Shri Vile Parle Kelavani Mandal's

Dwarkadas J. Sanghvi College of Engineering

(Autonomous College Affiliated to the University of Mumbai)

Scheme and detailed syllabus

Final Year B.Tech

in

Computer Science and Engineering (IoT and Cyber Security with Blockchain Technology)

(Semester VII)

With effect from the Academic Year: 2024-2025

Proposed Scheme for Final Year B.Tech. CSE (IoT and Cybersecurity with Blockchain Technology) Semester VII (Autonomous)

(Academic Year 2024-2025)

Sr No	Course Code	Course	Teaching Scheme(hr)			Continuous Assessment (A)			Semester End Assessment (B)					Aggregate (A+B)	Credits earned	
			Theory	Practical	Credits	Th.	T/W	Total CA (A)	Theory	Oral	Practical	Oral & Pract	Total SEA(B)			
1	DJ19ICC701	Blockchain for Cybersecurity	3	--	3	25	--	25	75	--	--	--	75	100	3	4
	DJ19ICL701	Blockchain for Cybersecurity Laboratory	--	2	1	--	25	25	--	25	--		25	50	1	
2	DJ19ICC702	Secure Software Engineering	3	--	3	25	--	25	75	--	--	--	75	100	3	4
	DJ19ICL702	Secure Software Engineering Laboratory	--	2	1	--	25	25	--	25	--	--	25	50	1	
3 @ Any 1 Core Elective	DJ19ICEC7011	Deep Learning	3	--	3	25	--	25	75	--	--	--	75	100	3	4
	DJ19ICEL7011	Deep Learning Laboratory	--	2	1	--	25	25	--	25	--	--	25	50	1	
	DJ19ICEC7012	Malware Analysis	3	--	3	25	--	25	75	--	--	--	75	100	3	
	DJ19ICEL7012	Malware Analysis Laboratory	--	2	1	--	25	25	--	25	--	--	25	50	1	
	DJ19ICEC7013	Data Analytics and Visualization	3	--	3	25	--	25	75	--	--	--	75	100	3	
	DJ19ICEL7013	Data Analytics and Visualization Laboratory	--	2	1	--	25	25	--	25	--	--	25	50	1	
#4	DJ19ILO7011	Product Life Cycle Management	3	--	3	25	--	25	75	--	--	--	75	100	3	3
	DJ19ILO7012	Management Information System	3	--	3	25	--	25	75	--	--	--	75	100	3	
	DJ19ILO7013	Operations Research	3	--	3	25	--	25	75	--	--	--	75	100	3	
	DJ19ILO7014	Cyber Security and Laws	3	--	3	25	--	25	75	--	--	--	75	100	3	
	DJ19ILO7015	Personal Finance Management	3	--	3	25	--	25	75	--	--	--	75	100	3	
	DJ19ILO7016	Energy Audit and Management	3	--	3	25	--	25	75	--	--	--	75	100	3	
	DJ19ILO7017	Disaster Management and Mitigation Measures	3	--	3	25	--	25	75	--	--	--	75	100	3	
	DJ19ILO7018	Science of Well-being	3	--	3	25	--	25	75	--	--	--	75	100	3	
	DJ19ILO7019	Research Methodology	3	--	3	25	--	25	75	--	--	--	75	100	3	
	DJ19ILO7020	Public Systems and Policies	3	--	3	25	--	25	75	--	--	--	75	100	3	
5	DJ19ICCP703	Project Stage I	--	4	2	--	50	50	--	50	--	--	50	100	2	2
		Total	**12**	**10**	**17**	**100**	**125**	**225**	**300**	**125**	--	--	**425**	**650**	17	17

Th	Theory	**T/W**	Term work
P	Practical	**O**	Oral
T	Tutorial		

Program: Final Year B.Tech. in IoT and Cyber Security with Blockchain Technology	**Semester : VII**
Course : Blockchain for Cybersecurity	**Course Code: (DJ19ICC701)**
Course Laboratory: Blockchain for Cybersecurity Laboratory	**Course Code: (DJ19ICL701)**

Teaching Scheme (Hours / week)				**Evaluation Scheme**						
				Semester End Examination Marks (A)			**Continuous Assessment Marks (B)**			**Total marks (A+ B)**
Lectures	**Practical**	**Tutorial**	**Total Credits**	**Theory**			**Term Test1**	**Term Test2**	**Total Term Test**	
				75			**25**	**25**	**25**	**100**
				Laboratory Examination			**Term work**		**Total Term work**	**50**
3	**2**		**4**	**Oral**	**Practical**	**Oral & Practical**	**Laboratory Work**	**Tutorial / Mini project / presentation/ Journal**		
				25	**--**	**--**	**15**	**10**	**25**	

Prerequisite:

1. Introduction to Blockchain technology
2. Applied Cryptography
3. Security in Computing

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.

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. Articulate the importance of privacy in blockchain networks and the specific challenges posed by enterprise-grade distributed ledger systems.

Detailed Syllabus: (unit wise)		
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	**6**
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	**6**
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	**6**
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	**6**
6	**Privacy in Hyperledger Fabric** Membership and Access control in Fabric, Authentication in fabric network, Channel encryption, Blockchain Security (Fabric SideDB), Security of a ledger, The future of cybersecurity with blockchain	**5**
	Total	**39**

List of Laboratory Experiments: (Minimum any eight 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	Build blockchain-based apps for Two-factor authentication (2FA)
5	Implement Ethereum based secure DNS infrastructue
6	Deploy the blockchain-based DDoS protection platform
7	Develop Blockchain-based PKI solutions and apps for storing DNS entries
8	Create smart contracts for tasks such as data validation or access control.
9	Implementation of cryptographic hashing, digital signatures, and time stamping for data verification
10	Develop smart contracts to handle data storage and transfer operations securely on the blockchain.
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. 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. https://www.leewayhertz.com/smart-contracts-security/
4. https://ethereum-contract-security-techniques-and-tips.readthedocs.io/en/latest/
5. https://www.ibm.com/topics/blockchain-security
6. https://www.hindawi.com/journals/wcmc/2022/4079781/
7. https://dl.acm.org/doi/10.1145/3316481

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**

Evaluation Scheme:

Semester End Examination (A):

Theory:

1. Question paper will be based on the entire syllabus summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Laboratory:

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

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester out of which; one will be a compulsory term test (on minimum 02 Modules) and the other can either be a term test or an assignment on live problems or a course project.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading

Laboratory: (Term work)

Term work shall consist of minimum 8 experiments.

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

1. Laboratory work (Performance of Experiments): 15 Marks
2. 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.

Prepared by Checked by Head of the Department Vice Principal Principal

Program: B.Tech. in CSE(IoT and Cyber Security with Blockchain Technology)	**Semester : VII**
Course : Secure Software Engineering	**Course Code: DJ19ICC702**
Course: Secure Software Engineering Laboratory	**Course Code:DJ19ICL702**

Teaching Scheme (Hours / week)				**Evaluation Scheme**						
				Semester End Examination Marks (A)			**Continuous Assessment Marks (B)**			**Total marks (A+ B)**
Lectures	**Practical**	**Tutorial**	**Total Credits**	**Theory**			**Term Test 1**	**Term Test 2**	**Total**	
				75			**25**	**25**	**25**	**100**
				Laboratory Examination			**Term work**		**Total Term work**	**50**
3	**2**	**--**	**4**	**Oral**	**Practical**	**Oral & Practical**	**Laboratory Work**	**Tutorial / Mini project / presentation/ Journal**		
				25	**--**	**--**	**15**	**10**	**25**	

Pre-requisite:

1. Concepts of Object-Oriented Programming & Methodology

Objectives: The course aims:

1. To provide knowledge of software engineering discipline.
2. To apply analysis, design and testing principles to software project development.
3. To demonstrate and evaluate real time projects with respect to software engineering principles.

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

1. Understand and demonstrate basic knowledge in software engineering.
2. Identify requirements, analyze and prepare models.
3. Plan, schedule and track the progress of the projects.
4. Identify risks, manage the change to assure quality in software projects
5. Apply testing principles on software project and understand the maintenance concepts
6. Understand the properties of secure software.

Detailed Syllabus: (unit wise)		
Unit	Description	Duration
1	**Introduction To Software Engineering and Process Models** 1.1 Nature of Software, Software Engineering, Software Process,Capability Maturity Model (CMM) 1.2 Secure Software Development Lifecycle (SDLC): Stages of the SDLC and the role of security at each stage, Integrating security into requirements, design, implementation, testing, and deployment, Case studies of security breaches and the impact on SDLC. 1.3 Generic Process Model, Prescriptive Process Models: The Waterfall Model, V-model, Incremental Process Models, Evolutionary Process Models, Concurrent Models, Agile process, Agility Principles, Extreme Programming (XP), Scrum, Kanban model	06
2	**Requirements Analysis, Modelling and Project Scheduling** 2.1 Requirement Elicitation, Software requirement specification (SRS), Developing Use Cases (UML)Requirement Model – Scenario-based model, Class-based model, Behavioral model, DFD 2.2 Project scheduling: Defining a Task Set for the Software Project, Timeline charts, Tracking the Schedule,Software Project Estimation: LOC, FP and COCOMO	12
3	**Secure Software** 3.1 Introduction, Defining Properties of Secure Software: Core Properties of Secure Software. Influential Properties of Secure Software. The Role of Processes and Practices in Software Security. 3.2 Threats to Software Security. Sources of Software Insecurity. The Benefits of Detecting Software Security Defects Early How to Influence the Security Properties of Software: The Defensive Perspective. The Attacker's Perspective.	07
4	**Software Testing and Maintenance** 4.1 Strategic Approach to Software Testing, Unit testing, Integration testing Verification, Validation Testing, System Testing 4.2 White-Box Testing , Basis Path Testing, Control Structure Testing, Black-Box Testing, 4.3 Software maintenance and its types, Software Re-engineering, Reverse Engineering	06
5	**Architecting Secure Software Systems** 5.1 Security Requirements Analysis, Threat Modelling, Security Design Patterns Anti-Patterns, Attack Patterns, Security Design Patterns, Authentication, Authorization -Security Coding Security Algorithm, Security Protocol, Key Generation	04
6	**Secure Coding Principles** 6.1 Coding in C String manipulation, vulnerabilities and exploits, Pointers based vulnerabilities. Coding C++ and JAVA - Memory management, common errors, Integer Security, Double free Vulnerabilities 6.2 Input Validation and Output Encoding: Importance of proper input validation, Techniques for output encoding to prevent Cross-Site Scripting (XSS) attacks, Secure handling of user inputs in different programming languages.	04
	Total	**39**

List of Laboratory Experiments:

Sr. No.	Title of Experiments
1	Prepare detailed statement of problem for the selected / allotted mini project and identify suitable process model for the same with justification.
2	Develop Software Requirement Specification (SRS) document in IEEE format for the project.
3	Use project management tool to prepare schedule for the project.
4	Prepare RMMM plan for the project.
5	Identify scenarios & develop UML Use case and Class Diagram for the project.
6	Draw DFD (upto 2 levels) and prepare Data Dictionary for the project.
7	Develop Activity / State Transition diagram for the project.
8	Develop Sequence and Collaboration diagram for the project
9	Change specification and make different versions using any SCM Tool.
10	Develop test cases for the project using white box testing.

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

Books Recommended:

Text Books

1. Roger Pressman, ―Software Engineering: A Practitioner‘s Approach",McGraw-Hill Publications, 7th edition, 2009.

2. Suhel Ahamed Khan, Rajeev Kumar, Raees Ahamed Khan, SOFTWARE SECURITY CONCEPTS AND PRACTICES, A Chapman &Hall Book, CRC Press,2023

3. Ian Sommerville, ―Software Engineering‖, Pearson Education,10th edition, 2017.

4. Asoke K. Talukder, Manish Chaitanya, Architecting Secure Software Systems, ISBN 9781420087840, 2008

5. Software Security Engineering A Guide for Project Managers by Julia H.Allen, ean J. Barnum, Robert J. Ellison and Gary McGraw, May 11, 2008

Reference Books

1. Ugrasen Suman, ―Software Engineering Concepts and Practices‖, Cengage Learning, 2nd edition 2022.

2. Pankaj Jalote, "An integrated approach to Software Engineering", Springer/Narosa,3rd Edition, 2005.

3. Jibitesh Mishra and Ashok Mohanty, ―Software Engineering‖, Pearson,1st Edition, 2011.

4. Rajib Mall, "Fundamentals of Software Engineering", Prentice Hall India,2018.

Web resources:

1. https://hyperproof.io/resource/secure-software-development-best-practices/
2. https://www.javatpoint.com/software-engineering

Online Courses: NPTEL / Swayam

1. Course on- Software Engineering-

https://onlinecourses.nptel.ac.in/noc21_cs65/preview

2. Course on- Secure Systems Engineering

-https://archive.nptel.ac.in/noc/courses/noc21/SEM1/noc21-cs30/

Evaluation Scheme:

Semester End Examination (A):

Theory:

1. Question paper based on the entire syllabus will comprise of 5 questions (All compulsory, but with internal choice as appropriate), each carrying 15 marks, total summing up to 75 marks.

2. Total duration allotted for writing the paper is 3 hrs.

Laboratory:

1. Oral examinations will be based on the entire syllabus including the practical's performed during laboratory sessions.

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester out of which one will be a compulsory term test (on minimum 02 Modules) and the other can either be a term test or an assignment on live problems or a course project.

2. Total duration allotted for writing each of the paper is 1 hr.

3. Average of the marks scored in the both the tests will be considered for final grading.

Laboratory: (Term work)

Laboratory work will be based on **DJ19ICC702** with a minimum of 08 experiments.

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

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

2. Journal Documentation (Write-up and Assignments): 05 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.

Prepared by Checked by Head of the Department Vice Principal Principal

Program: Final Year B.Tech. in IoT and Cyber Security with Blockchain Technology	**Semester : VII**
Course : Deep Learning	**Course Code: (DJ19ICEC7011)**
Course Laboratory: Deep Learning Laboratory	**Course Code: (DJ19ICEL7011)**

Teaching Scheme (Hours / week)				**Evaluation Scheme**					
				Semester End Examination Marks (A)			**Continuous Assessment Marks (B)**			**Total marks (A+ B)**
Lectures	**Practical**	**Tutorial**	**Total Credits**	**Theory**			**Term Test1**	**Term Test2**	**Total Term Test**	
				75			**25**	**25**	**25**	**100**
				Laboratory Examination			**Term work**		**Total Term work**	**50**
3	**2**		**4**	**Oral**	**Practical**	**Oral & Practical**	**Laboratory Work**	**Tutorial / Mini project / presentation/ Journal**		
				25	**--**	**--**	**15**	**10**	**25**	

Pre-requisite: Linear Algebra, Calculus, Probability, Statistics and Machine Learning Basics.

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 (CO): 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	**5**
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.	**8**
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.	**6**
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.	**7**
5	**Unsupervised Learning Networks:** Kohonen Self-Organizing Feature Maps – architecture, training algorithm, Kohonen Self- Organizing Motor Map. **Autoencoders:** Linear Factor Methods such as Probabilistic PCA and Factor Analysis, Independent Component Analysis, Sparse Coding; Undercomplete Autoencoders, Regularized Autoencoders, Stochastic Encoders and Decoders, Denoising Autoencoders, Contractive Autoencoders, Applications of Autoencoders.	**7**
6	**Generative Adversarial Networks:** Generative Vs Discriminative Modelling, Probabilistic Generative Model, Generative Adversarial Networks (GAN), GAN challenges: Oscillation Loss, Mode Collapse, Uninformative Loss, Hyper parameters, Tackling GAN challenges, Wasserstein GAN, Cycle GAN, Neural Style Transfer.	**6**
	Total	**39**

List of experiments

Sr. No	Experiment
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	Building CNN models for image categorization.
6	Visualizing Convolutional Neural Network using Tensor Flow with Keras Data.
7	OCR using tesseract.
8	Object detection using RNN using YOLO and Tensor Flow
9	Anomaly detection using Self-Organizing Network.
10	Compare the performance of PCA and Autoencoders on a given dataset.
11	Build Generative adversarial model for fake (news/image/audio/video) prediction.

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

2. Coursera:
Deep Learning Specilization, By DeepLearning.AI
https://www.coursera.org/specializations/deep-learning#courses

Evaluation Scheme:

Semester End Examination (A):

Theory:

1. Question paper will be based on the entire syllabus summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Laboratory:

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Continuous Assessment (B):

Theory:

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3. Average of the marks scored in both the two tests will be considered for final grading.

Laboratory: (Term work)

Term work shall consist of minimum 8 experiments and Mini project.

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

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

Prepared by Checked by Head of the Department Vice Principal Principal

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<tr><td rowspan="3">Lectures</td><td rowspan="3">Practical</td><td rowspan="3">Tutorial</td><td rowspan="3">Total Credits</td><td colspan="3">Theory</td><td>Term Test1</td><td>Term Test2</td><td>Total Term Test</td><td></td></tr>
<tr><td colspan="3">75</td><td>25</td><td>25</td><td>25</td><td>100</td></tr>
<tr><td colspan="3">Laboratory Examination</td><td colspan="3">Term work</td><td rowspan="3">Total Term work</td><td rowspan="3">50</td></tr>
<tr><td rowspan="2">3</td><td rowspan="2">2</td><td rowspan="2">--</td><td rowspan="2">4</td><td>Oral</td><td>Practical</td><td>Oral & Practical</td><td>Laboratory Work</td><td colspan="2">Tutorial / Mini project / presentation/ Journal</td></tr>
<tr><td>25</td><td>--</td><td>-</td><td>15</td><td colspan="2">10</td><td>25</td></tr>
</table>

Prerequisite:

1. Vulnerability Assessment and Penetration Testing

Objectives: The course aims:

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

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

1. Identify various malwares and understand the behavior of malwares in real world applications.
2. Implement different malware analysis techniques.
3. Understand the fundamental principles of static malware analysis and its importance in cybersecurity.
4. Apply advanced dynamic analysis techniques to analyze sophisticated malware threats
5. Assess of malware functionality and the tools and techniques.
6. Explore advanced obfuscation methods.

Detailed Syllabus: (unit wise)		
Unit	**Description**	**Duration**
1	**Introduction and Basic Analysis** **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.	**7**
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.	**6**
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.	**8**
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	**8**
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.	**6**
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.	**4**
	Total	**39**

List of experiments

Sr. No	Experiment
1	To perform static analysis of malware binaries using tools like PEiD or FileInsight to analyze malware file headers, sections, and embedded resources.
2	To perform Dynamic Malware Analysis using a malware sandbox like Cuckoo Sandbox to run malware samples and analyze their runtime behavior, including file system changes, registry modifications, and network communications.
3	To perform memory forensics tools like Volatility to extract malware-related artifacts from memory dumps, such as processes, DLLs, and network connections.
4	To Use packet capture tools like Wireshark to capture and analyze malware network traffic, focusing on protocols commonly used by malware for communication (e.g., HTTP, DNS).
5	Reverse engineer malware binaries using disassemblers and debuggers like IDA Pro or OllyDbg to analyze malware code, identify malicious routines, and understand the malware's operation.
6	Reverse engineer malware binaries using reverse engineering tools like Radare2 or Ghidra to analyze malware binaries and understand their internal workings.
7	Implement malware workflow orchestration tools like Apache Airflow or Jenkins to automate the entire analysis pipeline.
8	TO perform Virus Total API Online service for analyzing suspicious files and URLs.
9	To write YARA Yet Another Ridiculous Acronym rule to aid in detection of malware samples.
10	Document the findings, analysis results, and mitigation recommendations in a comprehensive report or presentation.
11	Android malware analysis using mobsf.

Books Recommended:

Text Books:

1. Abhijit Mohanta, Anoop Saldanha, Malware Analysis and Detection Engineering a Comprehensive Approach to Detect and Analyze Modern Malware, 2020, 1st edition, Apress (ISBN 978-1-4842-6192-7), United States.
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" by No Starch Press, 2012,ISBN: 9781593272906
4. Mastering Malware Analysis Alexey Kleymenov, Amr Thabet 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/
2. https://www.coursera.org/learn/malware-analysis-and-assembly
3. Penetration Testing Execution Standard (PTES) - http://www.pentest-standard.org/
4. SANS Institute - https://www.sans.org/
5. Metasploit Unleashed - https://www.metasploitunleashed.com/
6. 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/

Evaluation Scheme:

Semester End Examination (A):

Theory:

1. Question paper will be based on the entire syllabus summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Laboratory:

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

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester out of which; one will be a compulsory term test (on minimum 02 Modules) and the other can either be a term test or an assignment on live problems or a course project.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.

Laboratory: (Term work)

Term work shall consist of minimum 8 experiments and Mini project. The distribution of marks for term work shall be as follows:

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

Prepared by Checked by Head of the Department Vice Principal Principal

Program: B.Tech. in CSE(IoT and Cyber Security with Blockchain Technology)	Semester : VII
Course : Data Analytics and Visualization	Course Code: DJ19ICEC7013
Course: Data Analytics and Visualization Laboratory	Course Code: DJ19ICEL7013

Teaching Scheme (Hours / week)				Evaluation Scheme						
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)			Total marks (A+ B)
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Total	
				75			25	25	25	100
				Laboratory Examination			Term work		Total Term work	50
3	2	--	4	Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Miniproject / presentation/ Journal		
				25	--	--	15	10	25	

Prerequisite:

1. Basic statistics and Maths
2. Python programming

Objectives: The course aims:

1. To Introduce the concept of Data Analytics Lifecycle.
2. To Develop Mathematical concepts required for advance regression.
3. To Understand data modeling in time series and its process.
4. To create awareness about Text analytics and its applications.
5. To provide overview of Data analytics and visualization with Python.
6. To explore different stages of visualization.

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

1. Comprehend basics of data analytics and visualization.
2. Apply various regression models on given data set and perform prediction..
3. Demonstrate advance understanding of Time series concepts and analysis of data using various time series models.

4. Analyze Text data and gain insights.
5. Explore different stages of visualization .
6. Explore diverse analytics methodologies and visualization approaches leveraging Python.

Detailed Syllabus: (unit wise)

Unit	Description	Duration
1	**Introduction to Data analytics and life cycle** Data Analytics Lifecycle overview: Key Roles for a Successful Analytics, Background and Overview of Data Analytics Lifecycle Project **Phase 1**: Discovery, **Phase 2**: Data Preparation ,**Phase 3**: Model Planning, **Phase 4**: Model Building **Phase 5:** Communicate Results **Phase 6:** Operationalize	5
2	**Regression Models** Introduction to simple Linear Regression: The Regression Equation, Fitted value and Residuals, Least Square Introduction to Multiple Linear Regression: Assessing the Model, Cross-Validation, Model Selection and Stepwise Regression, Prediction Using Regression Logistic Regression: Logistic Response function and logit, Logistic Regression and GLM, Generalized Linear model, Predicted values from Logistic Regression, Interpreting the coefficients and odds ratios, Linear and Logistic Regression: similarities and Differences, Assessing the models.	8
3	**Time Series** Overview of Time Series Analysis Box-Jenkins Methodology, ARIMA Model Autocorrelation Function (ACF) ,Autoregressive Models ,Moving Average Models ,ARMA and ARIMA Models , Building and Evaluating an ARIMA Model, Reasons to Choose and Cautions	7
4	**Text Analytics** History of text mining, Roots of text mining overview of seven practices of text analytic, Application and use cases for Text mining: extracting meaning from unstructured text, Summarizing Text. Text Analysis Steps, A Text Analysis Example , Collecting Raw Text ,Representing Text, Term Frequency—Inverse Document Frequency (TFIDF),Categorizing Documents by Topics, Determining Sentiments , Gaining Insights .	7
5	**Introduction to Visualization and Stages** Computational Support – Issues – Different Types of Tasks – Data representation Limitation: Display Space- Rendering Time,Navigation Links. Human Vision ,Space Limitation ,Time Limitations, Design, Exploration of Complex Information Space, Figure Caption in Visual Interface ,Visual Objects and Data Objects Space Perception and Data in Space , Images, Narrative and Gestures for Explanation.	6
6	**Data analytics and Visualization with Python** Essential Data Libraries for data analytics: Pandas, NumPy, SciPy. Plotting and visualization with python: Introduction to Matplotlib, Basic Plotting with Matplotlib, Create Histogram, BarChart, Pie chart, Box Plot, violin plot using Matplotlib. Introduction to seaborn Library, Multiple Plots, Regression plot, regplot.	6
	Total	39

List of Laboratory Experiments: (Minimum any eight experiments)	
Sr. No.	**Suggested Experiments**
1	Getting introduced to data analytics libraries in Python.
2	Simple Linear Regression in Python.
3	Multiple Linear Regression in Python.
4	Time Series Analysis in Python.
5	Implementation of ARIMA model in python.
6	Create interactive visualizations for data exploration using Plotly.
7	Perform text mining on a set of documents and visualize the most important words in a visualization such as word cloud.
8	Build cartographic visualization for multiple datasets involving various countries of the world; states and districts in India etc. Using Tableau.
9	Develop a dynamic dashboard using Tableau.
10	Develop a dynamic dashboard using Power BI.
11	Create an interactive data story.

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

Books Recommended:

Text Books:

1. Data Analytics using Python , Bharati Motwani, Wiley Publications ,2020
2. Better Data Visualizations A Guide for Scholars, Researchers, and Wonks, Jonathan Schwabish, Columbia University Press ,2021.
3. Anil Maheshwari, "Data Analytics", McGraw Hill Education 2nd Edition 2023

Reference Books:

1. Wes McKinney, 'Python for Data Analysis', O'Reilly, 3 nd Edition, 2023

2. Jeffrey Shaffer, Steve Wexier, Andy Cotgreave, 'The Big Book of Dashboards: Visualizing your Data using Real-World Business Scenarios', Wiley, 1 st Edition, 2017.

Web resources:

1. https://towardsdatascience.com/introduction-to-arima-for-time-series-forecasting
2. https://www.coursera.org/specializations/data-science-python
3. https://www.geeksforgeeks.org/data-visualization-with-python/

Online Courses:

Data story telling with Power BI :https://www.coursera.org/learn/data-storytelling-with-power-bi

NPTEL Course:

https://onlinecourses.nptel.ac.in/noc19_ge20/preview

Evaluation Scheme:

Semester End Examination (A):

Theory:

1. Question paper will be based on the entire syllabus summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Laboratory:

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

Continuous Assessment(B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester out of which; one will be a compulsory term test (on minimum 02 Modules) and the other can either be a term test or an assignment on live problems or a course project.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.

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.

Program: Final Year (Common for All Programs)										Semester: VII
Course: Product Life Cycle Management										Course Code: DJ19ILO7011
Teaching Scheme (Hours / week)				Evaluation Scheme						
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)			Total marks (A+ B)
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.	
				75			25	25	25	100
				Laboratory Examination			Term work		Total Term work	--
3	--	--	3	Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation/ Journal		
				--	--	--	--	--	--	

Pre-requisite: Knowledge of basic concepts of Management.

Objectives: The course aims:

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

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 Management‖, 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.

Evaluation Scheme:

Semester End Examination (A):

Theory:

1. Question paper based on the entire syllabus will comprise of 5 questions (All compulsory, butwith internal choice as appropriate), each carrying 15 marks, total summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester out of which; one will be a compulsory term test (on minimum 02 Modules) and the other can either be a term test or an assignment on live problems or a course project.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.

Prepared by Checked by Head of the Department Vice Principal Principal

Program: Final Year (Common for All Programs)										Semester: VII			
Course: Management Information System										Course Code: DJ19ILO7012			
Teaching Scheme (Hours / week)				Evaluation Scheme									
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)					Total marks (A+ B)	
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2		Avg.			
				75			25	25		25		100	
				Laboratory Examination			Term work			Total Term work			
3	--	--	3	Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation/ Journal				--	
				--	--	--	--	--		--			

Objectives: The course aims:

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

Outcomes: Learner will be able to…

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

Evaluation Scheme:

Semester End Examination (A):

Theory:

1. Question paper based on the entire syllabus will comprise of 5 questions (All compulsory, butwith internal choice as appropriate), each carrying 15 marks, total summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester out of which; one will be a compulsory term test (on minimum 02 Modules) and the other can either be a term test or an assignment on live problems or a course project.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.

Prepared by Checked by Head of the Department Vice Principal Principal

Program: Final Year (Common for All Programs)										Semester: VII
Course: Operations Research										Course Code: DJ19ILO7013
Teaching Scheme (Hours / week)				Evaluation Scheme						
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)			Total marks (A+ B)
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.	
				75			25	25	25	100
				Laboratory Examination			Term work		Total Term work	--
3	--	--	3	Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation/ Journal		
				--	--	--	--	--	--	

Pre-requisites: Basic Knowledge of Algebra, Probability and Statistics.

Objectives:

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.

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:

Semester End Examination (A):

Theory:

1. Question paper based on the entire syllabus will comprise of 5 questions (All compulsory, but with internal choice as appropriate), each carrying 15 marks, total summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester out of which; one will be a compulsory term test (on minimum 02 Modules) and the other can either be a term test or an assignment on live problems or a course project.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.

Prepared by Checked by Head of the Department Vice Principal Principal

Program: Final Year (Common for All Programs)	Semester: VII
Course: Cyber Security and Laws	Course Code: DJ19ILO7014

Teaching Scheme (Hours / week)				Evaluation Scheme						
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)			Total marks (A+ B)
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.	
				75			25	25	25	100
				Laboratory Examination			Term work		Total Term work	--
3	--	--	3	Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation/ Journal		
				--	--	--	--	--	--	

Objectives: The course aims:

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

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:

Semester End Examination (A):

Theory:

1. Question paper based on the entire syllabus will comprise of 5 questions (All compulsory, but with internal choice as appropriate), each carrying 15 marks, total summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester out of which; one will be a compulsory term test (on minimum 02 Modules) and the other can either be a term test or an assignment on live problems or a course project.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.

Program: Final Year (Common for All Programs)	Semester: VII
Course: Personal Finance Management	Course Code: DJ19ILO7015

Teaching Scheme (Hours / week)				Evaluation Scheme						
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)			Total marks (A+ B)
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.	
				75			25	25	25	100
				Laboratory Examination			Term work		Total Term work	--
3	--	--	3	Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation/ Journal		
				--	--	--	--	--	--	

Pre-requisites: Basic Knowledge of Algebra, Probability and Statistics.

Objectives: The course aims:

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.

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**
01	**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
02	**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
03	**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
04	**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
05	**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:

Semester End Examination (A):

Theory:

1. Question paper based on the entire syllabus will comprise of 5 questions (All compulsory, but with internal choice as appropriate), each carrying 15 marks, total summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Continuous Assessment (B):

Theory:

1. Consisting **One Class Tests for 25 marks** based on approximately 50% of contents and one casestudy with presentations for 25 Marks.
2. Total duration allotted for writing test paper is 1 hr.
3. Average of the marks scored in the tests and case study will be considered for final grading.

Prepared by Checked by Head of the Department Vice Principal Principal

Program: Final Year (Common for All Programs)	Semester: VII
Course: Energy Audit and Management	Course Code: DJ19ILO7016

Teaching Scheme (Hours / week)				Evaluation Scheme						
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)			Total marks (A+ B)
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.	
				75			25	25	25	100
				Laboratory Examination			Term work		Total Term work	--
3	--	--	3	Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation/ Journal		
				--	--	--	--	--	--	

Objectives: The course aims:

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.

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**
01	**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
02	**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
03	**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
04	**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
05	**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*

Evaluation Scheme:

Semester End Examination (A):

Theory:

1. Question paper based on the entire syllabus will comprise of 5 questions (All compulsory, but with internal choice as appropriate), each carrying 15 marks, total summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Continuous Assessment (B):

Theory:

1. Consisting of **Two Compulsory Class Tests for 25 marks**, First test based on approximately 40% of contents and second test based on remaining contents (approximately 40% but excluding contents covered in Test I)
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the tests will be considered for final grading.

Prepared by Checked by Head of the Department Vice Principal Principal

Program: Final Year (Common for All Programs)										Semester: VII
Course: Disaster Management and Mitigation Measures										Course Code: DJ19ILO7017
Teaching Scheme (Hours / week)				Evaluation Scheme						
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)			Total marks (A+ B)
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.	
				75			25	25	25	100
				Laboratory Examination			Term work		Total Term work	--
3	--	--	3	Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation/ Journal		
				--	--	--	--	--	--	

Objectives: The course aims:

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.

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:

Semester End Examination (A):

Theory:

1. Question paper based on the entire syllabus will comprise of 5 questions (All compulsory, but with internal choice as appropriate), each carrying 15 marks, total summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester out of which; one will be a compulsory term test (on minimum 02 Modules) and the other can either be a term test or an assignment on live problems or a course project.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.

Program: Final Year (Common for All Programs)										Semester: VII
Course: Science of Well-being										Course Code: DJ19ILO7018
Teaching Scheme (Hours / week)				Evaluation Scheme						
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)			Total marks (A+ B)
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.	
				75			25	25	25	100
				Laboratory Examination			Term work		Total Term work	--
3	--	--	3	Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation/ Journal		
				--	--	--	--	--	--	

Objectives: The course aims:

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.

Outcomes: Upon Completion of the course, the learner should 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.

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:

Semester End Examination (A):

Theory:

1. Question paper based on the entire syllabus will comprise of 5 questions (All compulsory, butwith internal choice as appropriate), each carrying 15 marks, total summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester out of which; one will be a compulsory term test (on minimum 02 Modules) and the other can either be a term test or an assignment on live problems or a course project.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.

Prepared by Checked by Head of the Department Vice Principal Principal

Program: Final Year Mechanical Engineering										Semester: VII
Course: Research Methodology										Course Code: DJ19ILO7019
Teaching Scheme (Hours / week)				Evaluation Scheme						
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)			Total marks (A+ B)
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.	
				75			25	25	25	100
				Laboratory Examination			Term work		Total Term work	--
3	--	--	3	Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation/ Journal		
				--	--	--	--	--	--	

Pre-requisites: Basic Knowledge of Probability and Statistics.

Objectives: The course aims:

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

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

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:

Semester End Examination (A):

Theory:

1. Question paper based on the entire syllabus will comprise of 5 questions (All compulsory, but with internal choice as appropriate), each carrying 15 marks, total summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester out of which; one will be a compulsory term test (on minimum 02 Modules) and the other can either be a term test or an assignment on live problems or a course project.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.

Prepared by Checked by Head of the Department Vice Principal Principal

Program: Final Year (Common for All Programs)										Semester: VII
Course: Public Systems and Policies										Course Code: DJ19ILO7020
Teaching Scheme (Hours / week)				Evaluation Scheme						
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)			Total marks (A+ B)
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.	
				75			25	25	25	100
				Laboratory Examination			Term work		Total Term work	--
3	--	--	3	Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation/ Journal		
				--	--	--	--	--	--	

Pre-requisites: Basic Knowledge of Social science and Current affairs

Objectives: The course aims:

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.

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

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:

Semester End Examination (A):

Theory:

1. Question paper based on the entire syllabus will comprise of 5 questions (All compulsory, but with internal choice as appropriate), each carrying15 marks, total summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester, out of which one will be a compulsory term test (on minimum 02 Modules) and the other can either be a term test or an assignment on live problems or a course project.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in the two tests will be considered for final grading.

Prepared by Checked by Head of the Department Vice Principal Principal

Program: B.Tech. in CSE(IoT and Cyber Security with Blockchain Technology)				Semester: VII					
Course: Project Stage I				Course Code: DJ19CPC703					
Teaching Scheme (Hours / week)				Evaluation Scheme					
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)			Total marks (A+ B)
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.	
				--			--	--	--	--
				Laboratory Examination			Term work			
--	4	--	2	Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation/ Journal	Total Term work	100
				50	--	--	--	50	50	

Course Objectives: The course aims:

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. The department must allocate 1 day in the VII semester every week.
2. The project work is to be conducted by a group of three students
3. Each group shall identify a potential research area/problem domain, on which the study is to be

conducted.

4. Each group will be associated with a project mentor/guide. The group should meet with the project mentor/guide periodically and record of the meetings and work discussed must be documented.
5. Students will do a rigorous literature survey of the problem domain by reading and understanding at least 3-5 research papers from current superior quality national/international journals/conferences. (Papers selected must be indexed by SCOPUS, Web of Science, Thomas Index, UGC Care etc.). The list of papers surveyed must be clearly documented.
6. Students will design and implement (30-40%) the system in Sem VII.
7. The project assessment for term work will be done at least two times at department level by giving presentation to panel members which consist of at least three (3) members as Internal examiners (including the project guide/mentor) appointed by the Head of the department of respective Program.
8. A report is to be prepared summarizing the findings of the literature survey. A comparative evaluation of the different
   techniques surveyed is also to be done.
9. Every team must publish their work in national / international conference/journals (if possible, publish in Scopus indexed journals).

Evaluation Scheme:

Semester End Examination

(A): Presentation:

1. Each group will be jointly evaluated by a team of Internal and External Examiners approved by the University of Mumbai.
2. Oral exams will be conducted on the design done by the students.

Continuous Assessment

(B): Presentation:

(Term work)

1. Each team must give a presentation/demo to the Internal Panel consisting of 3 domain experts.
2. Each team will prepare a report that will summarize the results of the literature survey and implementation and coding as project proposal in SEM VII. The list of papers surveyed must be clearly documented.

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

1. Term Work shall consist of full Project-I on above guidelines/syllabus.
2. The final certification and acceptance of term work will be subject to satisfactory performance and upon fulfilling minimum passing criteria in the term work.