Syllabus (Course Structure)

Course Code		**:**	**22UIS604C**	**THEORY OF COMPUTATIONS**	**Semester**	**:**	**06**
L:T:P		**:**	**02:02:0**		**Course Type**	**:**	**Theory**
Hours/Sem.	**Teaching**	**:**	**42 Hrs**		**CIE Marks**	**:**	**50**
	Learning (TW+SL)	**:**	**42 Hrs**		**SEE Marks**	**:**	**50**
	Exam	**:**	**06 Hrs**		**Total Marks**	**:**	**100**
	Total Hrs.	**:**	**90 Hrs**		**Credits**	**:**	**03**

Professional Competency:

Apply the fundamental principles of automata theory, formal languages, and computational models to analyze, design, and evaluate computing systems and problem-solving processes.

Course Outcomes:

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

1. Apply Fundamentals of computational theory and basic terminology to solve real world problems.
2. Model and solve problems on DFA, Minimization of DFA, NFA, Epsilon-NFA and conversion between them.
3. Prove the properties of regular languages using regular expressions.
4. Design context-free grammars (CFGs) and pushdown automata (PDAs) for formal languages.
5. Design Turing machines to solve the computational problems.

UNIT–I	**11 Hrs**

Automata: Introduction to Finite Automata, The central concepts of Automata theory. Finite Automata: Deterministic Finite automata, Non-Deterministic Finite Automata. An application of Finite Automata, and Finite Automata with Epsilon-transitions,
Regular Expressions: Regular expressions, Finite Automata and Regular Expressions, and Applications of Regular Expressions

UNIT–II	**11 Hrs**

Properties of Regular Languages: Proving languages not to be regular languages, Closure properties of regular languages, Decision properties of regular languages, and Equivalence and Minimization of Automata.
Context Free Grammars and Languages: Context Free Grammars, Parse trees, Applications of Context Free Grammars, Ambiguity in Grammars and Languages.

UNIT-III	**10 Hrs**

Properties of Context-Free Languages: Normal forms for Context Free Grammars.
Pushdown Automata: Definition of the Pushdown Automaton, The languages of a PDA, Deterministic Pushdown Automata.

UNIT-IV	**10 Hrs**

Introduction To Turing Machine: The Turing Machine, Programming Techniques for Turing Machines, Extensions to the basic Turning Machines, Turing Machine and Computers.

Text Books:

1. A. M., Padma Reddy, “Finite Automata and Formal Languages”, 2012,Pearson Education.

Reference Books:

2. John. E., Hopcroft, Rajeev. Motwani, Jeffrey. D., Ullman, 2007, “Introduction to Automata Theory, Languages and Computation”, 3rd Edition, Pearson Education.

3. Peter. Linz, “An Introduction to Formal Languages and Automata", Third Edition, Fifth printing.
4. John, E., Hopcroft, Jeffrey. D. Ullman, “Introduction to Automata Theory, Languages and Computation”, Narosa Publication.

Table: Matrix to describe the mapping of COs with POs (considering WKs) and PSOs

Course Outcomes (COs)	Program Outcomes and (WKs)											Program Specific Outcomes (PSOs)	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**1**	**2**
CO1	2 WK2, WK3, WK4	2 WK2, WK3, WK4	2 WK2, WK3, WK4	2 WK2, WK3, WK4							1	2	2
CO2	2 WK2, WK3, WK4, WK6	2 WK2, WK3, WK4, WK6	2 WK2, WK3, WK4, WK6	2 WK2, WK3, WK4, WK6							1	3	2
CO3	1 WK2, WK3, WK4	3 WK2, WK3, WK4	3 WK2, WK3, WK4	2 WK2, WK3, WK4							1	3	2
CO4	2 WK2, WK3, WK4, WK5, WK6	2 WK2, WK3, WK4, WK5, WK6	3 WK2, WK3, WK4, WK5, WK6	2 WK2, WK3, WK4, WK5, WK6							1	3	2
CO5	2 WK2, WK3, WK4, Wk6	2 WK2, WK3, WK4, Wk6	2 WK2, WK3, WK4, Wk6	3 WK2, WK3, WK4, Wk6							1	3	2

Syllabus (Course Structure)

Course Code		**:**	**22UIS052E**	**Block chain Technology**	**Semester**	**:**	**06**
L:T:P		**:**	**02:02:0**		**Course Type**	**:**	**Theory**
Hours/Sem.	**Teaching**	**:**	**42 Hrs**		**CIE Marks**	**:**	**50**
	Learning (TW+SL)	**:**	**42 Hrs**		**SEE Marks**	**:**	**50**
	Exam	**:**	**06 Hrs**		**Total Marks**	**:**	**100**
	Total Hrs.	**:**	**90 Hrs**		**Credits**	**:**	**03**

Professional Competency:

- Students will gain the ability to analyze block chain architectures, decentralization models, and cryptographic foundations for secure distributed systems.
- Students will be competent in evaluating crypto currency platforms, smart contracts, and alternative block chains for real-world applications.

Course Outcomes:

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

1. Understand the types, benefits and limitation of block chain.
2. Explore the block chain decentralization and cryptography concepts.
3. Enumerate the Bit coin features, its alternative options and deploy the smart contracts
4. Summarize the block chain features outside of currencies.

UNIT–I	**10 Hrs**

Block chain 101: Distributed systems, History of block chain, Introduction to block chain, Types of block chain, CAP theorem and block chain, Benefits and limitations of block chain.

UNIT–II	**11 Hrs**

Decentralization and Cryptography: Decentralization using block chain, Methods of decentralization, Routes to decentralization, Decentralized organizations. Cryptography and Technical Foundations: Cryptographic primitives, Asymmetric cryptography, Public and private keys.

UNIT-III	**11 Hrs**

Bit coin and Alternative Coins A: Bit coin, Transactions, Block chain, Bit coin payments B: Alternative Coins, Theoretical foundations, Bit coin limitations, Name coin, Lite coin, Prime coin, Zcash.

Smart Contracts 101: Smart Contracts: Definition, Ricardian contracts.

UNIT-IV	**10 Hrs**

Ethereum 101: Introduction, Ethereum block chain, Elements of the Ethereum block chain, Precompiled contracts.

Alternative Block chains: Block chains Block chain-Outside of Currencies: Internet of Things, Government, Health, Finance, Media

Text Books:

1. 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:

1. Bitcoin and Crypto currency Technologies, Author- Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, Steven Gold feder, Princeton University, 2016
2. Blockchain Basics: A Non-Technical Introduction in 25 Steps, Author- Daniel Drescher, A press, First Edition, 2017

3. Mastering Bit coin: Unlocking Digital Crypto currencies, Andreas M. Antonopoulos, O'Reilly Media, First Edition, 2014

Table: Matrix to describe the mapping of COs with POs (considering WKs) and PSOs

Course Outcomes (COs)	Program Outcomes and (WKs)											Program Specific Outcomes (PSOs)	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**1**	**2**
CO1	3(WK1-4)	3(WK1-4)	2	2	-	-	-	-	-	-	-	2	1
CO2	2	3(WK1-5)	2	2	3(WK6)	-	-	-	-	-	-	2	2
CO3	2	3(WK5)	3(WK6)	1	2	2	-	-	-	-	-	2	2
CO4	2	2(WK5)	3	1	2	-	2	-	-	-	-	2	2

Course Code		:	22UIS049E	Cyber Security	Semester	:	06
L:T:P		:	03:00:00		Course Type	:	Theory
Hours/Sem.	Teaching	:	42 Hrs		CIE Marks	:	50
	Learning (TW+SL)	:	42 Hrs		SEE Marks	:	50
	Exam	:	06 Hrs		Total Marks	:	100
	Total Hrs.	:	90 Hrs		Credits	:	03

Professional Competency:

Students must know the fundamentals of network and system security. Students should be aware of cyber laws and follow ethical practices, subject develops analytical thinking, problem solving skills, teamwork and continuous learning to handle emerging cyber threats.

Course Outcomes:

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

1. Explain the cybercrime terminologies.
2. Describe Cyber offenses and Bot nets.
3. Illustrate Tools and Methods used on Cybercrime, Phishing and Identity Theft. Justify the need of computer forensics.

UNIT–I	10 Hrs

Introduction to Cybercrime: Definition and Origins of the Word, Cybercrime, and Information Security, who are Cybercriminals? Classifications of Cybercrimes, the legal perspective, An Indian Perspective, Hacking and Indian Laws., Global Perspectives

Cyber Offences: How Criminals Plan Them: Introduction, how criminals plant heat tacks, Social Engineering, Cyber Stalking, Cybercafé & cybercrime.

UNIT–II	11 Hrs

Cyber Offences: Bot nets: The fuel for cybercrime, Attack Vector.

Cybercrime: Mobile and Wireless Devices; Trends in Mobility, Credit card Frauds in mobile and wireless computing, security challenges posed by mobile devices, Registry setting for mobile devices, Authentication Service security, Attacks on mobiles, Mobile Devices: security implications for organizations.

UNIT-III	11 Hrs

Phishing and Identity Theft: Introduction, methods of phishing, phishing, phishing techniques, spear phishing, types of phishing scams, phishing toolkits and spy phishing, counter measures, Identity Theft.

Hacking Network Devices: Proxy Servers, Categories of attacks: Concealed Identity, Routers and Switches: Attacks on routers and switches, Router Exploits, Firewalls: Limitations of Firewall, Types and methods of Firewall Attacks, VPNs: Threats through VPN, Ways to Safeguard a Network from Attacks through VPNs.

UNIT-IV	10 Hrs

Understanding Computer Forensics: Introduction, Historical Background of Cyber forensics, Digital Forensics Science, Need for Computer Forensics, Cyber Forensics and Digital Evidence, Digital Forensic Life cycle, Chain of Custody Concepts, Network forensics.

Approaching a computer forensics investigation: Phases involved in computer forensic investigation, Typical elements addressed in a computer forensic engagement contract, solving a computer forensic case, relevancy of the OSI 7-layer model to computer forensic, challenges in computer forensics, Spatial tools and techniques.

Text Books:
1. Nina God bole and Sunit Belapure, “Cyber Security: Understanding Cyber Crimes, Computer Forensics And Legal Perspectives”, Wiley India Pvt Ltd, ISBN: 978-81- 265-21791, 2011, First Edition. 2. Alfred Basta, Nadine Basta, Mary Brown, Ravinder Kumar, ”Cyber Security and Cyber Laws”, Cengage Learning India Pvt. Ltd.
Reference Books:
1. Surya Prakash Tripathi, Ritendra Goyal, Praveen Kumar Shukla. Introduction to information security and cyberlaws.DreamtechPress.2015. 2. Sammons, John, and Michael Cross. The basics of cyber safety: computer and mobile device safety made easy. Elsevier, 2016. 3. Brooks, Charles J., Christopher Grow, Philip Craig, and Donald Short. Cyber security essentials. John Wiley & Sons, 2018.

Table: Matrix to describe the mapping of COs with POs (considering WKs) and PSOs

Course Outcomes (COs)	**Program Outcomes and (WKs)**											**Program Specific Outcomes (PSOs)**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**1**	**2**
CO1	1(WK1,WK2)							2(WK7, WK8)				1	
CO2		2(WK2)		3(WK 4)	3(WK5)								1
CO3					2(WK3, WK5)			2(WK7)					1
CO4						3(WK 6,WK 8)						1	1

Course Code		**:**	**22UIS603C**	**Machine Learning**	**Semester**	**:**	**06**
L:T:P		**:**	**3:0:2**		**Course Type**	**:**	**Theory**
Hours/Sem.	**Teaching**	**:**	**42 Hrs**		**CIE Marks**	**:**	**50**
	Learning (TW+SL)	**:**	**42 Hrs**		**SEE Marks**	**:**	**50**
	Exam	**:**	**06 Hrs**		**Total Marks**	**:**	**100**
	Total Hrs.	**:**	**90 Hrs**		**Credits**	**:**	**03**

Professional Competency:

Design, analyze, and implement suitable Machine Learning models and algorithms to extract insights from data and develop intelligent systems for real-world applications.

Course Outcomes:

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

1. Explain the fundamental concepts, need, and applications of Machine Learning and its relation to other disciplines.
2. Apply statistical and analytical techniques for understanding, preparing, and visualizing data in Machine Learning.
3. Demonstrate concept learning, hypothesis representation, and the use of basic learning algorithms such as Find-S.
4. Implement and analyze similarity-based, regression, decision tree, clustering, and Bayesian learning algorithms for predictive modeling.
5. Describe the principles and components of reinforcement learning and identify its applications in intelligent systems.

UNIT–I	**10 Hrs**

Need for Machine Learning, Why Machine Learning is popular? What is Machine Learning? Knowledge Pyramid, Machine Learning in relation to other fields, Types of Machine Learning, Challenges of Machine Learning, Machine Learning Process, Machine Learning Application.
Understanding Data: Introduction, Big Data Analytics and Types of Analytics, Big Data Analysis Framework.

UNIT–II	**11 Hrs**

Descriptive Statistics: Introduction: Why Descriptive Statistics in ML? Dataset and Data Types, Univar ate Data Analysis & Visualization, Bivariate Data and Multivariate Data. Multivariate Data: What is Multivariate Data? Essential Mathematics for Multivariate Data, Machine Learning and Importance of Probability and Statistics.
Overview of Hypothesis: Comparing Learning Methods. Introduction to Learning and its types, Designing of Learning System, Concept Learning, Representation of a Hypothesis, Hypothesis space search by Find-S algorithm.

UNIT-III	**11 Hrs**

Similarity-based Learning: Introduction to Similarity or Instance-based Learning, Nearest-Neighbour Learning, Weighted K-Nearest-Neighbour Algorithm, Nearest Centroid Classifier, Locally Weighted Regression (LWR). Regression Analysis: Introduction to Regression, Introduction to Linearity, Correlation, and Causation, Introduction to Linear Regression, Validation of Regression Methods, Multiple Linear Regression, Polynomial Regression, Logistic.

UNIT-IV	**10 Hrs**

Decision Tree Learning: Introduction to Decision Tree Learning Model, Decision Tree Induction Algorithms: ID3 and C4.5, Regression Trees, Validating and Pruning of Decision Trees. **Clustering**: K-Means Clustering. Bayesian Learning: Naïve Bayes Algorithm. **Reinforcement Learning**: Overview and Scope of Reinforcement Learning, Components of Reinforcement Learning.
Text Books:
1. S. Sridhar and M. Vijayalakshmi, "Machine Learning", Oxford University Press, 2021.
Reference Books:
1. Tom M. Mitchell, "Machine Learning", McGraw-Hill Education, 2013. **2.** Miroslav Kubat, "An Introduction to Machine Learning", Springer, 2017.
Web links and Video Lectures (e-Resources):
• https://www.drssridhar.com/?page_id=1053 • https://www.universitiespress.com/resources?id=9789393330697 • https://onlinecourses.nptel.ac.in/noc23_cs18/preview • https://www.geeksforgeeks.org/machine-learning/ • https://www.w3schools.com/python/python_ml_getting_started.asp • https://www.tutorialspoint.com/machine_learning/index.htm

Table: Matrix to describe the mapping of COs with POs (considering WKs) and PSOs

Course Outcomes (COs)	Program Outcomes and (WKs)											Program Specific Outcomes (PSOs)	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**1**	**2**
CO1	2 (WK1, WK2, WK3, WK4)	3 (WK1, WK2, WK3, WK4)	**3**	**3**	--	--	--	--	--	--	**1**	**2**	**1**
CO2	**3**	2 (WK1, WK2, WK3, WK4)	3 (WK5)	**2**	2 (WK6)	--	--	--	**1**	**1**	--	1 (WK8)	**2**
CO3	--	2 (WK1, WK2, WK3, WK4)	3 (WK5)	--	3(WK6)	1 (WK1, WK5, WK7)	--	**1**	**1**	--	1 (WK8)	--	**2**
CO4	--	2 (WK1, WK2, WK3, WK4)	2 (WK5)	--	--	1 (WK1, WK5, WK7)	--	**1**	**1**	--	1 (WK8)	--	**2**
CO5	2 (WK1, WK2, WK3,	2 (WK5)	--	--	2 (WK6,	--	--	**1**	**1**	--	1 (WK8)	**1**	**2**

	WK4)				WK7)								

Course Code		**:**	**22UIS681L**	**Machine Learning Laboratory**	**Semester**	**:**	**06**
L:T:P		**:**	**0:0:3**		**Course Type**	**:**	**Lab**
Hours/Sem.	**Teaching**	**:**	**0 Hrs**		**CIE Marks**	**:**	**50**
	Learning (TW+SL)	**:**	**42 Hrs**		**SEE Marks**	**:**	**50**
	Exam	**:**	**06 Hrs**		**Total Marks**	**:**	**100**
	Total Hrs.	**:**	**48 Hrs**		**Credits**	**:**	**1**

Professional Competency:

Develop, implement, and evaluate data-driven Machine Learning algorithms for analysis, visualization, prediction, and decision-making using real-world datasets.

Course Outcomes:

1. Apply Python programming and ML libraries to visualize, preprocess, and analyze data using standard datasets.
2. Implement supervised and unsupervised learning algorithms such as KNN, Decision Tree, Naïve Bayes, and K-Means to solve classification and clustering problems.
3. Perform dimensionality reduction using PCA and evaluate model accuracy and performance metrics for given datasets.
4. Design and execute experiments to interpret feature relationships, detect outliers, and extract insights from data visualizations.
5. Demonstrate and validate regression algorithms (Linear, Polynomial, and LWR) for prediction-based ML tasks.

Assignment List:

1. Develop a program to create histograms for all numerical features and analyze the distribution of each feature. Generate box plots for all numerical features and identify any outliers. Use California Housing dataset.
2. Develop a program to Compute the correlation matrix to understand the relationships between pairs of features. Visualize the correlation matrix using a heat map to know which variables have strong positive/negative correlations. Create a pair plot to visualize pairwise relationships between features. Use California Housing dataset.
3. Develop a program to implement Principal Component Analysis (PCA) for reducing the dimensionality of the Iris dataset from 4 features to 2.
4. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Find-S algorithm to output a description of the set of all hypotheses consistent with the training examples.
5. Develop a program to implement k-Nearest Neighbour algorithm to classify the randomly generated 100 values of x in the range of [0,1]. Perform the following based on dataset generated. a. Label the first 50 points {x1,……,x50} as follows: if (xi ≤ 0.5), then xi ∈ Class1, else xi ∈ Class1 b. Classify the remaining points, x51,……,x100 using KNN. Perform this for k=1,2,3,4,5,20,30
6. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.
7. Develop a program to demonstrate the working of Linear Regression and Polynomial

Regression. Use Boston Housing Dataset for Linear Regression and Auto MPG Dataset (for vehicle fuel efficiency prediction) for Polynomial Regression.

8. Develop a program to demonstrate the working of the decision tree algorithm. Use Breast Cancer Data set for building the decision tree and apply this knowledge to classify a new sample.
9. Develop a program to implement the Naive Bayesian classifier considering Olivetti Face Data set for training. Compute the accuracy of the classifier, considering a few test data sets.
10. Develop a program to implement k-means clustering using Wisconsin Breast Cancer data set and visualize the clustering result.

Table: Matrix to describe the mapping of COs with POs (considering WKs) and PSOs

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3 (WK1, WK2, WK3, WK4)	3	2	2	3 (WK5)	—	—	—	—	—	1 (WK8)	3	2
CO2	2	3 (WK2, WK3, WK4)	3	3 (WK5)	3 (WK6)	1	—	—	—	—	1 (WK8)	3	3
CO3	2	2	3 (WK5)	3 (WK6)	3 (WK4, WK5)	1	—	1	—	—	1 (WK8)	3	3
CO4	3	3 (WK2, WK4)	2	3 (WK4)	2 (WK6)	—	—	—	1	—	1 (WK8)	2	2
CO5	3	2	3 (WK5)	3 (WK6)	2 (WK4)	—	—	—	—	—	1 (WK8)	3	2

Course Code		:	22UIS602C	Object Oriented Modeling and Design	Semester	:	06
L:T:P		:	02:02:00		Course Type	:	Theory (Integrated)
Hours/Sem.	Teaching	:	42 Hrs		CIE Marks	:	50
	Learning (TW+SL)	:	42 Hrs		SEE Marks	:	50
	Exam	:	06 Hrs		Total Marks	:	100
	Total Hrs.	:	90 Hrs		Credits	:	03

Professional Competency:

Competency in applying object-oriented principles, design principles and proficient in modeling system requirements using UML diagrams.

Course Outcomes:

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

1. Demonstrate the ability to apply the knowledge of object orientation in modeling and design.
2. Demonstrate the ability to apply the concept of structural and behavioral models using UML appropriate notations.
3. To apply advanced concepts of state modeling and system design.
4. Comprehend the implementation of object oriented designs in object oriented languages.

UNIT–I **10 Hrs**

INTRODUCTION, MODELING CONCEPTS, CLASS MODELING: Object Orientation, OO development, OO themes; Evidence for usefulness of OO development; OO modeling history. Modeling as Design Technique: Modeling; abstraction; the three models. Class Modeling: Object and class concepts; Link and associations concepts; Generalization and inheritance; A sample class model; Navigation of class models; Practical tips. **Advanced Class Modeling:** Advanced object and class concepts; Association ends; N-Ary associations; Aggregation; Abstract classes; Multiple inheritance; Metadata; Reification; Constraints; Derived data; Packages; Practical tips.

UNIT–II **11 Hrs**

STATE MODELING, ADVANCED STATE MODELING, INTERACTION MODELING, PROCESS OVERVIEW:

State Modeling: Events, States, Transitions and Conditions; State diagrams; State diagram behavior; Practical tips. **Advanced State Modeling:** Nested state diagrams; Nested states; Signal generalization; Concurrency; A sample state model; Relation of class and state models; Practical tips. **Interaction Modeling:** Use case models; Sequence models; Activity models. Use case relationships; Procedural sequence models; Special constructs for activity models.

UNIT-III **11 Hrs**

SYSTEM CONCEPTION, DOMAIN ANALYSIS, APPLICATION ANALYSIS, AND SYSTEM DESIGN-1:

System Conception: Devising a system concept; Elaborating a concept; Preparing a problem statement. **Domain Analysis:** Overview of analysis; Domain class model; Domain state model; Domain interaction model; Iterating the analysis. **Application Analysis:** Application interaction model; Application class model; Application state model; Adding operations. **System Design:**

Overview of system design; Estimating performance; Making a reuse plan; Breaking a system in to sub-systems; Common architectural styles; Architecture of the ATM system.

UNIT-IV	10 Hrs

Class Design: Overview of class design; Bridging the gap; Realizing use cases; Designing algorithms; Recur sing downwards, Refactoring; Design optimization; Reification of behavior; Adjustment of inheritance; Organizing a class design; ATM example. **Implementation Modeling:** Overview of implementation; Fine-tuning classes; Fine-tuning generalizations; Realizing associations; Testing.

Text Books:

1. Michael. Blaha, James. Rumbaugh **"Object-Oriented Modeling and Design with UML"**, 2nd Edition, Pearson Education, 2005.

Reference Books:

1. **Ali. Bahrami, "Object Oriented Systems Development",** McGraw-Hill, 2008.
2. Grady. Booch **"Object-Oriented Analysis and Design with Applications",** 3rd Edition, Pearson, 2007.
3. Mark. Priestley, **"Practical Object-Oriented Design with UML"**, 2nd Edition, Tata McGraw-Hill, 2003.

OOMD LABORATORY ASSIGNMENTS

1. Design the Library system: Identify the use cases of the system. (Suggestive use cases: borrow book, return books, read newspapers, reference, and digital library). Develop the use case diagram, Packages and documentation for the same. Preferable use of uses & Extends relationships expected.
2. Design the Examination system: Identify the use cases. (Suggestive use cases:– Form filling, Get Hall Ticket, Write exam, get result Verify Hall Ticket) Develop the use case diagram, Packages and documentation for the same. Preferable use of uses & Extends relationships expected.
3. Analyze and design the system for ATM Transaction: Identify the use cases. (Suggestive use cases: Transaction, Approval process, Invalid PIN, Deposit Amount, Deposit savings, Deposit checking, withdraw Amount, withdraw checking, saving, withdraw saving denied, checking Transaction History, saving Transaction History). Package, documentation Develop the use case diagram, Packages and documentation for the same. Draw the essential class diagrams.
4. Analyze and design the system for Electronics voting system (The actors are presiding officer, 1st polling officer, 2nd polling officer, voters list, Election officer, voter candidate, EVM ID; Processes: Vote counting, and announcement of results). Develop the use case diagram, Packages and documentation for the same. Draw the essential sequence diagrams, activity diagram and state chart diagrams.
5. Analyze and design the system for Employee reference. (The Process HR Manager contacts employees of his company and HR manager of other company to publicize about the vacancy. The person, who has referred the right candidate, will be given bonus. Interview, Short-listing, selection list announcement, Bonus for referred employees are all parts of the process.). Develop the use case diagram, sequence diagrams and state chart diagrams.
6. Analyze and design the system for Vehicle Purchase, registration and licensing Systems. Develop the use case diagram, sequence diagrams, activity diagrams and packages.

7. Develop State transition diagrams for
    a. Telephone line System
    b. Nested State diagram for vehicle transmission states

General Remarks

1. Lab schedule: 2hrs/week for each student (1-hour tutorial, 1-hour program execution).
2. Student should complete all the lab assignments.
3. Lab Evaluation CIE 50 marks:

   Lab assignments: 30 marks

   Lab CIE : 20 marks

Table: Matrix to describe the mapping of COs with POs (considering WKs) and PSOs

Course Outcomes (COs)	Program Outcomes and (WKs)											Program Specific Outcomes (PSOs)	
	1	2	3	4	5	6	7	8	9	10	11	1	2
CO1				3 (WK3, WK5)	2 (WK4)				2 (WK7)	3 (WK5)	2 (Wk7)	3	1
CO2				2 (WK5, WK6)	3 (WK5, WK6)				3 (WK3, WK7)	2 (WK5)	1 (WK7)	2	3
CO3				2 (WK6)	3 (WK6)				3 (WK3, WK7)	3 (WK5)	2 (WK9)	2	2
CO4				2 (WK5)	3 (WK5)				3 (WK3, WK7)	3 (WK5)	2 (WK9)	1	

Course Code		:	22UIS633N	DATA MINING	Semester	:	06
L:T:P		:	3:0:0		Course Type	:	Theory
Hours/Sem.	Teaching	:	42 Hrs		CIE Marks	:	50
	Learning (TW+SL)	:	42 Hrs		SEE Marks	:	50
	Exam	:	06 Hrs		Total Marks	:	100
	Total Hrs.	:	90 Hrs		Credits	:	03

Professional Competency:

Competence in transforming raw, heterogeneous data into meaningful knowledge through preprocessing, pattern discovery, predictive modeling, and web data analysis to enable data-driven engineering solutions.

Course Outcomes:

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

CO1: Display a comprehensive understanding of Data mining, its role and importance in present scenario.

CO2: Apply various data preprocessing techniques to prepare the given raw input data, assess it and provide suitable data for a range of data mining algorithms.

CO3: Discover useful and interesting associations between various types of items in transactional data using association mining algorithms.

CO4: Apply classification algorithms to real time data

CO5: Find and evaluate clusters in given real time data and find useful patterns.

CO6: Select and apply the concepts of search engines for retrieving web pages.

UNIT–I	10 Hrs

Introduction to data mining: Definition of Data Mining. Motivating Challenges DM.
Data Mining Tasks of Data Preprocessing: Data Attributes, Types of Data, Quality of Data and Data Preprocessing. Measures of Similarity and Dissimilarity

UNIT–II	11 Hrs

Association Analysis: Definition of Association Analysis, Frequent Item Set Generation, Rule Generation, Compact Representation of Frequent Item Sets. FP Growth Algorithms, Evaluation of Association Patterns

UNIT-III	11 Hrs

Classification: Preliminaries, Decision Tree Based Classifier, Nearest Neighbor Classifier.
Cluster Analysis: Overview, K-means. DBSCAN

UNIT-IV	10 Hrs

Applications: Data Mining Applications, Web Mining, Search Engines

Text Books:

1. Introduction to Data Mining with Case Studies, G K Gupta, 3 Edition, PHI. (Chapter 1,2,3,4,5,6).
2. Data Mining-Concepts and Techniques, Jiawei Han and Michelins Kamber, Morgan Kaufman, 2006, 2 Edition.

3. Introduction to Duta Mining, Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Pearson Education.

Table: Matrix to describe the mapping of COs with POs (considering WKs) and PSOs

Course Outcomes (COs)	Program Outcomes and (WKs)											Program Specific Outcomes (PSOs)	
	1	2	3	4	5	6	7	8	9	10	11	1	2
CO1	2 (WK1, WK2, WK3, and WK4)	3 (WK1, WK2, WK3, and WK4)	3	3	----	----	----	----	--	--	1	2	1
CO2	3	2 (WK1, WK2, WK3, and WK4)	3 (WK 5)	2	2 (W K6)	-----	-----	1	1		1 (WK8)		2
CO3		2 (WK1, WK2, WK3, and WK4)	3 (WK 5)		3 (W K6)	1 (WK1, WK5 and WK7)		1	1		1 (WK8)		2
CO4		2 (WK1, WK2, WK3, and WK4)	2 (WK 5)			1 (WK1, WK5 and WK7)		1	1		1 (WK8)		2

Course Code		:	22UIS601C	FULL STACK DEVELOPMENT	Semester	:	06
L:T:P		:	02:00:02		Course Type	:	Theory
Hours/Sem.	Teaching	:	28 Hrs		CIE Marks	:	50
	Learning (TW+SL)	:	28 Hrs		SEE Marks	:	50
	Exam	:	06 Hrs		Total Marks	:	100
	Total Hrs.	:			Credits	:	03

Professional Competency:

The course enables students to design, develop, deploy, and maintain complete web applications by integrating front-end technologies, back-end programming, databases, and deployment tools, thereby building industry-ready full stack development skills.

Course Outcomes:

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

1. Apply Javascript to build dynamic and interactive Web projects .
2. Implement user interface components for JavaScript-based Web using React.JS
3. Apply Express/Node to build web applications on the server side.
4. Develop data model in an open source nosql database.
5. Demonstrate modularization and packing of the front-end modules .

UNIT–I	**10 Hrs**
Basic Java Script Instructions, Functions, Methods & Objects Document Object Model, Events	
UNIT–II	**11 Hrs**
Introduction to MERN: MERN components, Server less Hello world. React Components, React State	
UNIT-III	**11 Hrs**
Express, REST API, GraphQL, API Integration and Validation	
UNIT-IV	**10 Hrs**
Mongo DB Basics, Mongo DB Node.js Driver, Schema Initialization, Reading from Mongo DB, Writing to Mongo DB.	

Text Books:

1. Jon Duckett, " Java Script & j Query: Interactive Front-End Web Development", Wiley, 2014.
2. Vasan Subramanian, ProMERN Stack: Full Stack Web App Development with Mongo, Express, React, and Node.Apress,2019.

Table: Matrix to describe the mapping of COs with POs (considering WKs) and PSOs

Course Outcomes (COs)	Program Outcomes and (WKs)											Program Specific Outcomes (PSOs)	
	1	2	3	4	5	6	7	8	9	10	11	1	2
CO1	3(WK1, WK2)	2(WK2 ,WK3)	2(WK3, WK4)		3(WK5)					1(W K8)	2(WK 5)	3	1
CO2	3(WK1, WK2)	2(WK2 ,WK3)	3(WK3, WK4)		3(WK5)				2(W K8)	1(W K8)	2(WK 5)	3	1
CO3	3(WK1, WK2)	3(WK2 ,WK3)	3(WK3, WK4)	2(W K4)	3(WK5)				2(W K8)	1(W K8)	2(WK 5)	3	2
CO4	2(WK1, WK2)	3(WK2 ,WK3)	3(WK3, WK4)	2(W K4)	3(WK5)				2(W K8)		2(WK 5)	2	3

Course Code		:	22UHS600C	Indian Knowledge System	Semester	:	6
L:T:P		:	1:0:0		Course Type	:	HSS
Hours/Sem.	Teaching	:	14 Hrs		CIE Marks	:	50
	Learning (TW+SL)	:	14 Hrs		SEE Marks	:	50
	Exam	:	2 Hrs		Total Marks	:	100
	Total Hrs.	:	30 Hrs		Credits	:	3

Professional Competency:

Develop proficiency in Indian Knowledge Systems encompassing Vedic philosophy, traditional sciences, astronomy, governance and cultural heritage etc.

Course Outcomes:

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

CO1: Provide an overview of the concept of the Indian Knowledge System and its importance

CO2: Appreciate the need and importance of protecting traditional knowledge.

CO3: Recognize the relevance of Traditional knowledge in different domains.

CO4: Establish the significance of Indian Knowledge systems in the contemporary world.

UNIT - I	3 Hrs

Indian Knowledge Systems (IKS)

Overview, Vedic Corpus, Philosophy, Character, scope and importance, traditional knowledge vis-à-vis Indigenous knowledge, traditional knowledge vs. western knowledge.

UNIT – II	4 Hrs

Traditional Knowledge in Mathematics and Humanities

Introduction to Indian Mathematics, Unique aspects of Indian Mathematics, Indian Mathematicians and their Contribution. Number Systems and Units of Measurement.

Linguistics, Art, Craft and Trade in India.

UNIT - III	4 Hrs

Traditional Knowledge in Physics and Chemistry

Measurements for time, distance and weight, Astronomy, Indian contributions in astronomy, Astrology, the celestial coordinate system, Elements of the Indian calendar, Notion of years and month, Pañcāṅga – The Indian calendar system.

Metals and Metalworking: The rise and fall of a great Indian technology, Mining and ore extraction, Zinc extraction, Copper and it's alloys, Iron and steel in ancient India

Module-IV	3 Hrs.

Traditional Knowledge in Professional domain

Town Planning and Architecture, Agriculture, Governance and Public Administration, United Nations sustainable development goals

Text Books:

1. Mahadevan, B., Bhat Vinayak Rajat, Nagendra Pavana R.N. "Introduction to Indian Knowledge System: Concepts and Applications", PHI Learning Private Ltd. Delhi (2022**).** Pride of India: A Glimpse into India's Scientific Heritage, Samskrita Bharati, New Delhi.

Reference Books:

1. Sampad and Vijay "The Wonder that is Sanskrit", Sri Aurobindo Society, Puducherry. (2011).
2. Acarya, P.K. Indian Architecture, Munshiram Manoharlal Publishers, New Delhi. (1996).
3. Kapoor Kapil, Singh Avadhesh "Indian Knowledge Systems Vol – I & II", Indian Institute of

Advanced Study, Shimla, H.P. (2021).
4. Dasgupta,S. A History of Indian Philosophy- Volume 1, Motilal Banarsidass, New Delhi. (1975).
5. PLofker, K. (1963). Mathematics in India, Princeton University Press, New Jeresy, USA"

Web Links and Video Lectures:

Suggested Web Links:

1. https://www.youtube.com/watch?v=LZP1StpYEPM
2. http://nptel.ac.in/courses/121106003/
3. http://www.iitkgp.ac.in/department/KS;jsessionid=C5042785F727F6EB46CBF432D7683B63 (Centre of Excellence for Indian Knowledge System, IIT Kharagpur)
4. https://www.wipo.int/pressroom/en/briefs/tk_ip.html
5. https://unctad.org/system/files/official-document/ditcted10_en.pdfhttp://nbaindia.org/uploaded/docs/traditionalknowledge_190707.pdf developmentgoals/?gclid=EAIaIQobChMInpJtb_p8gIVTeN3Ch2
6. https://unfoundation.org/what-wedo/issues/sustainabledevelopmentgoals/?gclid=EAIaIQobChMInp

Jtb_p8gIVTeN3Ch27LAmPEAAYASAAEgIm1vD_BwELAmPEAAYASAAEgIm1vD_BwE

Mapping of Course outcomes with Pos and PSOs,

Course Outcomes (COs)	Program Outcomes (POs)											Program Specific Outcomes (PSOs)	
	1	2	3	4	5	6	7	8	9	10	11	1	2
CO1	2							3				1	2
CO2						2						1	2
CO3			2	2								1	2
CO4						3	2					1	2

Sl.No.	Unit	Chapter No.	Bit No.
1.	I	1	1.1; 1.2; 1.3 &1.4
		2	2.1; 2.2; 2.3 &2.4
		3	3.1 & 3.2
2.	II	6	6.1; 6.2 &6.4
		8	8.1; 8.2; 8.3; 8.4; 8.5 &8.6
3.	III	9	9.1; 9.2; 9.3; 9.4; 9.5 & 9.6
4.	IV	12	12.1; 12.2; 12.5
		14	14.1; 14.2; 14.3; 14.4 &14.5

******For Course Type, Mention ESC/ETC/PSC/PEC/OEC/INT/IPCC/HSMC/PROJ/IPCC/PCC/PCCL/HSMC/AEC/BSC/PCCL/UHV/AEC/SEC/MC/HSS/INT**

Table: Matrix to describe the mapping of COs with POs (considering WKs) and PSOs is to be included in the syllabus copy (Refer Sample syllabus copy in word file for the course on Fluid Power Systems for Industry 4.0)

Note: From the academic year 2024–25, courses need to be mapped to the revised 11 POs. This means that from the academic year 2024–25 onwards, all mapping needs to be aligned with the 11 POs.

Course Code		**:**	**22UIS635N**	**Fundamentals of Operating System**	**Semester**	**:**	**06**
L:T:P		**:**	**02:02:0**		**Course Type**	**:**	**Theory**
Hours/Sem.	**Teaching**	**:**	**42 Hrs**		**CIE Marks**	**:**	**50**
	Learning (TW+SL)	**:**	**42 Hrs**		**SEE Marks**	**:**	**50**
	Exam	**:**	**06 Hrs**		**Total Marks**	**:**	**100**
	Total Hrs.	**:**	**90 Hrs**		**Credits**	**:**	**03**

Professional Competency:

Develop proficiency to analyze basic principles of operating system, process management, memory management and file systems, and to apply CPU scheduling and deadlock detection algorithms.

Course Outcomes:

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

1. Analyze the principles of operating system.
2. Apply process scheduling algorithms for efficient resource utilization by selecting appropriate one.
3. Identify race conditions to avoid and resolve deadlocks.
4. Analyze various memory management approaches used for efficient utilization of memory.

UNIT–I	**11 Hrs**

OVERVIEW

Introduction: What Operating Systems Do: User View, System View, Operating-System Structure, Operating-System Operations, Process Management, Memory Management, Storage Management, Protection and Security.

System Structures: Operating-System Services, User Operating-System Interface, System Calls, Types of System Calls, System Programs, Operating-System Design and Implementation, Operating-System Structure.

UNIT–II	**11 Hrs**

PROCESS MANAGEMENT

Process Concept: Operations on Processes.

Process Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms

Multi-Threaded Programming: Overview, Multithreading Models.

UNIT-III	**10 Hrs**

PROCESS COORDINATION

Synchronization: The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores

Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Detection, Recovery from Deadlock.

UNIT-IV	**10 Hrs**

MEMORY MANAGEMENT

Memory Management Strategies: Background, Swapping, Contiguous Memory Allocation,

Paging, Implementation of page table

Virtual Memory Management: Background, Demand Paging, Page Replacement

STORAGE MANAGEMENT

Text Books:

5. A. M., Padma Reddy, "Finite Automata and Formal Languages", 2012,Pearson Education.

Reference Books:

6. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, **"OPERATING SYSTEM PRINCIPLES"**, 7th Edition
7. D. M. Dhamdhere, "Operating systems - A concept based Approach", 2nd Edition, Tata McGraw-Hill, 2002.

Table: Matrix to describe the mapping of COs with POs (considering WKs) and PSOs

Course Outcomes (COs)	Program Outcomes and (WKs)											Program Specific Outcomes (PSOs)	
	1	2	3	4	5	6	7	8	9	10	11	1	2
CO1	2 (WK1, WK2, WK3, WK4)	1 (WK1, WK2, WK3, WK4)									1 (WK8)	2	1
CO2	3 (WK1, WK2, WK3, WK4)	2 (WK1, WK2, WK3, WK4)	3 (WK5)			1 (WK1, WK5, WK7)					1 (WK8)	3	1
CO3	2 (WK1, WK2, WK3, WK4)	2 (WK1, WK2, WK3, WK4)	1 (WK5)			1 (WK1, WK5, WK7)					1 (WK8)	2	1
CO4	2 (WK1, WK2, WK3, WK4)	1 (WK1, WK2, WK3, WK4)	1 (WK5)			1 (WK1, WK5, WK7)					1 (WK8)	2	1