Shri Vile Parle Kelavani Mandal's

Dwarkadas J. Sanghvi College of Engineering

(Autonomous College Affiliated to the University of Mumbai)

Scheme and detailed syllabus

Third Year B.Tech

in

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

(Semester VI)

Prepared by:- Board of Studies in Computer Science & Engineering

(IoT and Cyber Security with Blockchain Technology)

With effect from the Academic Year: 2024-2025

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

Scheme for Third Year Undergraduate Program in Computer Science and Engineering (IoT and Cyber Security with Block Chain Technology) : Semester VI (Autonomous) Academic Year (2024-2025)

Sr. No.	Course Code	Course	Teaching Scheme			Semester End Examination (A)						Continuous Assessment (B)					Aggregate (A+B)	Credits
			Theory (hrs.)	Practical (hrs.)	Tutorial (hrs.)	Duration	Theory	Oral	Pract	Oral & Pract	SEE Total	Term Test 1 (TT1) -a	Term Test 2 (TT2) - b	Total (a+b)	Term work	CA Total		
1	DJS22ICC601	Secure Software Engineering	3	--	--	2	65	--	--	--	65	20	15	35	--	35	100	3
	DJS22ICL601	Secure Software Engineering Laboratory	--	2	--	2	--	25	--	--	25	--	--	--	25	25	50	1
2	DJS22ICC602	Data Engineering	3	--	--	2	65	--	--	--	65	20	15	35	--	35	100	3
	DJS22ICL602	Data Engineering Laboratory	--	2	--	2	--	25	--	--	25	--	--	--	25	25	50	1
3	DJS22ICC603	Big Data Analytics	3	--	--	2	65	--	--	--	65	20	15	35	--	35	100	3
	DJS22ICL603	Big Data Analytics Laboratory	--	2	--	2	--	25	--	--	25	--	--	--	25	25	50	1
4	DJS22ICL604	Cloud Computing Laboratory	--	4	--	2	--	--	--	25	25	--	--	--	25	25	50	2
5 @	DJS22ICC6011	Machine Learning	3	--	--	2	65	--	--	--	65	20	15	35	--	35	100	3
	DJS22ICL6011	Machine Learning Laboratory	--	2	--	2	--	25	--	--	25	--	--	--	25	25	50	1
	DJS22ICC6012	Mobile Device Security and Forensics	3	--	--	2	65	--	--	--	65	20	15	35	--	35	100	3
	DJS22ICL6012	Mobile Device Security and Forensics Laboratory	--	2	--	2	--	25	--	--	25	--	--	--	25	25	50	1
	DJS22ICC6013	Cryptocurrency Technology	3	--	--	2	65	--	--	--	65	20	15	35	--	35	100	3
	DJS22ICL6013	Cryptocurrency Technology Laboratory	--	2	--	2	--	25	--	--	25	--	--	--	25	25	50	1
6#	DJS22IHL	Professional and Business Communication Laboratory	--	4	--	--	--	--	--	--	--	--	--	--	50	50	50	2
7	DJS22ILLL2	Innovative Product Development IV	--	2	--	2	--	--	--	25	25	--	--	--	25	25	50	1
		Total	**12**	**18**	**0**	**20**	**260**	**100**	**0**	**50**	**410**	**80**	**60**	**140**	**200**	**340**	**750**	**21**

@ Elective Course

2 hr Theory (Classwise)and 2 hr Activity based Laboratory(Batch wise)

21/01/25

Program: B.Tech in Computer Science and Engineering(IoT and Cybersecurity with Block Chain Technology)	T.Y.B.Tech	Semester: VI
Course: Secure Software Engineering	Course Code: DJS22ICC601	
Course: Secure Software Engineering Laboratory	Course Code: DJS22ICL601	

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	
				65			20	15	35	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:

Object-oriented programming using JAVA.

Course Objectives: The objectives of the course are:

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.

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

1. Understand and demonstrate basic knowledge in software engineering.
2. Identify requirements, and develop UML modelling.
3. Identify risks, manage the change to assure quality in software projects.
4. Design Security Patterns and Anti-Patterns.
5. Apply testing principles on software project and understand the maintenance concepts.
6. Understand secure coding principals.

Detailed Syllabus:		
Unit	**Description**	**Duration**
1	**Introduction to Software Engineering and Process Models** Nature of Software, Software Engineering, Software Process, Capability Maturity Model (CMM) Generic Process Model, Prescriptive Process Models: The Waterfall Model, Secure SDLC, 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** Requirement Elicitation, Software requirement specification (SRS), Developing Use Cases (UML) Requirement Model – Scenario-based model, Class-based model, Behavioral model. Project scheduling: Defining a Task Set for the Software Project, Timeline charts, Tracking the Schedule Software Project Estimation: LOC, FP and COCOMO	12
3	**Software Risk and Configuration Management** Risk Identification, Risk Assessment, Risk Projection, RMMM Software Configuration management, SCM repositories, SCM process Software Quality Assurance Task and Plan, Metrics, Software Reliability, Formal Technical Review (FTR), Walkthrough.	07
4	**Software Testing and Maintenance** Strategic Approach to Software Testing, Unit testing, Integration testing Verification, Validation Testing, System Testing Software Testing Fundamentals, White-Box Testing, Basis Path Testing, Control Structure Testing, Black-Box Testing, Software maintenance and its types, Software Re-engineering, Reverse Engineering	06
5	**Secure Software Design** Design Principles & Concepts, Objectives, Levels of Software Design, Secure Software Design Principals, Effective Modular Design, Cohesion and Coupling, Architectural design	04
6	**Secure Coding Principles** Coding in C String manipulation, Pointers based vulnerabilities. Coding C++ and JAVA - Memory management, common errors, Integer Security, Double free Vulnerabilities, 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 (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,2010
2. Ian Sommerville, —Software Engineeringl, Pearson Education (9th edition),2012
3. Asoke K. Talukder, Manish Chaitanya, Architecting Secure Software Systems, ISBN 9781420087840, 2008
4. 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
2. Pankaj Jalote, "An integrated approach to Software Engineering", Springer/Narosa
3. Jibitesh Mishra and Ashok Mohanty, —Software Engineering‖, Pearson
4. Rajib Mall, "Fundamentals of Software Engineering", Prentice Hall India

Web resources:

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

Online Courses: NPTEL / Swayam

1. Software Engineering, By Prof. Rajib Mall, IIT Kharagpur
https://onlinecourses.nptel.ac.in/noc21_cs65/preview

2. Secure Systems Engineering, By Prof. Chester Rebeiro, IT Madras
https://archive.nptel.ac.in/noc/courses/noc21/SEM1/noc21-cs30/

Evaluation Scheme:

Semester End Examination (A):

Theory:

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

Laboratory:

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

Continuous Assessment (B):

Theory:

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

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

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.

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

Program: B.Tech in Computer Science and Engineering (IoT and Cybersecurity with Block Chain Technology)	T.Y.B.Tech	Semester: VI
Course : Data Engineering	Course Code:DJS22ICC602	
Course: Data Engineering Laboratory	Course Code: DJS22ICL602	

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

Prerequisite:

1. Database Management System
2. Structured Query Language

Course Objectives: The objectives of the course are:

1. To define different data Architectures for Data Engineering Business Model.
2. To demonstrate ETL process on Dataware house.
3. To perform real-time analysis on data Engineering with Data Preprocessing traits.
4. To develop a comprehensive understanding of data Engineering by using GUI Based Tools.
5. To Understand Common data regulatory requirements for data security and privacy.

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

1. Describe different data Architectures for Data Engineering Business Model.
2. Introduced dataware house with utilization of different data Techniques and ETL process.
3. Build and Configuring the data Sources with utilization of Data Preprocessing traits.
4. Design Different Ways to Ingest Data with Message Queues and Event Streaming Platforms.
5. Demonstrate Data Transformation Tools to Optimize for Analytics.
6. Understand the Security aspects for Data Engineering based on Common data regulatory requirements.

Detailed Syllabus		
Unit	**Description**	**Duration**
1	**Fundamentals with Introduction to Data Engineering** Data Engineering Definition, Evolution and Lifecycle, Data Engineering and Data Science, Data Mining Definition, Data Mining as a step in KDD, Kind of patterns to be mined, Technologies used, Data Mining, applications, Principles of Good Data Architecture, Types of Data Architecture – Data Warehouse, DWH characteristics, Data Lake and Lambda Architecture.	**07**
2	**Data Extraction, Transformation, and Loading** ETL Overview, Requirements and Steps. Data Extraction- Source Identification and Data Extraction Techniques, Evaluation. Data Transformation- Types, Data Integration and Consolidation, Transformation for Dimension Attributes. Data Loading- Applying data Techniques and processes, Dimension Table and Fact Table.	**06**
3	**Data Pre-processing** Overview- Data Quality and Major Task in Data Pre-processing, Data Cleaning-Missing Value, Noisy Data and Data Cleaning as a Process, Data Integration-Redundancy and Correlation Analysis, Tuple Duplication, Data Value Conflict Detection and Resolution, Data Reduction-Overview of Data Reduction Strategies, Attribute Subset Selection, Regression and Log-Linear Models: Parametric Data Reduction, Histograms, Clustering and data Cube Aggregation. Overview of Data Transformation.	**07**
4	**Data Ingestion and Streaming** Definition and Key Engineering Considerations for the Ingestion Phase, Data Ingestion- Bounded Verses Unbounded Data, Synchronous versus Asynchronous Ingestion, Stream Ingestion Considerations- Schema Evolution, Late Arriving Data, Time to live and Message Size, Different Ways to Ingest Data- Direct Database Connection, Change data Capture, API's, Message Queues and Event Streaming Platforms.	**07**
5	**Transforming Data to Optimize for Analytics** Technical Requirements of Transformations, Making Raw data more Valuable, Data Transformations as a part of Pipeline, Types of Data Transformation Tools-GUI Based Tools, Apache Spark, Data Preparation Transformations – Optimizing the File Format, Optimizing with data Partitioning, Data Cleansing.	**06**

6	**Data Security and Privacy** Processes- Active Security, The Principle of Least Privilege, Technology- Patch and Update Systems, Monitoring, Alerting Network Access and Security for Low Level Data Engineering. Cataloguing your data to avoid data swamp, Technical Requirements Getting data security and governance Right: Common data regulatory requirements and core data protection concept.	06
Total		**39**

List of Laboratory Experiments	
Sr. No.	**Suggested Experiments**
1	To Implement Loading the data from CSV or JSON files using SQL command (PostgreSQL) or LOAD DATA (MySQL).
2	To Build an end-to-end ETL pipeline: extract data from an API, transform it and load it into a database.
3	To Load a large dataset into a data warehouse and run queries on it. (e.g., Google or BigQuery).
4	To Implement SQL-based transformations using data build tool to build a reliable data transformation pipeline.
5	To Build a data pipeline that applies multiple transformations to a dataset, creating a repeatable process
6	Implement least privilege principle to minimize the number of permissions granted to users by using database tool.
7	To implement Data Anonymization masking and redaction techniques to protect sensitive information.
8	To Test different data quality metrics and validation techniques by using Apache Spark.
9	To Share sensitive data with external organizations using Lake Formation's data sharing capabilities.
10	To perform fine-grained access control policies on tables and columns within your data lake.
11	To Configure Kinesis Data Firehose for streaming delivery to Amazon S3.
12	To Deploy dataset as an Infrastructure Using Apache Spark.
13	To Create Delta Lake Table and demonstrate how Delta Lake Enables the Lake House.

14	To implement data cataloguing and Sharing Services by using open-source tools Apache Atlas.
15	To Create Pipeline for the Gold Layer by using ETL Tools (Apache Spark or dbt).

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

Books Recommended:

Text Books:

1. Joe Reis, Matt Housley: Fundamentals of Data Engineering, Grayscale Edition, Shroff Publishing, 2023, ISBN: 97893355421548,
2. Han, Kamber, "Data Mining Concepts and Techniques", Morgan Kaufmann 3nd Edition, 2016, ISBN: 9780123814807
3. Gareth Eagar, Data Engineering with AWS, 1st Edition, Packt Publication, 2021, ISBN:978-1-80056-041-3
4. Paulraj Ponniah "Data Warehousing Fundamentals: A Comprehensive Guide for IT Professionals" Wiley Publications,2019, ISBN:978-0471412540
5. Manoj Kukreja, Data Engineering with Apache Spark, Delta Lake, and Lake House, Packt Publication,2017, 978-1-80107-774-3

Reference Books:

1. Michael Berry and Gordon Linoff "Data Mining Techniques", 2nd Edition Wiley Publications. 2020, ISBN: 978-0-471-47064-9
2. Carlo Vercellis, "Business Intelligence Data Mining and Optimization for Decision Making", Wiley,2021, ISBN:9781119965473.
3. Vikram Pudi & Radha Krishna, "Data Mining", Oxford Higher Education,2019, ISBN:9789332537231.
4. Introduction to Data Mining, Tan, Steinbach and Vipin Kumar, Pearson Education, 2019, ISBN:9789332586055.
5. Tarik Makota, Brian Maguire, Danny Gagne, Rajeev Chakrabarti, "Scalable Data Streaming with Amazon Kinesis", Packt Publication, 2021, ISBN:9781800564336.

Web resources:

1. Introduction to Data Mining- https://www.ibm.com/topics/data-mining
2. Data Extraction, Transformation, and Loading- https://www.ewsolutions.com/foundations-of-data-extraction-transform-load-etl/

3. Data Preprocessing, Classification and Association- https://www.kaggle.com/code/alirezahasannejad/data-preprocessing-in-machine-learning
4. Cluster and Outlier Analysis -https://docs.foursquare.com/analytics-products/docs/use-cases-cluster-outlier-analysis
5. Data Ingestion and Streaming - https://www.confluent.io/learn/data-ingestion/
6. Transforming Data to Optimize for Analytics - https://pages.matillion.com/rs/992-UIW-731/images/Optimize%20Analytics%20-%20Matillion_Final.pdf

Online Courses: NPTEL / Swayam

1. Data Mining, By Prof. Pabitra Mitra, IIT Kharagpur https://onlinecourses.nptel.ac.in/noc21_cs06/preview
2. Business Analytics and Data Mining Modeling Using R, By Prof. Gaurav Dixit, IIT Roorkee https://archive.nptel.ac.in/courses/110/107/110107092/
3. Introduction to Data Preprocessing, By Prof. Pabitra Mitra, IIT Kharagpur https://archive.nptel.ac.in/noc/courses/noc19/SEM1/noc19-cs15/
4. Business Analytics and Data Mining Modeling Using R Part-II, By Prof. Gaurav Dixit, IIT Roorkee https://archive.nptel.ac.in/courses/110/107/110107095/
5. Cyber Security and Privacy, By Prof. Saji K Mathew, IIT Madras, https://onlinecourses.nptel.ac.in/noc23_cs127/preview

Evaluation Scheme:

Semester End Examination (A):

Theory:

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

Laboratory:

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

Continuous Assessment (B):

Theory:

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Laboratory: (Term work)

Term work shall consist of minimum 8 experiments.

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

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Prepared by	Checked by	Head of the Department	Vice Principal	Principal

Program: B.Tech in Computer Science and Engineering (IoT and Cybersecurity with Block Chain Technology)	T.Y.B.Tech	Semester: VI
Course: Big Data Analytics	Course Code: DJS22ICC603	
Course: Big Data Analytics Laboratory	Course Code: DJS22ICL603	

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

Pre-requisite:

1. Database Management System.
2. Python Programming.

Course Objectives: The objectives of the course are:

1. To provide students with foundational knowledge of Big Data concepts, technologies, and tools, with a focus on Hadoop, enabling them to understand the challenges and infrastructure required for managing large-scale data.
2. To introduce students to NoSQL databases, their architecture patterns, and business applications, with practical experience in using MongoDB for managing and analyzing large datasets.
3. Understand the principles and implementation of the MapReduce programming model for processing large-scale data sets in distributed computing environments.
4. Understand and apply key techniques for finding similar items, mining data streams, conducting link analysis, and frequent itemset mining to address various challenges in big data analytics.
5. Explore the principles and methodologies behind recommendation systems, focusing on content-based and collaborative-filtering techniques to enhance user experience in big data applications.
6. Understand the representation of social networks as graphs and explore techniques for community detection, including the Clique Percolation Method, to analyze relationships and interactions within social structures.

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

1. Understand Big Data concepts, challenges, and applications, and apply Hadoop and its ecosystem to solve real-world problems.
2. Distinguish NoSQL architectures and use MongoDB to manage and analyze distributed unstructured data.
3. Execute complex data processing tasks using MapReduce and manage distributed applications with a focus on execution efficiency and fault tolerance.
4. Gain proficiency in techniques for big data analysis, including similarity search, stream processing, link analysis, and frequent itemset mining.
5. Develop expertise in building recommendation systems using content-based and collaborative filtering techniques.
6. Analyze social networks as graphs and apply community detection techniques like Clique Percolation

Detailed Syllabus		
Unit	**Description**	**Duration**
1	**Introduction to Big Data Analytics & Hadoop** Introduction to Big Data, Big Data characteristics, types of Big Data, Traditional vs. Big Data business approach. Technologies Available for Big Data, Infrastructure for Big Data, Big Data Challenges, Case Study of Big Data Solutions. Introduction to Hadoop. Core Hadoop Components, Hadoop Ecosystem, Physical Architecture, Name Node and Data Node.	**06**
2	**NoSQL** Introduction to NoSQL, NoSQL business drivers, NoSQL case studies. NoSQL data architecture patterns: Key-value stores, Graph stores, Column family (Bigtable) stores, Document stores, Variations of NoSQL architectural patterns. Analyzing big data with a shared-nothing architecture; Choosing distribution models: master-slave versus peer-to-peer Introduction to MongoDB, MongoDB commands.	**08**
3	**MapReduce** MapReduce and The New Software Stack: Distributed File Systems, Physical Organization of Compute Nodes, Large Scale File-System Organization. MapReduce: The Map Tasks, Grouping by Key, The Reduce Tasks, Combiners, Details of MapReduce Execution, Matrix vector multiplication using MapReduce, Coping With Node Failures	**08**
4	**Techniques in Big Data Analytics** Finding Similar Item: Nearest Neighbor Search, Similarity of Documents	**10**

	Mining Data Streams: Data Stream Management Systems, Data Stream Model, Apache Spark. Apache Beam Link Analysis: PageRank Definition, Structure of the web, dead ends, Using Page rank in a search engine Frequent Itemset Mining: Market Basket Model- Applications, Association Rule-Confidence, Interest, Support. Apriori Algorithm - Pass1, Pass2.	
5	**Big Data Analytics Applications** Recommendation Systems: Introduction, A Model for Recommendation Systems, Content based Recommendation System, Collaborative-Filtering System: Nearest Neighbour Technique, Example.	**04**
6	**Mining Social-network Graphs:** Social Networks as graphs, Types of Social-network, relevance of community detection, Clique Percolation Method	**03**
Total		**39**

List of Laboratory Experiments:	
Sr. No.	**Suggested Experiments**
1	Case Study on Hadoop Installation and HDFS Commands
2	Installation of MongoDB, and execution of CREATE, INSERT, DELETE and UPDATE operations. Querying in MongoDB.
3	Implement Word Count program in Map- Reduce.
4	Execution of PIG SCRIPTING language and PIG Commands.
5	Execution of HIVE SCRIPTING language.
6	Implement any Social Analysis Tool (Pajek/SocNet/ Graphviz).
7	Language Processing with SPARK
8	Consumer and Consumer Groups implementation on kafka.
9	Data visualization (Tablaue/ SAS/ PowerBI/ Infogram etc.)
10	Neo4J for Graph Based Data Analysis.
11	Exploratory Data Analysis using Spark/ Pyspark.
12	Streaming window word count application using Flink
13	Apriori Algorithm Implementation in Python
14	Data Aggregation Using Apache Beam.

15	Implementation of Recommendation system in Python
16	Mini Project: One real life large data application to be implemented (Use standard Datasets available on the web). - Streaming data analysis use flume for data capture, HIVE/PYSpark for analysis of twitter data, chat data, weblog analysis etc. - Recommendation System (for example: Recommendation System, Health Care System, Stock Market Prediction, Movie Recommendation, etc.) Spatial Temporal Data Analytics

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

Books Recommended:

Textbooks

1. Big Data Analytics By M. Vijayalakshmi Radha Shankarmani, Wiley 2016
2. Big Data Analytics : Tools And Technology For Effective Planning By Arun K. Somani, Ganesh Chandra Deka, CRC Press
3. Anand Rajaraman and Jeff Ullman-Mining of Massive Datasets, Cambridge University Press, 2016.

Reference Books

1. Alex Holmes -Hadoop in Practicel, Manning Press, Dream Tech Press, second edition 2015.ERING
2. Dan Mcary and Ann Kelly -Making Sense of NoSQLI - A guide for managers and the rest of us, Manning Press, 2013.
3. DT Editorial Services, -Big Data Black Book, Dream Tech Press, 2016.

Online References

1. "NPTEL course on Big Data Computing by By Prof. Rajiv Misra", https://archive.nptel.ac.in/courses/106/104/106104189/
2. "Coursera course on Introduction to Big Data By UC SanDiego", https://www.coursera.org/learn/big-data-introduction

Evaluation Scheme:

Semester End Examination (A):

Theory:

1. The question paper will be based on the entire syllabus, summing up to 65 marks.

2. The total duration allotted for writing the paper is 2 hrs.

Laboratory:

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

Continuous Assessment (B):

Theory:

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

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

Laboratory: (Term work)

Term work shall consist of a minimum of 8 experiments.

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

i. Laboratory work (Performance of Experiments): 15 Marks
ii. Mini Project: 10 Marks (Report and Presentation): 10 marks

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

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

Program: B.Tech in Computer Science and Engineering(IoT and Cybersecurity with Block Chain Technology)									T.Y.B.Tech	Semester : VI
Course: Cloud Computing Laboratory									Course Code: DJS22ICL604	
Teaching Scheme (Hours/week)				Evaluation Scheme						
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)			Total marks (A+B)
Lectures	Practical	Tutorial	Total Credit	Theory			Term Test 1	Term Test 2	Total	
				-			-	-	-	-
				Laboratory Examination			Term work			
-	4	-	2	Oral	Practical	Oral & Practical	Laboratory work	Tutorial/Mini project/ presentation/ Assignment	Total Term work	50
				-	-	25	15	10	25	

Prerequisite:

1. Computer Network
2. Operating System

Course Objectives: The objectives of the course are:

1. Gain an understanding of the core concepts of Cloud Computing
2. Learn about the importance of virtualization technologies in cloud environments
3. Explore the application of cloud services in real-world scenarios by learning about IaaS, PaaS, and SaaS
4. Examine the Benefits and Challenges of Cloud Computing such as security

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

1. Implement different types of virtualization techniques.
2. Analyze various cloud computing service models and implement them to solve the given problems.
3. Design and develop real-world web applications and deploy them on commercial cloud

4. Identify major security issues in the cloud and mechanisms to address them.
5. Explore various commercially available cloud services and recommend the appropriate one for the given application.
6. Implement the concept of containerization

Detailed Syllabus:

Unit	Description	Duration
1	**Introduction to Cloud Computing** Cloud Computing Fundamentals Definition and Characteristics - Cloud Service Models (IaaS, PaaS, SaaS) - Cloud Deployment Models (Public, Private, Hybrid, Community) Virtualization and its Role in Cloud Computing Introduction to Virtualization - Types of Virtualizations (Server, Storage, Network, Desktop, Application) - Hypervisors: Type 1 vs Type 2 Benefits and Challenges of Cloud Computing Scalability, Flexibility, Cost Efficiency - Security, Data Privacy, Downtime Risks	06
2	**Cloud Services and Applications** Infrastructure as a Service (IaaS)- Compute, Storage, and Network as a Service - Provisioning Virtual Machines and Virtual Networks Platform as a Service (PaaS)- Application Development and Deployment on Cloud - PaaS Platforms: Google App Engine, Heroku, Microsoft Azure Software as a Service (SaaS) - SaaS Examples: Salesforce, Google Workspace, Microsoft 365 - SaaS Application Development Case Studies of Cloud Applications - Cloud in Healthcare, E-commerce, Finance, IoT	10
3	**Cloud Computing Architecture** Cloud Computing Architecture- Cloud Service Models Architecture (IaaS, PaaS, SaaS) - Cloud Native Architecture: Containers and Microservices - Multi-Tenancy Cloud Infrastructure - Components of Cloud Infrastructure: Compute, Storage, Network - Cloud Data Centers: Architecture and Energy Efficiency - Cloud Networking and Connectivity (SDN and NFV) Cloud Security - Identity and Access Management (IAM), - Data Encryption in Cloud - Cloud Security Best Practices and Challenges	06
4	**Cloud Storage and Data Management** Cloud Storage Type - Block Storage, Object Storage, File Storage - Cloud Storage Providers: Amazon S3, Google Cloud Storage, Azure Blob Cloud Data Management - Data Replication and Distribution - Data Consistency and Redundancy Models - Backup and Recovery in the Cloud	10

	Big Data and Cloud Integration- Introduction to Big Data - Hadoop and Spark on Cloud - Cloud Data Warehousing: Amazon Redshift, Google BigQuery	
5	**Cloud Deployment, Automation, and DevOps:** Cloud Deployment Models - Comparison of Public, Private, and Hybrid Clouds - On-Prem vs Cloud Advantages and Trade-offs Cloud Automation and Orchestration - Configuration Management Tools: Ansible, Puppet, Chef - Infrastructure as Code (IaC): Terraform, AWS CloudFormation DevOps in Cloud- CI/CD Pipelines: Jenkins, Travis CI - Docker and Kubernetes for Container Orchestration - Monitoring and Logging: Prometheus, ELK Stack	**10**
6	**Emerging Trends and Future Directions in Cloud Computing** Edge Computing and Fog Computing - Edge vs Cloud Computing - Applications of Edge Computing in IoT Serverless Computing - Function as a Service (FaaS) and Event-Driven Architectures - AWS Lambda, Google Cloud Functions AI and Machine Learning in the Cloud- AI/ML Tools on Cloud Platforms: AWS SageMaker, Google AI Platform - Use Cases of AI/ML with Cloud Blockchain and Cloud Integration - Blockchain as a Service (BaaS) - Use Cases in Supply Chain, Finance Future of Cloud Computing - Quantum Computing and Cloud - Cloud Sustainability and Green Computing	**10**
Total		**52**

List of Laboratory Experiments:	
Sr. No.	**Suggested Experiments**
1	Research and write a report on the different Cloud Service Models (IaaS, PaaS, SaaS) and Cloud Deployment Models (Public, Private, Hybrid). Create a comparison chart.
2	To study and implement Hosted Virtualization using Virtual Box & KVM.
3	To study and implement Bare-metal Virtualization using Xen, HyperV or VMware Esxi
4	To study and implement Infrastructure as a service using AWS/ Microsoft Azure
5	To study and Implement the Platform as a Service using AWS Elastic Beanstalk/ Microsoft AzureApp Service.
6	To study and implement Security as a Service on AWS/Azure
7	To study and implement identity and Access Management (IAM) practices on AWS/Azure cloud.

8	To study and implement Storage as a Service using OwnCloud/AWS53, Glaciers/ Azure Storage.
9	To study and Implement Database as a Service on SQL/NoSQL databases like AWSRD S, AZURE SQL/MongoDB/Firebase.
10	To study and Implement Containerization using Docker on AWS/Azure/Google cloud platform.
11	To study and implement container orchestration using Kubernetes on AWS/Azure/ Google cloud platform
12	Design a Web Application hosted on a public cloud platform.
13	Mini Project (A group of 3 to 4 students is required to develop an application using Python and submit a report)

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

Books Recommended:

Text Books:

1. Barrie Sosinsky, "Cloud Computing Bible", 2nd Edition, Willy, 2018 ISBN-97-81-265-29803, 2018
2. Sean P. Kane, Karl Matthias, "Docker: Up & Running: Shipping Reliable Containers in Production", 3rd Edition, O'Reilly ISBN: 9781098131821, April 2023
3. Sunilkumar Manvi, Gopal Shyam "Cloud Computing Concepts and Technology" 1st Edition, CRC Press, ISBN 9781032793917, March 2021

Reference Books:

1. Gautam Shroff, "Enterprise Cloud Computing Technology, Architecture, Application" 1st Edition, Combridge University Press, ISBN-978-1-107-64889-0
2. Chris Dotson "Practical Cloud Security A Guide for Secure Design and Deployment" O'Reilly Media, ISBN 9781492037484 Oct 2023

Web resources:

1. AWS Training https://aws.amazon.com/training/
2. Google Cloud Skills Boost https://www.cloudskillsboost.google/

3. Microsoft Azure https://www.youtube.com/c/MicrosoftAzure
4. Cloud Computing https://www.geeksforgeeks.org/cloud-computing-tutorial/
5. Cloud Computing https://www.tutorialspoint.com/cloud_computing/index.htm

Online Courses: NPTEL / Swayam

1. Cloud computing by Prof. Soumya Kanti Ghosh IIT Kharagpur https://onlinecourses.nptel.ac.in/noc21_cs14/preview?
2. Cloud Computing and Distributed Systems by Prof. Rajiv Misra IIT Patna https://onlinecourses.nptel.ac.in/noc21_cs15/preview?

Evaluation Scheme:

Semester End Examination (A):

Laboratory:

The oral and practical examinations will be based on the syllabus, including the practical performed during laboratory sessions.

Continuous Assessment (B):

Laboratory: (Term work)

Term work shall consist of a minimum of 12 experiments.

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

i. Laboratory work (Performance of Experiments): 15 Marks
ii. Mini Project (Implementation and Report): 10 marks

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

Prepared by **Checked by** **Head of the Department** **Vice-Principal** **Principal**

Program: B.Tech in Computer Science and Engineering(IoT and Cybersecurity with Block Chain Technology)	T.Y.B.Tech	Semester: VI
Course: Machine Learning	Course Code: DJS22ICC6011	
Course: Machine Learning Laboratory	Course Code: DJS22ICL6011	

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	
				65			20	15	35	100
				Laboratory Examination			Term work			
3	2	-	4	Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project/presentation/ Journal	Total Term work	50
				25	-	-	15	10	25	

Pre-requisite:

1. Artificial Intelligence
2. Statistics for Engineers

Course Objectives: The objectives of the course are:

1. To understand basic concepts of Machine Learning.
2. To explore different machine learning methods.
3. To familiarize with regression, clustering, classification.
4. To evaluate SVM models effectively using accuracy, precision, recall, and F1-score metrics.

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

1. Understand the types of machine learning
2. Apply regression analysis to real-world problems and datasets
3. Construct decision trees using different algorithms.
4. Make optimal decisions based on Bayesian principles.
5. Identify patterns in data and classify or cluster information into distinct categories.
6. Analyze different SVM techniques.

Detailed Syllabus:		
Unit	**Description**	**Duration**
1	**Introduction to Machine Learning:** Terminologies in machine learning, History, Types of Machine Learning, Issues in Machine Learning, Application of Machine Learning, Steps involved in developing a Machine Learning Application, Hypothesis, and Inductive Bias, Training Error, Generalization error, Overfitting, Under fitting, Bias and Variance trade-off. Dimensionality Reduction Dimensionality Reduction Techniques, Principal Component Analysis, Linear Discriminant Analysis	07
2	**Regression:** Linear Regression, Least Square Regression, Gradient Descent Algorithm, Univariate and Multivariate Linear Regression, Prediction Model, probabilistic interpretation, Regularization, Logistic regression.	06
3	**Decision Tree:** Definitions, Attribute Selection Measures, learning with Trees: Decision Trees, Constructing Decision Trees using Gini Index (Regression), Classification and Regression Trees (CART) Model Evaluation and Selection Performance Metrics: Confusion Matrix, [Kappa Statistics], Sensitivity, Specificity, Precision, Recall, F-measure, ROC curve	07
4	**Bayes Decision Theory**: Bayes decision rule, Bayes Theorem, Naïve Bayes algorithm. **Ensemble Models**: Introduction to Ensemble Methods, Bagging, Boosting, Random forests. K-fold cross validation, Stumping, XGBoost	07
5	**Clustering:** Introduction to clustering with overview of distance metrics and major clustering approaches. Graph Based Clustering: Clustering with minimal spanning tree Model based Clustering: Expectation Maximization Algorithm, Density Based Clustering: DBSCAN	06
6	**Support Vector Machine:** Constrained Optimization, Optimal decision boundary, Margins and support vectors, SVM as constrained optimization problem, Quadratic Programming, SVM for linear and nonlinear classification, Basics of Kernel trick. Support Vector Regression, Multiclass Classification	06
Total		**39**

List of Laboratory Experiments:	
Sr. No.	**Suggested Experiments**
1	Perform Linear Regression.
2	Perform Logistic Regression.
3	Implementing CART decision tree algorithm.
4	Perform Ensemble methods.
5	Perform Bayesian Classification.
6	Support Vector Machine.
7	Perform K-means clustering.
8	Perform DBSCAN clustering.
9	Analyze performance measures.
10	To implement Support Vector Machine.
11	Mini project based on any machine learning application.

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

Books Recommended:

Text Books

1. Tom M.Mitchell, "Machine Learning", 1 st edition, McGraw Hill Education, 2017.
2. Peter Harrington, "Machine Learning in Action", 1 st Edition, DreamTec Press, 2012.
3. Ethem Alpaydın, "Introduction to Machine Learning", 3rd Edition, MIT Press, 2014.
4. Kevin P Murphy, "Machine Learning a probabilistic perspective", Illustrated edition, The MIT Press, 2012.

Reference Books

1. Kevin P. Murphy, "Machine Learning: A Probabilistic Perspective", 2nd Edition, The MIT Press, 2012.
2. Andreas C. Müller and Sarah Guido, "Introduction to Machine Learning with Python: A Guide for Data Scientists", 1st Edition, O'reilly, 2016.

3. Stephen Marsland, "Machine Learning: An Algorithmic Perspective", 2 nd Edition, CRC Press, 2014.
4. Jiawei Han, Micheline Kamber, "Data Mining Concepts and Techniques", 3 rd Edition Morgann Kaufmann Publishers, 2011.

Web Resources:

1. https://towardsdatascience.com/machine-learning/home?gi=e6b8558a75dd
2. https://archive.ics.uci.edu/

Online References

1. Introduction to Machine Learning by Prof. Balaraman Ravindran, IIT Madras, https://nptel.ac.in/courses/106106139
2. Introduction to Machine Learning By Prof. Sudeshna Sarkar, IIT kharagpur https://onlinecourses.nptel.ac.in/noc22_cs97/preview

Evaluation Scheme:

Semester End Examination (A):

Theory:

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

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

Continuous Assessment (B):

Theory:

1. One term test of 20 marks and one term test/presentation/assignment/course project/Group discussion/ any other of 15 marks will be conducted during the semester.
2. The total duration allotted for writing each of the papers is 1 hr.

Laboratory: (Term work)

Term work shall consist of a minimum of 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 laboratory work performance and upon fulfilling minimum passing criteria for term work.

Prepared by	Checked by	Head of the Department	Vice Principal	Principal

Program: B.Tech in Computer Science and Engineering (IoT and Cybersecurity with Block Chain Technology)	T.Y.B.Tech	Semester: VI
Course : Mobile Device Security and Forensics	Course Code: DJS22ICC6012	
Course: Mobile Device Security and Forensics Laboratory	Course Code: DJS22ICL6012	

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	
				65			20	15	35	100
				Laboratory Examination			Term work			
3	2	-	4	Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project/presentation/ Journal	Total Termwork	50
				25	-	-	15	10	25	

Prerequisite:

1. Network Fundamentals
2. Operating Systems

Course Objectives: The objectives of the course are:

1. To understand mobile device hardware and software characteristics.
2. Identify various risks and attacks on mobile devices.
3. To comprehend the concept of mobile device management framework.
4. To explore the need for mobile forensics and its practices.

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

1. Describe mobile device architecture and its software characteristics.
2. Analyze various risks and attacks on mobile devices.
3. Acquire fundamental concept of mobile device management framework.
4. Usage of mobile forensics and its practices.
5. Express the functionalities of Mobile OS forensics.
6. Compare and analyze mobile data carving methods.

Detailed Syllabus:

Unit	Description	Duration
1	**Introduction to Mobile Devices** Basics of Mobile phone: Different Mobile Devices, Hardware & Software Characteristics of Mobile Devices, Mobile Operating Systems: Classification of Mobile Operating Systems (Android OS, Apple iOS), difference between desktop operating system and mobile operating system. Top Issues Facing Mobile Devices.	06
2	**The Mobile Risk Ecosystem** Mobile Risk Model: Physical Risks, Service Risks and App Risks, Basic Cellular Network Functionality: Interoperability, Voice Calls, The Control Channels, Voice Mailboxes, Short Message Service Attacks and Countermeasures: Hacking Mobile Voicemail, Countermeasures for Mobile Voicemail Hacks, Rogue Mobile Devices, Rogue Mobile Device Countermeasures, Early Rogue Station Attacks, Rogue Base Station Countermeasures, Rogue Femtocell Attacks, Countermeasures for Rogue Femtocells.	07
3	**Mobile Device Management** MDM Frameworks, Device Provisioning, Bypassing MDM, Decompiling and Debugging Apps, Detecting Jailbreaks, Remote Wipe and Lock. Mobile App Threat Modelling: Threats, Assets, Finishing and Using the Threat Model. Secure Mobile Development Guidance: Preparation, Secure Mobile Application Guidelines.	06
4	**Introduction to Mobile Forensics** Need for mobile forensics, Mobile forensics, Challenges in mobile forensics, The evidence intake phase, The identification phase, preparation phase, isolation phase, processing phase, verification phase, documenting and reporting phase, The presentation phase, archiving phase, Data acquisition methods, Examination and analysis, Good forensic practices: Securing the evidence, Preserving the evidence, Documenting the evidence and changes, Reporting.	07
5	**Introduction to iOS Forensics** iOS Boot Process, iOS Architecture, iOS Architecture Layers, The HFS Plus and APFS File Systems, iOS Security, iOS Data Extraction Techniques, Data Acquisition from Backup Devices, Data Acquisition from iOS Devices, Jailbreaking. Introduction to Android Forensics: Android File System, Flash Memory File Systems, Media-Based File Systems, Pseudo File Systems, Android System Architecture, Android System Permission	07

	Model, Data Extraction Techniques on Android, Mobile Forensics Investigation Challenges on Android Devices	
6	**Data carving:** Best practices – ACPO, Interpol, STCIA, DOJ guidelines and best practices in Indian environment. Responsive toolkit – preparation, portable software tools, validation of tools, things to carry. Areas to search – Active files, deleted files, slack space, unallocated space, hibernation file, page file, metadata and registry etc. Case Study for crime scene investigation.	**06**
	Total	**39**

List of Laboratory Experiments:	
Sr. No.	**Suggested Experiments**
1	To install Android SDK
2	To Study and install Androguard to analyze apk files.
3	To Study and install Drozer in kali linux and Drozer agent in android device.
4	To Study and install mobsf installation in windows for mobile pen-testing, malware analysis and security assessment.
5	To Study and install QARK (Quick Android Review Kit) tool capable of finding common security vulnerabilities in Android.
6	To Study and install Frida (Dynamic Instrumentation Toolkit) to modify code snippets of JavaScript.
7	To Study GDA (GJoy Dex Analyzer) - Android Reversing Tool
8	To perform Screen lock bypassing in Android.
9	To perform SQLite Browser to view the data in Android
10	To perform recovery of deleted data and files from an external SD card using file-carving techniques
11	To perform analysis of Android apps using Android Lint.
12	To perform extraction of an APK file from an Android device.
13	To perform Mobile forensics using UFED tool.

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

Books Recommended:

Text Books:

1. Kumar Saurabh , Ashutosh Saxena, Mobile Forensics Investigation , 3nd Edition, TMH, 2020, ISBN: 978-1-26-013510-7
2. Rohit Tamma, Oleg Skulkin, Heather Mahalik, Satish Bommisetty, Practical Mobile Forensics 4th Edition, Packt Publishing, 2020
3. Mobile Device Security by Stefen Fried, CRC Press 2017.
4. Himanshu Dwivedi, Chris Clark, David Thiel, Mobile Application Security 3rd Edition, TMH Publishing, 2010, ISBN: 978-0-07-163357-4,

Reference Books:

1. Practical Mobile Forensics, Mohammed Moreb, 2022, Apress
2. Wireless and Mobile Device Security Jim Doherty, JONES & BARTLETT learning 2nd edition 2021.
3. Mobile Application hackers handbook , Dominic Chell,Tyrone Erasmus, Wiley 2nd edition 2017.
4. Hacking Exposed mobile Security and Solutions Neil Bergman,Mike Stanfield, Jason Rouse McGraw Hill Publishing 1st edition 2017.

Web resources:

1. Android Hacking tools -Top 10 Github Hacking Tools for Android (analyticsinsight.net).
2. MOOCS resources - Introduction to Forensic Science
a. https://ugcmoocs.inflibnet.ac.in/index.php/courses/view_ug/3.
3. https://www.udemy.com/course/mobile-application-security-and-penetration-testing-e/.
4. https://www.mygreatlearning.com/academy/learn-for-free/courses/ethical-hacking-mobile-platforms-and-network-architecture.

Online Courses: NPTEL / Swayam

Digital Forensic, By Dr. Navjot Kaur Kanwal
https://onlinecourses.swayam2.ac.in/cec20_lb06

Evaluation Scheme:

Semester End Examination (A):

Theory:

1. The question paper will be based on the entire syllabus, summing up to 65 marks.
2. The total duration allotted for writing the paper is 2 hrs.

Laboratory:

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

Continuous Assessment (B):

Theory:

1. One term test of 20 marks and one term test/presentation/assignment/course project/Group discussion/ any other of 15 marks will be conducted during the semester.
2. The total duration allotted for writing each of the papers is 1 hr.

Laboratory: (Term work)

Term work shall consist of a minimum of 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 laboratory work performance and upon fulfilling minimum passing criteria for term work.

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

Program: B.Tech in Computer Science and Engineering(IoT and Cybersecurity with Block Chain Technology)	T.Y.B.Tech	Semester : VI
Course : Cryptocurrency Technology	Course Code: DJS22ICC6013	
Course: Cryptocurrency Technology Laboratory	Course Code: DJS22ICL6013	

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

Prerequisite:

1. Applied Cryptography
2. Introduction to Blockchain Technology

Course Objectives: The objectives of the course are:

1. To introduce the concepts related to blockchain and cryptocurrencies
2. To provide skills and knowledge about operations and management in cryptocurrency technologies.
3. To decide suitable model to capture the business needs by analyzing different cryptocurrencies.
4. To design cryptocurrencies that meets the business service and customer needs

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

1. Understand evolution, principles and benefits of Cryptocurrencies.
2. Infer the various bitcoin related security and privacy issues.
3. Analyze the real-world cryptocurrency ecosystem.
4. Develop and deploy auction-based smart contracts on the Ethereum blockchain
5. Design cryptocurrency with appropriate policies and mechanisms
6. Explore applications beyond traditional cryptocurrencies.

Detailed Syllabus:

Unit	Description	Duration
1	**Introduction to Cryptocurrency** Preview: The need of Cryptocurrency evolution Digital currency, cryptocurrency vs flat currency, A Simple Cryptocurrency: GoofyCoin, ScroogeCoin, Usage of Cryptocurencies Cryptocurrency Regulation: Stakeholders, Roots of Bitcoin, Legal Aspects Cryptocurrency Exchange, Black Market and Global Economy Decentralized Mixing & cryptocurrency anonymity: Coinjoin, Zerocoin and Zerocash, A comparison of the anonymity technologies	10
2	**Cryprocurrencies and Bitcoin** Introduction to Cryptocurrencies Tokens – Cryptosecurities, Players involved Cryptocurrency Users, Miners, Cryptocurrency exchanges, Trading platforms, Wallet providers, Coin inventors, Coin offerors. Building Bitcoin payment system, Building payment gateway, Compiling Bitcoin from source cloning bitcoin, Readercoin, Readercoin rebranding	07
3	**Altcoins and the Cryptocurrency Ecosystem** Altcoins: History and Motivation, Altcoin Blockchain, Altcoin Types: Namecoin, Litecoin, Peercoin, Dogecoin, Relationship Between Bitcoin and Altcoins, Merge Mining and Security, Atomic Cross-chain Swap protocol, Bitcoin-Backed Altcoins: "Side Chains"	06
4	**Cryptocurrency and Auctions in Ethereum** Ether (ETH) as a cryptocurrency, Overview of auction mechanisms, Auctions in Ethereum, Building an auction DApp: Auction description, Dutch and Vickrey auctions in Solidity, Deployment and testing of auction smart contracts on the Ethereum testnet	06
5	**Building Cryptocurrency** E-governance and other contract enforcement mechanisms, Initial Coin Offerings (ICOs) in Cryptocurrency, Definition and Purpose of ICOs, ICO vs. Traditional Fundraising Key Components of ICOs: Tokenomics- Designing Tokens for ICOs, ICO Smart Contracts and Crowdsale Mechanisms, Structure and Content Risks and Challenges Associated with ICOs Assessment	06
6	**Beyond Cryptocurrency** Smart property, Efficient micro-payments, Coupling transactions and payments, Escrow transactions, Green addresses, Multi-party Lotteries, Digital Rupee -eINR or E-Rupee, UPI - Unified Payments Interface	04
Total		39

List of Laboratory Experiments:	
Sr. No.	**Suggested Experiments**
1	To perform experimental study of Cryptocurrency Market Dynamics
2	To Create and Build Crypto Tokens
3	To find the exchange rate for bitcoin with the help of necessary data and find the number of bitcoins by applying the equation over the defined values
4	To calculate the 'number of ethers' for the transaction of gas limit for the scenario in which the sender sets the gas limit to 50,000 and a gas price to 20 gwei.
5	To represent the Ethereum Merkley Tree for the given list of Transactions
6	To Implement Dutch and Vickrey auctions in Solidity
7	To Deploy and test of auction smart contracts on the Ethereum testnet
8	To generate public and private key pairs using cryptographic libraries and Simulate the signing and verification of transactions
9	To perform transactions using privacy-focused cryptocurrencies (e.g., Monero).
10	To explore coin mixing services to enhance transaction privacy.
11	To study Pre-designed smart contract templates for creating custom tokens and managing ICO-related functionalities.
12	To generate a simulated cryptocurrency token to use during the ICO
13	To Analyze real-world use cases of blockchain and cryptocurrencies
14	To Perform Case studies of successful ICOs

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

Books Recommended:

Text Books:

1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press, 2016.
2. Makoto Yano, Chris Dai, Kenichi Masuda, Yoshio Kishimoto , "Blockchain and Crypto Currency: Building a High Quality Marketplace for Crypto Data",Springer; 1st ed. 2020

3. Mastering Block chain - Distributed ledgers, decentralization and smart contracts explained, Author- Imran Bashir, Packt Publishing Ltd, Second Edition, ISBN 978-1- 78712-544-5, 2017 Reference Books
4. S. Shukla, M. Dhawan, S. Sharma, S. Venkatesan, -Blockchain Technology: Cryptocurrency and Applications, Oxford University Press, 2019
5. Antonopoulos, Andreas M, "Mastering Bitcoin: Unlocking Digital Crypto-Currencies" O'Reilly Media, Inc, ISBN:978-1-4493-7404-4, 2014

Reference Books:

1. Fantazzini, D. Quantitative Finance with R and Cryptocurrencies. Amazon KDP, ISBN-13 978-1090685315,2019:. https://sites.google.com/view/quafirc
2. Daskalakis, Nikos, and Panagiotis Georgitseas, "An Introduction to cryptocurrencies: The Crypto Market Ecosystem", Routledge, 1st Edition, 2020
3. Grabowski, Mark, "Cryptocurrencies: A Primer on Digital Money", Routledge, 1st Edition, 2019
4. Quinn Dupont, " Cryptocurrencies and Blockchain",willey,2018
5. Chris Burniske and Jack Tatar, "Cryptoassets: The Innovative Investor's Guide to Bitcoin and Beyond: Theory and Politics of Ambiguity Hardcover", McGraw Hill ,2017

Web resources:

1. Cryptocurrency and Bitcoin: https://intelligenttrading.org/guides/cryptoasset-classifications/ https://www.investopedia.com/tech/most-important-cryptocurrencies-other-than-bitcoin/
2. How to Create Your Own Cryptocurrency – https://coinmarketcap.com/academy/article/how-to-create-your-own-cryptocurrency
3. Cryptocurrency- https://www.investopedia.com/tech/most-important-cryptocurrencies-other-than-bitcoin/
4. Cryptocurrency & Blockchain Technology https://guides.loc.gov/fintech/21st-century/cryptocurrency-blockchain https://guides.loc.gov/fintech/21st-century/cryptocurrency-blockchain

Online Courses: NPTEL / Swayam/MOOC

1. Blockchain and its Applications, By Prof. Sandip Chakraborty, Prof. Shamik Sural IIT Kharagpur https://onlinecourses.nptel.ac.in/noc23_cs47/preview https://www.coursera.org/specializations/introduction-to-blockchain https://www.coursera.org/learn/wharton-cryptocurrency-blockchain-introduction-digital-currency

https://www.velmie.com/practical-blockchain-study

2. Udemy- The Complete Cryptocurrency Course: More than 5 Courses in 1
https://www.udemy.com/course/the-complete-cryptocurrency-course-

Evaluation Scheme:

Semester End Examination (A):

Theory:

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

Laboratory:

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

Continuous Assessment (B):

Theory:

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

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

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 laboratory work performance and upon fulfilling minimum passing criteria for term work.

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

Program: B.Tech in Computer Science and Engineering(IoT and Cybersecurity with Block Chain Technology)				T.Y.B.Tech				Semester: VI
Course: Professional and Business Communication Laboratory				Course Code: DJS22IHL				
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	
				--			-- / -- / --	--
				Laboratory Examination			Term work	
--	4*	--	2	Oral	Practical	Oral & Practical	Laboratory Work / Tutorial / Mini project / presentation/ Journal / Total Term work	50
				--	--	--	-- / --- / 50	

*2 hrs. Theory (Class wise) and 2 hrs. Tutorial (Batch wise)

Pre-requisite:

Basic course in Effective Communication Skills

Objectives: The objectives of the course are:

1. To inculcate professional and ethical attitude at the workplace
2. To enhance communication and interpersonal skills
3. To develop effective employability skills
4. To hone written skills for technical documentation

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

1. Prepare technical documents using appropriate style, format, and language
2. Use employability skills to optimize career opportunities
3. Employ storytelling techniques in corporate situations
4. Conduct effective meetings and document the process
5. Demonstrate interpersonal skills in professional and personal situations
6. Describe cultural differences, etiquettes, and the concept of professional ethics

Detailed Syllabus:

Unit	Description	Duration
1	**Technical Writing**: Report Writing: Types of reports, Basic structure of a report, collection of data through questionnaires, survey analysis, language and style in reports Business Proposal Writing: Types of business proposals, format of proposal, language and style, presentation of proposal Plagiarism: Types of plagiarism, consequences of plagiarism	06
2	**Employment Skills**: Group Discussion: Purpose of a GD, types of GD, criteria for evaluating GD, Dos and Don'ts of GD Resume Writing: Types of resumes, structure, content and formatting of resume Interview Skills: Types and modes of interview, Preparation for interview, Dos and Don'ts of interview, frequently asked questions during interview Presentation Skills: Presentation strategies, overcoming stage fear, techniques to prepare effective PowerPoint presentation	08
3	**Corporate Story Telling:** Basics of storytelling: Setting, characters, plot, crisis, climax, resolution, Benefits of storytelling Types of stories: Elevator pitch, product stories, event stories, stories in presentations, storytelling in SOP's and interviews, storytelling to manage conflict or to motivate Storytelling techniques: Narration using verbal and non-verbal communication, Analysis of storytelling strategies of corporate master storytellers	03
4	**Meetings and Documentation:** Planning and preparation for meetings: Planning layout of meetings, arranging logistics, defining roles and responsibilities Strategies for conducting effective meetings: Follow the agenda, record discussion, observe meeting decorum Documentation: Draft notice, agenda and minutes of meeting Business meeting etiquettes: Verbal and non-verbal aspects of etiquettes	02
5	**Introduction to Interpersonal Skills**: Emotional Intelligence: Definition, difference between IQ and EQ, how to develop EQ Leadership: Types of leadership, leadership styles, case studies Team Building: Difference between group and team, importance of teamwork, strategies to be a good team player Time Management: Importance of time management, cultural views of time, 80/20 rule, time wasters, setting priorities and goals, Conflict Management: Types of conflicts, strategies to manage conflict, case studies	05

6	**Cross-cultural communication and Professional ethics**: Communication across cultures: Understanding cultures and developing sensitivity towards cultural differences Corporate etiquettes: Telephone, dining, cubicle etiquette, etc. Professional ethics: Effective work habits, accountability, integrity and excellence	**02**

Professional and Business Communication Laboratory

Laboratory (conducted batch wise) will comprise of activities and assignments based on the syllabus.

Books Recommended:

1. Fred Luthans, *"Organizational Behavior"*, McGraw Hill, edition
2. Lesiker and Petit, *"Report Writing for Business"*, McGraw Hill, edition
3. Huckin and Olsen, *"Technical Writing and Professional Communication"*, McGraw Hill
4. Wallace and Masters, *"Personal Development for Life and Work"*, Thomson Learning, 12th edition
5. Heta Murphy, *"Effective Business Communication"*, Mc Graw Hill, edition
1. 6. Sharma R.C. and Krishna Mohan, *"Business Correspondence and Report Writing"*, Tata McGraw-Hill Education
6. Ghosh, B. N., *"Managing Soft Skills for Personality Development"*, Tata McGraw Hill. Lehman,
7. Bell, Smith, "Management Communication" Wiley India Edition, 3rd edition.
8. Dr. Alex, K.," Soft Skills", S Chand and Company
9. Subramaniam, R., "Professional Ethics" Oxford University Press.
10. Sandeep Das, "How Business Story Telling Works: Increase Your Influence and Impact" Penguin Random House India Pvt. Ltd.

Evaluation Scheme:

Laboratory: (Term work)

Term work shall consist of 6 assignments, Group Discussion and Power Point Presentation based on the Business Proposal. The distribution of marks for term work shall be as follows:

i. Tutorials ..... (25) Marks

ii. Business Proposal..... (15) Marks

iii. Group Discussion..... (10) Marks

iv. TOTAL: ..... (50) 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 Computer Science and Engineering(IoT and Cybersecurity with Bolckchain Technology)											Semester: VI			
Course: Innovative Product Development-IV											Course Code: DJS22ILLL2			
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							
--	2	--	1	Oral	Practical	Oral & Practical	Laboratory Work		Tutorial / Mini project / presentation/ Journal		Total Term work		50	
				--	--	25	--		25		25			

Objectives: The objectives of the course are:

1. To acquaint the students with the process of identifying the need (considering a societal requirement) and ensuring that a solution is find out to address the same by designing and developing an innovative product.
2. To familiarize the students with the process of designing and developing a product, while they work as part of a team.
3. To acquaint the students with the process of applying basic engineering fundamentals, so as to attempt at the design and development of a successful value-added product.
4. To inculcate the basic concepts of entrepreneurship and the process of self-learning and research required to conceptualize and create a successful product.

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

1. Identify the requirement for a product based on societal/research needs.
2. Apply knowledge and skills required to solve a societal need by conceptualising a product, especially while working in a team.
3. Use standard norms of engineering concepts/practices in the design and development of an

innovative product.

4. Draw proper inferences through theoretical/ experimental/simulations and analyse the impact of the proposed method of design and development of the product.
5. Develop interpersonal skills, while working as a member of the team or as the leader.
6. Demonstrate capabilities of self-learning as part of the team, leading to life-long learning, which could eventually prepare themselves to be successful entrepreneurs.
7. Demonstrate product/project management principles during the design and development work and also excel in written (Technical paper preparation) as well as oral communication.

Guidelines for the proposed product design and development:

- Students shall convert the solution designed in semester 3 and 4 into a working model, using various components drawn from their domain as well as related interdisciplinary areas.
- The working model is to be validated with proper justification and the report is to be compiled in a standard format and submitted to the department. Efforts are to be made by the students to try and publish the extended technical paper, either in the institute journal, "Techno Focus: Journal for Budding Engineers" or at a suitable publication, approved by the department research committee/ Head of the department.
- Faculty supervisor may provide inputs to students during the entire span of the activity, spread over 2 semesters, wherein the main focus shall be on self-learning.
- A record in the form of an activity log-book is to be prepared by each team, wherein the team can record weekly progress of work. The guide/supervisor should verify the recorded notes/comments and approve the same on a weekly basis.
- The focus should be on self-learning, capability to design and innovate new products as well as on developing the ability to address societal problems. Advancement of entrepreneurial capabilities and quality development of the students through the year long course should ensure that the design and development of a product of appropriate level and quality is carried out, spread over two semesters, i.e. during the semesters V and VI.

Guidelines for Assessment of the work:

- The review/ progress monitoring committee shall be constituted by the Head of the Department. The progress of design and development of the product is to be evaluated on a

continuous basis, holding a minimum of two reviews in each semester.

- In the continuous assessment, focus shall also be on each individual student's contribution to the team activity, their understanding and involvement as well as responses to the questions being raised at all points in time.
- Oral examination should be conducted by Internal and External examiners. Students have to givepresentation and demonstration on their working model
- The distribution of marks for term work shall be as follows:
    1. Marks awarded by the supervisor based on log-book 10
    2. Marks awarded by review committee 10
    3. Quality of the write-up 05

The overall work done by the team shall be assessed based on the following criteria;

1. Quality of survey/ need identification of the product.
2. Clarity of Problem definition (design and development) based on need.
3. Innovativeness in the proposed design.
4. Feasibility of the proposed design and selection of the best solution.
5. Cost effectiveness of the product.
6. Societal impact of the product.
7. Functioning of the working model as per stated requirements.
8. Effective use of standard engineering norms.
9. Contribution of each individual as a member or the team leader.
10. Clarity on the write-up and the technical paper prepared.

- The semester reviews (V and VI) may be based on relevant points listed above, as applicable.

Guidelines for Assessment of Semester Reviews:

- The write-up should be prepared as per the guidelines given by the department.
- The design and the development of the product shall be assessed through a presentation and demonstration of the working model by the student team to a panel of Internal and External

Examiners, preferably from industry or any research organisations having an experience of more than five years, approved by the Head of the Institution. The presence of the external examiner isdesirable only for the 2nd presentation in semester VI. Students are compulsorily required to presentthe outline of the extended technical paper prepared by them during the final review in semester VI.

Prepared by	Checked by	Head of the Department	Vice Principal	Principal