogel's approximation method. Optimality test: the stepping stone method and MODI method. Improving the solution.	08
3	**Dynamic Programming**: Bellman's Principle of optimality - Applications of dynamic programming- Employment smoothening problem, capital budgeting problem, shortest path problem, cargo loading problem	05
4	**Queuing Models:** Characteristics of queuing models. Single Channel – Single and multi phase servers, Poisson arrivals, exponential service time - with infinite population and finite population models – with infinite and finite capacity. Multichannel – Single phase server - Poisson arrivals, exponential service time with infinite population. **Game Theory:** Introduction. Minimax & Maximin Criterion and optimal strategy. Solution of games with saddle points, rectangular games without saddle points - 2 x 2 games, dominance principle. Approximate methods - Iterative method, m x 2 & 2 x n games -Graphical method and method of sub-games. Expressing game as LPP.	10
5	**Simulation:** Definition. Types of simulation models. Monte Carlo simulation technique. Applications of simulation - Inventory and Queuing problems. Simulation Languages. **Replacement Models:** Replacement of items that deteriorate with time - when money value is not counted and counted, Replacement of items that fail suddenly – individual and group replacement policy.	06
	Total	39

Note: Educator is expected to introduce relevant software available for solving various mathematicalmodels.

Books Recommended:

Text books:

1. Operations Research, Sharma J. K., Trinity Press
2. Operations Research, Gupta P. K., Hira D. S., S. Chand Limited

Reference Books:

1. Operations Research - An Introduction; Taha, H.A.; Prentice Hall
2. Operations Research: Principles and Practice; Ravindran, A, Phillips, D. T and Solberg, J. J.;John Willey and Sons
3. Introduction to Operations Research; Hiller, F. S. and Liebermann, G. J.; Tata McGraw Hill
4. Operations Research Principles and Practice; Pradeep Prabhakar Pai; Oxford University Press
5. Operations Research, R. Panneerselvam, PHI Publications.
6. Operations Research, A. M. Natarajan, P. Balasubramani, A. Tamilarasi, Pearson Education.
7. Operations Research; Kanti Swarup, P. K. Gupta and Man Mohan; Sultan Chand & Sons

Evaluation Scheme:

Continuous Assessment (A):

Theory:

1. One term test of 20 marks and one term test/presentation/assignment/course project/Group discussion/any other of 15 marks will be conducted during the semester.
2. Total duration allotted for writing Term Test 1 paper is 1 hr.
3. Total duration allotted for writing Term Test 2 paper is 45 minutes.

Semester End Examination (B):

Theory:

1. Question paper will be based on the entire syllabus summing up to 65 marks.
2. Total duration allotted for writing the paper is 2 hrs.

Prepared by Checked by Head of the Department Vice Principal Principal

Program: B.Tech in Computer Science and Engineering (IoT and Cybersecurity with Block chain Technology)				Final Year B.Tech				Semester : VII
Course: Cyber Security and Laws				Course Code: DJS22ILO7014				

Teaching Scheme (Hours / week)				Evaluation Scheme							
				Continuous Assessment Marks (A)			Semester End Examination Marks (B)			Total marks (A+B)
Lectures	Practical	Tutorial	Total Credits	Term Test 1	Term Test 2	Total	Theory			
				20	15	35	65			100
				Term Work			Laboratory Examination			
3	–	--	3	Laboratory Work	Tutorial / Mini project / presentation/ Journal/ Practical	Total Term work	Oral	Practical	Oral & Practical	--
				--	–	–	–	–	–	

Course Objectives: The objective of the course is:

1. To understand and identify different types cybercrime and cyber offences.
2. To recognized Indian IT Act 2008 and its latest amendments
3. To learn various types of security standards compliances

Course Outcomes: On completion of the course, learner will be able to:

1. Understand the different types of cybercrime and security issues E Business.
2. Analyses different types of cyber threats and techniques for security management.
3. Explore the legal requirements and standards for cyber security in various countries to regulatecyberspace.
4. Impart the knowledge of Information Technology Act and legal frame work of right to privacy,data security and data protection.

Detailed Syllabus (Unit wise)		
Unit	**Description**	**Duration in Hours**
1	**Introduction to Cybercrime:** Cyber Crime, Cyber Law, Cyber Security, History of Cyber Crime, Hacking, Data Theft, Cyber Terrorism, Virus & Worm's, Email Bombing, Pornography, online gambling, Forgery, Web Defacements, Web Jacking, Illegal online Selling, Cyber Defamation, Software Piracy, Electronics/ Digital Signature, Phishing, Password Cracking, Key loggers and Spywares, Steganography, DoS and DDoS attacks, SQL Injection, Buffer Over Flow,, Phishing Identity Theft (ID Theft) ,How criminal plan the attacks, Social Engineering, Cyber stalking .	10
2	**Cyber Threats Analysis** Knowledge of Dynamic and Deliberate Targeting Knowledge of Indications and Warning Knowledge of Internal Tactics to Anticipate and/or, Emulate Threat Capabilities and Actions Knowledge of Key Cyber Threat Actors and their EquitiesKnowledge of Specific Target Identifiers and Their Usage	06
3	**Electronic Business and legal issues** Evolution and development in Ecommerce, Policy Frameworks for Secure Electronic Business, paper vs paper less contracts, E-Commerce models- B2B, B2C, E security. E-Payment Mechanism; Payment through card system, E-Cheque, E-Cash, E-Payment Threats & Protections, Security for E-Commerce.	06
4	**Indian IT Act** Cyber Crime and Criminal Justice, Penalties, Adjudication and Appeals Under the IT Act, 2000, IT Act. 2008 and its Amendments **Security aspect in cyber Law** The Contract Aspects in Cyber Law , The Security Aspect of Cyber Law, The Intellectual Property Aspect in Cyber Law ,The Evidence Aspect in Cyber Law ,The Criminal Aspect in Cyber Law.	08
5	**Security Industries Standard Compliances** IT Security v/s IT Compliance, Cyber Security Standards, critical security controls for cyber security, GRC (Governance, Risk Management, and Compliance), SOX, GLBA, HIPAA, ISO/IEC 27001, NIST Cyber Security Framework (CSF), PCI-DSS. OWASP Top Ten Project, GDPR (General Data Protection Regulation), NIST (National Institute of Standards and Technology), CIS Controls (Center for Internet Security Controls)	09
	Total	**39**

Books Recommended:

Reference Books and Material:

1. Nina Godbole, Sunit Belapure, Cyber Security, Wiley India, New Delhi
2. The Indian Cyber Law by Suresh T. Vishwanathan; Bharat Law House New Delhi
3. The Information Technology Act, 2000; Bare Act- Professional Book Publishers, New Delhi.
4. E-Commerce Security and Privacy", Anup K. Ghosh, Springer Science and Business Media,2012
5. Izzat Alsmadi , The NICE Cyber Security Framework Cyber Security Intelligence andAnalytics, Springer
6. Cyber Law & Cyber Crimes, Advocate Prashant Mali; Snow White Publications, Mumbai
7. Nina Godbole, Information Systems Security, Wiley India, New Delhi
8. Kennetch J. Knapp, Cyber Security &Global Information Assurance Information SciencePublishing.
9. William Stallings, Cryptography and Network Security, Pearson Publication
10. Websites for more information is available on : The Information Technology ACT, 2008-TIFR : https://www.tifrh.res.in
11. Website for more information, A Compliance Primer for IT professional: https://www.sans.org/reading-room/whitepapers/compliance/compliance-primer- professionals-33538

Evaluation Scheme:

Continuous Assessment (A):

Theory:

1. One term test of 20 marks and one term test/presentation/assignment/course project/Group discussion/any other of 15 marks will be conducted during the semester.
2. Total duration allotted for writing Term Test 1 paper is 1 hr.
3. Total duration allotted for writing Term Test 2 paper is 45 minutes.

Semester End Examination (B):

Theory:

1. Question paper will be based on the entire syllabus summing up to 65 marks.
2. Total duration allotted for writing the paper is 2 hrs.

Prepared by Checked by Head of the Department Vice Principal Principal

Program: B.Tech in Computer Science and Engineering (IoT and Cybersecurity with Block chain Technology)	Final Year B.Tech	Semester : VII
Course: Personal Finance Management	Course Code: DJS22ILO7015	

Teaching Scheme (Hours / week)				Evaluation Scheme							
				Continuous Assessment Marks (A)			Semester End Examination Marks (B)				Total marks (A+B)
Lectures	Practical	Tutorial	Total Credits	Term Test 1	Term Test 2	Total	Theory				
				20	15	35	65				100
				Term Work			Laboratory Examination				
3	–	--	3	Laboratory Work	Tutorial / Mini project / presentation/ Journal/ Practical	Total Term work	Oral	Practical	Oral & Practical		--
				--	–	–	–	–	–		

Prerequisites: Basic Knowledge of Algebra, Probability and Statistics.

Course Objectives: The objective of the course is:

1. To create awareness and educate consumers on access to financial services.
2. To make the students understand the basic concepts, definitions and terms related to direct taxation.
3. To help the students compute the Goods and Service Tax (GST) payable by a supplier after considering the eligible input tax credit.
4. To familiarize the students with microfinance for accelerating the expansion of local microbusinesses.

Course Outcomes: On completion of the course, learner will be able to:

1. Use a framework for financial planning to understand the overall role finances play in his/her personal life.
2. Compute income from salaries, house property, business/profession, capital gains and income from other sources.
3. Compute the amount of CGST, SGST and IGST payable after considering the eligible input tax credit.
4. Understand how Microfinance can help in financial inclusion.

Detailed Syllabus (Unit wise)		
Unit	**Description**	**Duration in Hours**
1	**Overview of Indian Financial System:** Characteristics, Components and Functions of Financial System. Financial Instruments and Financial Markets, Financial inclusion. **Introduction to Personal Finance** Person Financial Planning in Action, Money Management Skills, Taxes in Your Financial Plan, Savings and Payment Services. Consumer Credit: Advantages, Disadvantages, Sources and Costs.	07
2	**Personal Financial Management** **Loans:** Home, Car, Education, Personal, Loan against property and Jewel loan. **Insurance:** Types of Insurance – ULIP and Term; Health and Disability Income Insurance, Life Insurance. **Investment:** Investing Basics and Evaluating Bonds, Investing in Stocks and Investing in Mutual Funds, Planning for the Future.	07
3	**Income Tax** **Income Tax Act Basics-** Introduction to Income Tax Act, 1961 **Heads of Income and Computation of Total Income and Tax Liability-** Heads of Income and Computation of Total Income under various heads, Clubbing Provisions, Set off and Carry forward of Losses, Deductions, Assessment of Income and tax liability of different persons. **Tax Management, Administrative Procedures and ICDS** - TDS, TCS and Advance Tax Administrative Procedures, ICDS.	07
4	**Goods and Services Tax** GST Constitutional framework of Indirect Taxes before GST (Taxation Powers of Union & State Government); Concept of VAT: Meaning, Variants and Methods; Major Defects in the structure of Indirect Taxes prior to GST; Rationale for GST; Structure of GST (SGST, CGST, UTGST & IGST); GST Council, GST Network, State Compensation Mechanism, Registration. **Levy and Collection of GST** Taxable event- "Supply" of Goods and Services; Place of Supply: Within state, Interstate, Import and Export; Time of supply: Valuation for GST- Valuation rules, taxability of reimbursement of expenses; Exemption from GST: Small supplies and Composition Scheme: Classification of Goods and Services	09
5	**Introduction to Micro – finance** Micro-Finance: Definitions, Scope & Assumptions, Types of Microfinance, Customers of Micro-finance, Credit Delivery Methodologies, SHG concept, origin, Formation & Operation of Self Help Groups (SHGs). **Models in Microfinance** - Joint Liability Groups (JLG), SHG Bank Linkage Model and GRAMEEN Model: Achievements & Challenges, **Institutional Mechanism** Current Challenges for Microfinance, Microfinance Institutions (MFIs): Constraints & Governance Issues, Institutional Structure of Microfinance in India :NGO-MFIs, NBFC-MFIs, Co-operatives, Banks, Microfinance Networks and Associations; Demand & Supply of Microfinance Services in India, Impact assessment and social assessments of MFIs.	09
	Total	**39**

Books Recommended:

Reference Books:

1. Banking and Financial Sector Reforms in India , by Asha Singh, M.S. Gupta, SerialsPublication.
2. Indian Banking Sector: Essays and Issues (1st) , by M.S. Gupta & J.B. Singh, SerialsPublication.
3. Basics Of Banking & Finance , by K.M. Bhattacharya O.P. Agarwal , Himalaya PublishingHouse
4. Agricultural Finance And Management, by S. Subba Reddy , P. Raghu Ram .
5. The Indian Financial System And Development , by Dr.Vasant Desai, Himalaya PublishingHouse; Fourth Edition
6. Income Tax Management , Simple Way of Tax Management, Tax Planning and Tax Saving , By Sanjay Kumar Satapathy
7. Direct Tax System Income Tax by Dr. R. K. Jain, SBPD Publications.
8. Simplified Approach to GST Goods and Services Tax, By S K Mishra , EducreationPublishing.
9. Introduction To Microfinance , By Todd A Watkins , World Scientific Publishing Company

Evaluation Scheme:

Continuous Assessment (A):

Theory:

1. One term test of 20 marks and one term test/presentation/assignment/course project/Group discussion/any other of 15 marks will be conducted during the semester.
2. Total duration allotted for writing Term Test 1 paper is 1 hr.
3. Total duration allotted for writing Term Test 2 paper is 45 minutes.

Semester End Examination (B):

Theory:

1. Question paper will be based on the entire syllabus summing up to 65 marks.
2. Total duration allotted for writing the paper is 2 hrs.

Prepared by Checked by Head of the Department Vice Principal Principal

Program: B.Tech in Computer Science and Engineering (IoT and Cybersecurity with Block chain Technology)	Final Year B.Tech	Semester : VII
Course: Energy Audit and Management	Course Code: DJS22ILO7016	

Teaching Scheme (Hours / week)				Evaluation Scheme							
				Continuous Assessment Marks (A)			Semester End Examination Marks (B)			Total marks (A+B)
Lectures	Practical	Tutorial	Total Credits	Term Test 1	Term Test 2	Total	Theory			
				20	15	35	65			100
				Term Work			Laboratory Examination			
3	–	--	3	Laboratory Work	Tutorial / Mini project / presentation/ Journal/ Practical	Total Term work	Oral	Practical	Oral & Practical	--
				--	–	–	–	–	–	

Course Objectives: The objective of the course is:

1. To understand the importance of energy security for sustainable development and the fundamentals of energy conservation.
2. To identify and describe the basic principles and methodologies adopted in energy audit of utility
3. To introduce performance evaluation criteria of various electrical and thermal installations to facilitate the energy management.
4. To relate the data collected during performance evaluation of systems for identification of energy saving opportunities.

Course Outcomes: On completion of the course, learner will be able to:

1. To identify and describe present state of energy security and its importance.
2. To identify and describe the basic principles and methodologies adopted in energy audit of a utility.
3. To describe the energy performance evaluation of some common electrical installations and identify the energy saving opportunities.
4. To describe the energy performance evaluation of some common thermal installations and identify the energy saving opportunities.
5. To analyze the data collected during performance evaluation and recommend energy saving measures.

Detailed Syllabus (Unit wise)		
Unit	**Description**	**Duration in Hours**
1	**Energy Scenario:** Present Energy Scenario, Energy Pricing, Energy Sector Reforms, Energy Security, Energy Conservation and its Importance, Energy Conservation Act-2001 and its Features. Basics of Energy and its various forms, Material and Energy balance.	05
2	**Energy Audit:** Definition, Energy audit- need, Types of energy audit, Energy management (audit) approach-understanding energy costs, Bench marking, Energy performance, matching energy use to requirement, Maximizing system efficiencies, Optimizing the input energy requirements, Fuel and energy substitution. Elements of monitoring & targeting, Energy audit instruments. Technical and economic feasibility, Classification of energy conservation measures. Safety considerations during energy audit. **Financial analysis techniques:** Simple payback period, NPV, Return on investment (ROI) Internal rate of return (IRR).	09
3	**Energy Management and Energy Conservation in Electrical System:** Electricity billing, Electrical load management and maximum demand Control; Power factor improvement, Energy efficient equipments and appliances, star ratings. Energy efficiency measures in lighting system, lighting control: Occupancy sensors, daylight integration, and use of intelligent controllers. Energy conservation opportunities in water pumps, compressor, fan and blower. industrial drives, induction motors, motor retrofitting, soft starters, variable speed drives.	10
4	**Energy Management and Energy Conservation in Thermal Systems:** Review of different thermal loads; Energy conservation opportunities in: Steam distribution system, Steam leakages, Steam trapping, Condensate and flash steam recovery system. Waste heat recovery, use of insulation- types and application. Energy conservation opportunities in: Boiler system. Refrigeration system and HVAC system.	09
5	**Energy conservation in Buildings**: Energy Conservation Building Codes (ECBC):Green Building, LEED rating, Application of Non-Conventional and Renewable Energy Sources, Energy sources and energy management in electric vehicles.	06
	Total	39

Books Recommended:

Reference Books:

1. Handbook of Electrical Installation Practice, Geofry Stokes, Blackwell Science.
2. Designing with light: Lighting Handbook, By Anil Valia, Lighting System.
3. Energy Management Handbook, By W.C. Turner, John Wiley and Sons.
4. Handbook on Energy Audits and Management, edited by A. K. Tyagi, Tata Energy Research Institute (TERI).
5. Energy Management Principles, C.B. Smith, Pergamon Press.
6. Energy Conservation Guidebook, Dale R. Patrick, S. Fardo, Ray E. Richardson, Fairmont Press.
7. Handbook of Energy Audits, Albert Thumann, W. J. Younger, T. Niehus, CRC Press.
8. www.energymanagertraining.com
9. www.bee-india.nic.in

Gholkar.

Evaluation Scheme:

Continuous Assessment (A):

Theory:

1. One term test of 20 marks and one term test/presentation/assignment/course project/Group discussion/any other of 15 marks will be conducted during the semester.
2. Total duration allotted for writing Term Test 1 paper is 1 hr.
3. Total duration allotted for writing Term Test 2 paper is 45 minutes.

Semester End Examination (B):

Theory:

1. Question paper will be based on the entire syllabus summing up to 65 marks.
2. Total duration allotted for writing the paper is 2 hrs.

Prepared by Checked by Head of the Department Vice Principal Principal

Program: B.Tech in Computer Science and Engineering (IoT and Cybersecurity with Block chain Technology)	Final Year B.Tech	Semester : VII
Course: Disaster Management and Mitigation Measures	Course Code: DJS22ILO7017	

Teaching Scheme (Hours / week)				Evaluation Scheme							
				Continuous Assessment Marks (A)			Semester End Examination Marks (B)			Total marks (A+B)
Lectures	Practical	Tutorial	Total Credits	Term Test 1	Term Test 2	Total	Theory			
				20	15	35	65			100
				Term Work			Laboratory Examination			
3	–	--	3	Laboratory Work	Tutorial / Mini project / presentation/ Journal/ Practical	Total Term work	Oral	Practical	Oral & Practical	–
				–	–	–	–	–	–	

Course Objectives: The objective of the course is:

1. To provide basic understanding hazards, disaster and various types and categories of disaster occurring around the world.
2. To identify extent and damaging capacity of a disaster.
3. To study and understand the means of losses and methods to overcome /minimize it.
4. To understand roles and responsibilities of individual and various organization during and after disaster.
5. To appreciate the significance of GIS, GPS in the field of disaster management.
6. To understand the emergency government response structures before, during and after disaster.

Course Outcomes: On completion of the course, learner will be able to:

1. Know natural as well as manmade disaster and their extent and possible effects on the economy.
2. Know the institutional framework and organization structure in India for disaster management and get acquainted with government policies, acts and various emergency laws.
3. Get to know the simple dos and don'ts in such extreme events and build skills to respond accordingly.
4. Understand the importance of disaster prevention and various mitigation measure with the exposure to disasters hotspots across the globe.

Detailed Syllabus (Unit wise)		
Unit	**Description**	**Duration in Hours**
1	**General Information about Disaster:** Brief concept of Hazards, definition and types of Disasters – Natural, Man-made, and hybrid, Groups of Disasters- Natural and Technological, global Scenario, Significance of studying various aspects of disasters, effects of disasters, India's vulnerability to disasters, Impact of disaster on National development. Study of Natural disasters: Flood, drought, cloud burst, Earthquake, Landslides, Avalanches, Volcanic eruptions, Mudflow, Cyclone, Storm, Storm Surge, climate change, global warming, sea level rise, ozone depletion etc. Study of Human/Technology Induced Disasters: Chemical, Industrial and Nuclear disasters, Internally displaced persons, road and train accidents Fire Hazards, terrorism, militancy, Role of growing population and subsequent industrialization, urbanization and changing lifestyle of human beings in frequent occurrences of manmade disasters.	09
2	**Disaster Management:** Brief Introduction, Disaster management cycle, Evolution of Disaster and Disaster management in India, Disaster management acts, policies and guidelines, laws of emergencies etc. Prior, During and Post disaster management activities: (Preparedness, strengthening emergency centers, Logistics, optimum resource management, emergency response and relief, Training, Public awareness, Research, Reconstruction of essential services and livelihood restoration.	08
3	**Institutional framework and Mechanism for disaster management in India:** Institutions in India for dealing with various disasters, Organizational structure, functions and responsibilities of National Institute of Disaster Management (NIDM) and National disaster management authority (NDMA) in India, roles and responsibilities of central and state government during and after disaster, NGO's involved in disasters and their task, Jobs carried out by armed forces. Financial Relief During disaster (State, National and International Disaster Assistance)	07
4	**Disaster risk reduction and Mitigation Measures:** Need of disaster prevention and mitigation, mitigation guiding principles, challenging areas, structural and non-structural measures for disaster risk reduction. Mitigation measures for flood, earthquake, cyclone monitoring, air quality, water quality, climate change, land use, winter storms and aquatic biology etc. Use of information management, GIS, GPS and remote sensing Mitigation measure. Do's and don'ts in case of disasters and effective implementation of relief aids.	08
5	**Case studies on disaster (National /International):** Case study discussion of Hiroshima – Nagasaki (Japan), India – Tsunami (2004) , Bhopal gas tragedy, Kerala and Uttarakhand flood disaster, Cyclone Phailin (2013), Fukushima Daiichi nuclear disaster (2011), 26th July 2005 Mumbai flood, Chernobyl meltdown and so on. (Discuss case studies on disaster with respect to reason for the disaster, incidents, effects of disaster, present scenario and safety measures taken)	07
	Total	39

Books Recommended:
Reference Books and Reports:

1. Disaster Management, by Harsh K.Gupta, Universities Press Publications (2003).
2. Disaster Management: An Appraisal of Institutional Mechanisms in India, by O.S.Dagur, published by Centre for land warfare studies, New Delhi, 2011.
3. Introduction to International Disaster Management, by Damon Copolla, Butterworth Heinemann Elsevier Publications (2015).
4. Disaster Management Handbook, by Jack Pinkowski, CRC Press, Taylor and Francis group (2008).
5. Disaster management & rehabilitation, by Rajdeep Dasgupta, Mittal Publications, New Delhi (2007).
6. Natural Hazards and Disaster Management, Vulnerability and Mitigation, by R B Singh, Rawat Publications (2006).
7. Concepts and Techniques of GIS, by C.P.Lo Albert, K.W. Yonng, Prentice Hall (India) Publications(2006).
8. Risk management of natural disasters, by Claudia G. Flores Gonzales, KIT Scientific Publishing (2010).
9. Disaster Management – a disaster manger's handbook, by W. Nick Carter, Asian Development Bank (2008).
10. Disaster Management in India, by R. K. Srivastava, Ministry of Home Affairs, GoI, New Delhi(2011)
11. The Chernobyl Disaster: Legacy and Impact on the Future of Nuclear Energy, by Wil Mara,Marshall Cavendish Corporation, New York, 2011.
12. The Fukushima 2011 Disaster, by Ronald Eisler, Taylor & Francis, Florida, 2013.
(Learners are expected to refer reports published at national and international level and updated information available on authentic web sites)

Evaluation Scheme:

Continuous Assessment (A):

Theory:

1. One term test of 20 marks and one term test/presentation/assignment/course project/Group discussion/any other of 15 marks will be conducted during the semester.
2. Total duration allotted for writing Term Test 1 paper is 1 hr.
3. Total duration allotted for writing Term Test 2 paper is 45 minutes.

Semester End Examination (B):

Theory:

1. Question paper will be based on the entire syllabus summing up to 65 marks.
2. Total duration allotted for writing the paper is 2 hrs.

Prepared by Checked by Head of the Department Vice Principal Principal

Program: B.Tech in Computer Science and Engineering (IoT and Cybersecurity with Block chain Technology)										Final Year B.Tech	Semester : VII
Course: Science of Well-being										Course Code: DJS22ILO7018	

Teaching Scheme (Hours / week)				Evaluation Scheme							
				Continuous Assessment Marks (A)			Semester End Examination Marks (B)			Total marks (A+B)
Lectures	Practical	Tutorial	Total Credits	Term Test 1	Term Test 2	Total	Theory			
				20	15	35	65			100
				Term Work			Laboratory Examination			
3	–	--	3	Laboratory Work	Tutorial / Mini project / presentation/ Journal/ Practical	Total Term work	Oral	Practical	Oral & Practical	–
				–	–	–	–	--	–	

Course Objectives: The objective of the course is:

1. To create consciousness about importance of holistic health and physical as well as mental well-being.
2. To make learners aware of the concepts of Happiness, Gratitude, Self-Compassion, Empathy etc.
3. To introduce the learners to the means of mental and physical well-being, ill effects of mal-practices like alcoholism, smoking etc.
4. To equip the learners to manage and cope up with stress in their daily living.

Course Outcomes: On completion of the course, learner will be able to:

1. Describe concepts of holistic health and well-being, differentiate between its true meaning and misconceptions and understand the benefits of well-being.
2. Recognize meaning of happiness, practice gratitude and self-compassion and analyze incidents from one's own life.
3. Understand the causes and effects of stress, identify reasons for stress in one's own surrounding and self.
4. Recognize the importance of physical health and fitness, assess their life style and come up with limitations or effectiveness.
5. Inspect one's own coping mechanism, assess its effectiveness, develop and strategize for betterment and execute it.

Thakkar.

Detailed Syllabus (Unit wise)		
Unit	**Description**	**Duration in Hours**
1	**Health and well-being:** The concept of health, dimensions of health, the notion of well-being, various facets of well-being, relation between health and well-being. Concept of holistic health, its principles and importance, concept and benefits of holistic care, misconceptions about holistic health approach, the application of a true holistic approach to our well-being.	06
2	**Concepts of happiness:** Happiness: what is it and how do we measure it? Philosophical perspectives on happiness, Happiness: Nature or Nurture? Happiness in the modern world: impediments and accelerators, Narrow vs. Broad Band Approaches to Happiness, Benefits of Happiness, Self-Compassion and Gratitude. Misconceptions of happiness.	08
3	**Stress and mental health/well-being**: Nature and concept of stress, meaning and definitions of stress, types of stress, meaning of stressors, types of stressors, symptoms of stress, effects of stress, different models of stress. Sources of stress and how does stress cause illness, various sources of stress, delineate between external and internal sources of stress, differentiate between continuous and discrete stressors, the effects of these stressors on health and well-being, diversity of stressors and their health consequences, relation between stress and illness from different perspectives association between stress related physiological mechanisms and different illnesses.	09
4	**Physical Well-being / Health management:** concept of health behaviours, dimensions of health behaviours. Health enhancing behaviors: Exercise and Weight control, application and importance of these health enhancing behaviours. Health protective behaviors and illness management: concept of illness management, effectiveness of illness management. Concept of Nutrition, Role of Nutrition, Components of Nutrition, concept of Malnutrition, Health compromising behaviours: Alcoholism, Smoking and its effects on health.	08
5	**Dealing with Difficult Times / Coping mechanisms:** The concept of chronic stress, Health and safety risks of chronic stress, Forms and Treatment of chronic stress, Coping with Acute and Chronic stress, theories of the stress-illness link, role of stress in mental disorders. Concept of coping, Ways of coping and stress management, basic knowledge about stress management, various techniques of stress management, stress management programs. Mental strengths and virtues, Hope, Optimism, Resilience – concept, pathways and models, Meditation and Self-introspection.	08
	Total	39

Books Recommended:

Textbooks:

1. The Science of well-being by Felicia Huppert, Nick Baylis, Barry Keverne; Oxford University Press
2. Health and Well-Being: Emerging Trends by S. Ojha, U. Rani Srivastava, Shobhna Joshi, Global Vision Publishing House
3. Positive psychology: The scientific and practical explorations of human strengths by Shane J. Lopez, Jennifer Teramoto Pedrotti, Charles Richard Snyder; Sage Publications.

Reference Books:

1. The pursuit of happiness and the realization of sympathy: Cultural patterns of self, social relations, and well-being by Kitayama, S., & Markus, H. R, Culture and subjective well- being, The MIT Press.
2. Man Adapting by Dubos, R; New Haven: Yale University Press.
3. Happiness a history by McMahon D. M., Atlantic Monthly Press.
4. Well-being: The foundations of hedonic psychology by D. Kahneman & E. Diener & N. Schwarz, New York: Russell Sage
5. Selye H. The Stress of Life. New York; McGraw-Hill; 1984.

Evaluation Scheme:

Continuous Assessment (A):

Theory:

1. One term test of 20 marks and one term test/presentation/assignment/course project/Group discussion/any other of 15 marks will be conducted during the semester.
2. Total duration allotted for writing Term Test 1 paper is 1 hr.
3. Total duration allotted for writing Term Test 2 paper is 45 minutes.

Semester End Examination (B):

Theory:

1. Question paper will be based on the entire syllabus summing up to 65 marks.
2. Total duration allotted for writing the paper is 2 hrs.

Prepared by Checked by Head of the Department Vice Principal Principal

Program: B.Tech in Computer Science and Engineering (IoT and Cybersecurity with Block chain Technology)	Final Year B.Tech	Semester : VII
Course: Research Methodology	Course Code: DJS22ILO7019	

Teaching Scheme (Hours / week)				Evaluation Scheme							
				Continuous Assessment Marks (A)			Semester End Examination Marks (B)			Total marks (A+B)
Lectures	Practical	Tutorial	Total Credits	Term Test 1	Term Test 2	Total	Theory			
				20	15	35	65			100
				Term Work			Laboratory Examination			
3	–	--	3	Laboratory Work	Tutorial / Mini project / presentation/ Journal/ Practical	Total Term work	Oral	Practical	Oral & Practical	–
				–	–	–	–	--	–	

Prerequisites: Basic Knowledge of Probability and Statistics.

Course Objectives: The objective of the course is:

1. To understand Research and Research Process
2. To acquaint learners with identifying problems for research and develop research strategies
3. To familiarize learners with the techniques of data collection, analysis of data and interpretation

Course Outcomes: On completion of the course, learner will be able to:

1. Prepare a preliminary research design for projects in their subject matter areas
2. Accurately collect, analyze and report data
3. Present complex data or situations clearly
4. Review and analyze research findings
5. Write report about findings of research carried out

Ghatkar.

Detailed Syllabus (Unit wise)		
Unit	**Description**	**Duration in Hours**
1	**Basic Research Concepts** Meaning of research, Objectives of research, Types of research, Significance of research Research process	**07**
2	**Research Methodology:** Identification of research problem, Literature review, Formulation of hypothesis, Formulation of Research design.	**09**
3	**Research and Sample Design:** Meaning of research and sample design, Need of research design, Features of good research design, Important concepts, Different research designs, Types of sampling designs	**09**
4	**Data Collection and Data Analysis:** Types of data, Methods for collecting data: Experiments and surveys, Collection of primary and secondary data, Hypothesis testing and interpretation of Data	**09**
5	**Interpretation and Report Writing:** Interpretation and drawing conclusions on the research, Preparation of the report, Ethical Issues	**05**
	Total	**39**

Books Recommended:
Reference Books:

1. Dawson, Catherine, 2002, Practical Research Methods, New Delhi, UBS Publishers Distributors.
2. Kothari, C.R.,1985, Research Methodology-Methods and Techniques, New Delhi, Wiley Eastern Limited.
3. Kumar, Ranjit, 2005, Research Methodology-A Step-by-Step Guide for Beginners, (2nd Edition),Singapore, Pearson Education

Evaluation Scheme:

Continuous Assessment (A):

Theory:

1. One term test of 20 marks and one term test/presentation/assignment/course project/Group discussion/any other of 15 marks will be conducted during the semester.
2. Total duration allotted for writing Term Test 1 paper is 1 hr.
3. Total duration allotted for writing Term Test 2 paper is 45 minutes.

Semester End Examination (B):

Theory:

1. Question paper will be based on the entire syllabus summing up to 65 marks.
2. Total duration allotted for writing the paper is 2 hrs.

Prepared by | Checked by | Head of the Department | Vice Principal | Principal

Program: B.Tech in Computer Science and Engineering (IoT and Cybersecurity with Block chain Technology)	Final Year B.Tech	Semester : VII
Course: Public Systems and Policies	Course Code: DJS22ILO7020	

Teaching Scheme (Hours / week)				Evaluation Scheme							
				Continuous Assessment Marks (A)			Semester End Examination Marks (B)			Total marks (A+B)
Lectures	Practical	Tutorial	Total Credits	Term Test 1	Term Test 2	Total	Theory			
				20	15	35	65			100
				Term Work			Laboratory Examination			
3	–	--	3	Laboratory Work	Tutorial / Mini project / presentation/ Journal/ Practical	Total Term work	Oral	Practical	Oral & Practical	–
				–	--	–	–	–	–	

Prerequisites: Basic Knowledge of Social science and Current affairs

Course Objectives: The objective of the course is:

1. To analyze the transformations in public systems with emphasis on current initiatives and emerging challenges in the field.
2. To understand public systems in a fast-changing environment in the global context.
3. To provide an in-depth understanding of the ills prevailing in the society and aids to identify the solutions for them.
4. To explain public policy and its operations with special focus on policy relating to Government finance.
5. To analyze and evaluate the impact of the public policy on firms and economy at large.

Course Outcomes: On completion of the course, learner will be able to:

1. Understand the importance of public systems in a fast-changing environment in the global context.
2. Analyze the transformations in public systems with emphasis on current initiatives and emerging challenges in the field.
3. Explain public policy and its operations with special focus on policy relating to Government finance.
4. Make policies and know about the happenings in the world, in the nation and those in their locality.
5. Analyze and evaluate the impact of the public policy on firms and economy at large and work under various fields as policymakers.

Detailed Syllabus (Unit wise)		
Unit	**Description**	**Duration in Hours**
1	**Introduction and Overview of Public Systems:** Ideology of Public Systems; Mechanistic and Organic view of Society and Individuals, The Legal Framework; Federal Government; State and Local Governments, Government growth; The size of Government.	09
2	**Public Sector in the Economics Accounts:** Public Sector in the circular flow; Public Sector in the National Income Accounts.	06
3	**Public Choice and Fiscal Politics:** Direct Democracy; Representative Democracy; The Allocation Function; The Distribution Function; The Stabilization Function; Coordination of Budget Functions; The Leviathan Hypothesis.	07
4	**Introduction and Overview of Public Policy:** Markets and Government; Social goods and Market failure, Public expenditure and its evaluation; Cost Benefit Analysis, Public policy and Externalities, Taxation Policy and its impact, Income distribution, redistribution and social security issues Fiscal & Budgetary Policy, Fiscal Federalism in India.	11
5	**Case Studies in Expenditure Policy: Public Services** A) National Defense B) Highways C) Outdoor Recreation D) Education	06
	Total	39

Thakur

Books Recommended:

Reference Books:

1. Introduction to Public Policy by Charles Wheelan, W.W. Norton & Company.
2. Understanding Public Policy by Thomas R. Dye, Prentice Hall.
3. Public Policy-Making: An Introduction by Anderson J.E., Boston, Houghton.
4. Public Administration by Avasthi & Maheshwari, Lakshminarayan Agarwal, Agra.
5. New Horizons of Public Administration by Bhattacharya, Mohit, Jawahar Publishers, NewDelhi.
6. Public Administration and Public Affairs by Henry, Nicholas, Prentice Hall of India, New Delhi.
7. Public Finance 10th Edition by Harvey S Rosen and Ted Gayer, McGraw-Hill Education, 2013.
8. Public Finance in Theory and Practice by Musgrave and Musgrave.

Evaluation Scheme:

Continuous Assessment (A):

Theory:

1. One term test of 20 marks and one term test/presentation/assignment/course project/Group discussion/any other of 15 marks will be conducted during the semester.
2. Total duration allotted for writing Term Test 1 paper is 1 hr.
3. Total duration allotted for writing Term Test 2 paper is 45 minutes.

Semester End Examination (B):

Theory:

1. Question paper will be based on the entire syllabus summing up to 65 marks.
2. Total duration allotted for writing the paper is 2 hrs.

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Program: B.Tech in Computer Science and Engineering (IoT and Cybersecurity with Block chain Technology)				Final Year BTech			Semester : VII
Course : Project Stage I				Course Code: DJS22ICP703			
Teaching Scheme (Hours / week)				Evaluation Scheme			
				Continuous Assessment Marks (A)			Semester End Examination Marks(B)			Total marks (A+B)
Lectures	Practical	Tutorial	Total Credits	Term Test 1	Term Test 2	Total	Theory			
				--	--	--	--			--
				Term Work			Laboratory Examination			
--	4	--	2	Laboratory Work	Tutorial / Mini project / presentation/ Journal/ Practical	Total Term work	Oral	Practical	Oral & Practical	100
				--	50	50	--	--	50	

Course Objectives: The objective of the course is:

1. To introduce the students to professional engineering practice by providing them with an opportunity to work on an open-ended engineering problem.
2. To apply knowledge from different areas or courses, which they have studied in their curriculum using methods, tools, and techniques, which they learned to a real-world scenario.
3. To apply not only their engineering knowledge and proficiencies (hard skills), but also to demonstrate their competence in generic, professional skills (soft skills).
4. Emphasizes the importance of life-long learning as a fundamental attribute of graduate engineers

Course Outcomes: On completion of the course, learner will be able to:

1. Discover potential research areas in the field of IoT design with Security.
2. Survey several available literatures in the related field of study.
3. Compare the several existing solutions for research challenges.
4. Design the solution for the research plan.
5. Summarize the findings of the study conducted.
6. Work effectively as a member of the team.

Guidelines:

1. Project Topic:

- To proceed with the project work it is very important to select a right topic. Project can be undertaken on any subject addressing the programme. Research and development projects on problems of practical and theoretical interest should be encouraged.
- Project work must be carried out by the group of at least two students and maximum three and must be original.
- Students can certainly take ideas from anywhere, but be sure that they should evolve them in the unique way to suit their project requirements.
- The project work can be undertaken in a research institute or organization/company/any business establishment.
- Student must consult internal guide along with external guide (if any) in selection of topic.
- Head of department and senior staff in the department will take decision regarding selection of projects.
- Student has to submit weekly progress report to the internal guide and whereas internal guide has to keep track on the progress of the project and also has to maintain attendance report. This progress report can be used for awarding term work marks.
- In case of industry projects, visit by internal guide will be preferred.

2. Project Report Format:

At the end of semester, a project report should preferably contain at least following details: -
Abstract
Introduction
Literature Survey
Survey Existing system
Limitation Existing system or research gap
Problem Statement and Objective
Scope
Proposed System
Analysis/Framework/ Algorithm
Details of Hardware & Software
Design details
Methodology (your approach to solve the problem)
Implementation Plan for next semester
Conclusion
References

Evaluation Scheme:

Continuous Assessment (A):

Laboratory: (Term work)

The distribution of marks for term work shall be as follows:

1. Weekly Attendance on Project Day
2. Project work contribute
3. Mid-Sem Review
4. Project Report
5. Term End Presentation

Review 1:

Selection and finalization of project topic.

Review 2:

i. Implementation Details & Status (50% project implementation)
ii. Design & System Specifications
iii. Presentation Quality
iv. Contribution as a team member and Punctuality
v. Project Documentation.

Review 3:

i. Implementation Details & Status (80% project implementation)
ii. Draft copy of research paper

The final certification and acceptance of term work will be subject to satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the term work.

Semester End Examination (B):

Laboratory:

- Oral and practical examination of Project Stage-I should be conducted by Internal and External examiners.
- Students have to give presentation and demonstration on the Project.

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