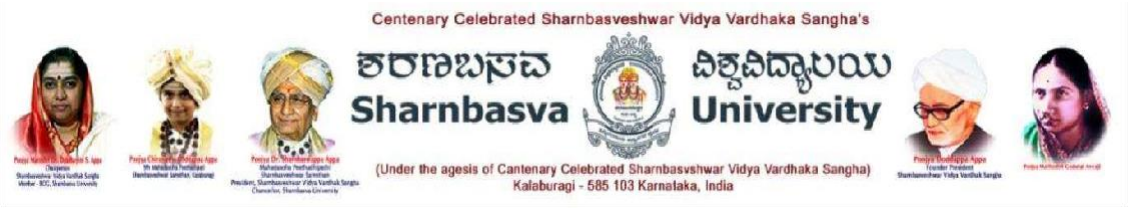

Faculty of Engineering and Technology (Co-Ed)

Department of Computer Science and Engineering

B. Tech 4nd year (VII and VIII Semester)

Scheme of Teaching and Examination

Outcome Based Education (OBE) & Choice Based Credit System (CBCS)

(Effective from the academic year 2024-2025)

Vision and Mission of Faculty of Engineering and Technology (Co-Ed)

VISION OF FACULTY OF ENGINEERING AND TECHNOLOGY(Co-Ed)

To be a premier technological institution that contribute for sustainable development of our nation & the world at large through achieving excellence in technical education and research which facilitating transformation of students into socially responsible citizens and competent professionals of the highest quality.

MISSION OF FACULTY OF ENGINEERING AND TECHNOLOGY(Co-Ed)

- Provide the affordable and quality education and achieve excellence in teaching learning by designing industry need based curriculum.
- Create good research environment that produces innovations and nurture research scholars.
- Collaborate with industries and other institutions of excellence in order to exchange of expertise.
- To inculcate the significance of human values based on the concept of Dasoha Philosophy of Lord Sharnbasveshwara i.e , "service to Humanity in Service to God" and professional ethics to serve the society.

VISION OF DEPARTMENT

To be recognized globally as a department of computer science and engineering focusing on social issues, embracing new technologies, providing highly talented technocrats and entrepreneurs with sound knowledge in ethics occupying top positions and are adaptable and sustainable in ever changing technological realm. To build a strong research and teaching environment par with the latest needs.

MISSION OF DEPARTMENT

M1: To impart quality technical education by designing curriculum in collaboration with industry requirements
M2: To transform young talents into highly competent individuals who work well in a team or as a single.
M3: To train the computer science Engineering graduates to cater to the needs of society and solve real-world problems by providing strong foundation.
M4: To develop a strong, inter and multi-research culture in the department by collaborating with other department of the university.

PROGRAM EDUCATIONAL OBJECTIVES (PEO'S)

PEO 1	Apply basic knowledge, principles and skills in the field of Computer Science to meet the job specification. (Knowledge / Practical Skills)
PEO 2	Implement the responsibility for solving problems analytically, critically, effective, innovative and market- oriented. (Critical Thinking and Problem Solving / Life-long Learning and Information Management / Entrepreneurship Skills/Researcher)
PEO 3	Acts effectively as an individual or in a group to convey information within the organization and community. (Team Working Skills / Communication Skills)
PEO 4	Practicing good values and ethics in a professional manner in the community and able to act as a leader. (Professional, Social, Ethics, and Humanity / Leadership Skills)

PROGRAM OUTCOMES (PO'S)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals and computing to solve Computer Science and Engineering related problems.

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

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

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

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

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

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and Team Work: Function effectively as an individual and as a member or leader to diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective report and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-Long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOME(PSO'S)

Graduates of the Computer Science and Engineering program will be able to

PSO 1: Understand and recognize the fundamental concepts in basic science, humanities and programming languages like C/C++/java etc. to solve engineering problems.

PSO 2: Design, develop, apply concepts from diverse fields , analyse various computer science engineering design and management principles, mathematical foundations, sustainability and emerging challenges in the computation domain for effective computational solutions for real-life and research problems.

PSO 3: Apply modern programming languages, frameworks, and software tools in engineering and emerging trends principles to develop viable solutions for Information Technology Enabled Services and diverse fields.

Sharnbasva University, Kalaburagi Scheme of Teaching and Examination 2021-22
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from the academic year 2021-22)

Programme: B.Tech: Computer Science and Engineering

VII SEMESTER

Sl. No.	Course Code		Course Title	Teaching Department	Teaching Hours/week			Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Duration in Hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P					
1	PCC	21CS71	Big Data Analytics	CSE	3			3	50	50	100	03
2	PCC	21CS72	Internet of Things	CSE	3			3	50	50	100	03
3	PEC	21CS73	Deep Learning	CSE	2	1		3	50	50	100	03
4	PEC	21CS74X	Professional Elective Course-IV	CSE	3			3	50	50	100	03
5	OEC	21XX75X	Open Elective Course-III	CSE	4			3	50	50	100	04
6	PCC	21CSL76	Big Data Analytics Lab	CSE			2	3	50	50	100	01
7	PEC	21CSL77	Internet of Things Lab	CSE			2	3	50	50	100	01
8	PEC	21CSL78	Deep Learning Lab	CSE			2	3	50	50	100	01
9	PW	21PRJ79	Project-VII	CSE			2	3	50	50	100	01
10	HSS	21HSM710	Industrial Psychology and Organizational Behavior	Humanities	1			3	50	50	100	01
	Internship	--	Internship	To be carried out during vacation *								
Total					**16**	**1**	**8**	**30**	**500**	**500**	**1000**	**21**

Note: PCC-Professional Core Course, PEC-Professional Elective Course, OEC-Open Elective Course, PW-Project Work, HSS-Humanity and Social Science, AEC- Ability Enhancement Course. Internship-To be carried out during the vacation/s of VI and VII semesters or VII and VIII semesters

Project(PRJ): Based on the ability /abilities of the student/s and recommendations of the mentor, a single discipline or multidisciplinary mini project can be6 assigned to an individual students or to a group having not more than 4 students.

Professional Elective Course-IV	
Course Code under 21CS74X	**Course Title**
21CS741	Blockchain Technology
21CS742	Soft Computing
21CS743	Edge Computing
Open Elective Course-IV	
Course Code under 21CS75X	**Course Title**
21CS751	Adhoc Networks
21CS752	Object Oriented Programming with Java
21CS753	Operating System

AICTE Activity Points: In case students fail to earn the prescribed activity points, Eighth semester Grade Card shall be issued only after earning the required activity points. Student shall be admitted for the award of the degree only after the release of the Eighth semester Grade Card.

Sharnbasva University, Kalaburagi Scheme of Teaching and Examination 2021-22
Outcome Based Education(OBE) and Choice Based Credit System (CBCS)
(Effective from the academic year 2021-22)

Programme: B.Tech: Computer Science and Engineering

VIII SEMESTER

Sl. No.	Course Code		Course Title	Teaching Department	Teaching Hours/week			Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Duration in Hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P					
1	Project	21PRJ81	Research Project -VIII				06	3	50	50	100	08
2	Internship	21CSI82	Internship				12	3	50	50	100	07
Total							**18**	**06**	**100**	**100**	**200**	**15**

Note:

PCC-Professional Core Course, PEC-Professional Elective Course, OEC-Open Elective Course, PW-Project Work, HSS-Humanity and Social Science, AEC-Ability Enhancement Course. Internship-To be carried out during the vacation/s of VI and VII semesters or VII and VIII semesters

Project(PRJ): Based on the ability /abilities of the student/s and recommendations of the mentor, a single discipline or multidisciplinary mini project can be assigned to an individual students or to a group having not more than 4 students.

Note: Project-8 Manufacturable and marketable project / Research project/Field Project.

BIG DATA ANALYTICS
[As per Choice Based Credit System (CBCS) scheme] (Effective from the academic year 2024-2025) SEMESTER – VII

Course Code	**21CS71**	**CIE Marks**	**50**
Number of Lecture Hours/Week	**03**	**SEE Marks**	**50**
Total Number of Lecture Hours	**40**	**Exam Hours**	**03**

CREDITS – 03

Course Objectives:

1. Understand Hadoop Distributed File system and examine MapReduce Programming
2. Explore big data programming to manipulate, store, and analyze the data.
3. Explore Hadoop tools and manage Hadoop with Ambari & Appraise the role of Business intelligence and its applications across industries.
4. Assess core data mining techniques & data visualization for data analytics.
5. Identify various Text Mining techniques, clustering models.

Modules	Hours
Module I	
Hadoop Distributed File System Basics, Running Example Programs and Benchmarks, Hadoop MapReduce Framework, MapReduce Programming	**08**
Module II	
INTORDUCTION TO MongoDB : What is Mongo DB?, Why Mongo DB?, Using Java Script Object Notation(JSON), Creating or generation a unique key, support for dynamic queries, storing binary data, replication, sharding, updating information in-place, terms used in RDBMS and MongoDB, create database, drop database, data types in MongoDB, MongoDB Query language, insert method, save() method, Adding a new field to an existing document – update method, removing an existing field from an existing document,- remove method, finding documents based on search criteria-find method, dealing with NULL values, count, Limit, Sort, and skip, Arrays , Aggregate Function, MapReduce Function, Java Script Programming, Cursors in MongoDB, Indexes, Mongo Import, Mongo Export, Automatic Generation of unique numbers for the "- id" field.	**08**
Module III	
Essential Hadoop Tools, Business Intelligence Concepts and Application, Data Warehousing, Data Mining	**08**
Module IV	
Data Visualization, Decision Trees, Regression, Artificial Neural Networks	**08**
Module V	
Cluster Analysis, Association Rule Mining, Text Mining, Naïve-Bayes Analysis, Social Network Analysis.	**08**

Question paper pattern:

- The question paper will have ten questions.
- There will be 2 questions from each module.
- Each question will have questions covering all the topics under a module.

The students will have to answer 5 full questions, selecting one full question from each module.

Text Books:

1. Douglas Eadline,"Hadoop 2 Quick-Start Guide: Learn the Essentials of Big DataComputing in the Apache Hadoop 2 Ecosystem", 1st Edition, Pearson Education, 2016. ISBN-13: 978-9332570351
2. Anil Maheshwari, "Data Analytics", 1st Edition, McGraw Hill Education,2017. ISBN-13: 978- 9352604180

Big data and Analytics:Seema Acharya(Infosys ltd), Subhashini hellappan(Infosys ltd)

Reference Books:

1. Douglas Eadline, "Hadoop 2 Quick-Start Guide: Learn the Essentials of Big Data Computing in the Apache Hadoop 2 Ecosystem", 1 stEdition, Pearson Education, 2016. ISBN13: 978-9332570351
2. Tom White, "Hadoop: The Definitive Guide", 4 th Edition, O"Reilly Media, 2015.ISBN-13: 978- 9352130672
3. Boris Lublinsky, Kevin T Smith, Alexey Yakubovich, "Professional Hadoop Solutions", 1 stEdition, Wrox Press,

E-books and Online course materials

1. Noreen Burlingame, The little book on Big Data,New Street publisher(eBook) http://www.prlog.org/11800911-just-published-the-little-book-of-big-data-2012- edition.html
2. http://www.johndcook.com/R_language_for_programmers.html
3. **http://bigdatauniversity.com/**

Online Courses and Video Lectures

1. **https://www.youtube.com/watch?v=Uv96qQ3uC6Y&list=PLWPirh4EWFpENnR0p1JvhJkyTK1M0sOLR**
2. **https://youtu.be/r5k-_RLIpuA**
3. **https://www.youtube.com/watch?v=fUPV776pY2M**
4. **https://www.youtube.com/watch?v=sQ4ZOjPD9wE&list=PLT4WSVLdb6zoyNJt7W6LYSZyphXPPn8-v**

CO#	COURSE OUTCOMES
CO1	Analyze the concepts of HDFS and MapReduce framework
CO2	Apply big data programming to manipulate, store, and analyze the data
CO3	Investigate Hadoop related tools for Big Data Analytics and Recognize the role of Business Intelligence & Data warehousing
CO4	Adapt the data visualization in decision making & Decision Trees for data analysis
CO5	Apply the Cluster analysis and association rules for data analytics

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	2	-	-	-	-	-	2	2	3	-
CO2	3	-	-	-	-	2	-	-	-	-	-	2	2	3	-
CO3	3	3	2	-	-	2	-	-	-	-	-	2	2	3	-
CO4	3	3	2	-	-	2	-	-	-	-	-	2	2	3	-
CO5	3	3	2	-	-	2	-	-	-	-	-	2	2	3	-

INTERNET OF THINGS
[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2024-2025)
SEMESTER – VII

Course Code	**21CS72**	**CIE Marks**	**50**
Number of Lecture Hours/Week	**03**	**SEE Marks**	**50**
Total Number of Lecture Hours	**40**	**Exam Hours**	**03**

CREDITS – 03

Course Objectives:

1. Assess the genesis and impact of IoT applications, architectures in real world.
2. Illustrate diverse methods of deploying smart objects and connect them to network.
3. Compare different Application protocols for IoT.
4. Infer the role of Data Analytics and Security in IoT.
5. Identify sensor technologies for sensing real world entities and understand the role of IoT in various domains of Industry.

Modules	**Hours**
Module I	
What is IoT : What is IoT, Genesis of IoT, IoT and Digitization, IoT Impact, Convergence of IT and IoT, IoT Challenges, IoT Network Architecture and Design, Drivers Behind New Network Architectures, Comparing IoT Architectures, A Simplified IoT Architecture, The Core IoT Functional Stack, IoT Data Management and Compute Stack.	**08**
Module II	
Smart Objects: The "Things" in IoT, Sensors, Actuators, and Smart Objects, Sensor Networks, Connecting Smart Objects, Communications Criteria, IoT Access Technologies.	**08**
Module III	
IP as the IoT Network Layer: IP as the IoT Network Layer, The Business Case for IP, The need for Optimization, Optimizing IP for IoT, Profiles and Compliances, Application Protocols for IoT, The Transport Layer, IoT Application Transport Methods.	**08**
Module IV	
Data and Analytics for IoT: An Introduction to Data Analytics for IoT, Machine Learning, Big Data Analytics Tools and Technology, Edge Streaming Analytics, Network Analytics, Securing IoT, A Brief History of OT Security, Common Challenges in OT Security, How IT and OT Security Practices and Systems Vary, Formal Risk Analysis Structures: OCTAVE and FAIR, The Phased Application of Security in an Operational Environment.	**08**

Module V	
IoT Physical Devices and Endpoints - Arduino UNO: Introduction to Arduino, Arduino UNO, Installing the Software, Fundamentals of Arduino Programming. IoT Physical Devices and Endpoints - RaspberryPi: Introduction to RaspberryPi, About the RaspberryPi Board: Hardware Layout, Operating Systems on RaspberryPi, Configuring RaspberryPi, Programming RaspberryPi with Python, Wireless Temperature Monitoring System Using Pi, DS18B20 Temperature Sensor, Connecting Raspberry Pi via SSH, Accessing Temperature from DS18B20 sensors, Remote access to RaspberryPi, Smart and Connected Cities, An IoT Strategy for Smarter Cities, Smart City IoT Architecture, Smart City Security Architecture, Smart City Use-Case Examples.	**08**

Question paper pattern:

- The question paper will have ten questions.
- There will be 2 questions from each module.
- Each question will have questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Text Books:

1. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry,"IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things", 1stEdition, Pearson Education (Cisco Press Indian Reprint). (ISBN: 978-9386873743)
2. Srinivasa K G, "Internet of Things",CENGAGE Leaning India, 2017.

Reference Books:

1. Vijay Madisetti and ArshdeepBahga, "Internet of Things (A Hands-on-Approach)", 1 stEdition, VPT, 2014. (ISBN: 978-8173719547
2. Raj Kamal, "Internet of Things: Architecture and Design Principles", 1 st Edition, McGraw Hill Education, 2017. (ISBN: 978-9352605224)

Online Courses and Video Lectures

1. https://onlinecourses.nptel.ac.in/noc22_cs53/preview
2. https://www.javatpoint.com/internet-of-things-applications
3. https://www.geeksforgeeks.org/top-applications-of-iot-in-the-world/

CO#	COURSE OUTCOMES
CO1	Interpret the impact and challenges posed by IoT networks leading to new architectural models.
CO2	Illustrate the smart objects and the technologies to connect them to network.
CO3	Assess different protocols for IoT.
CO4	Infer the role of Data Analytics and Security in IoT.
CO5	Identify sensor technologies for sensing real world entities and understand the role of IoT in various domains of Industry.

CO PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	-	-	-	2	-	-	-	-	2	2	3	-
CO2	3	2	2	-	-	-	2	-	-	-	-	2	2	3	-
CO3	3	2	2	-	-	-	2	-	-	-	-	2	2	3	-
CO4	3	2	2	-	-	-	2	-	-	-	-	2	2	3	-
CO5	3	2	2	-	-	-	2	-	-	-	-	2	2	3	-

DEEP LEARNING
[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2024-2025)
SEMESTER – VII

Course Code	**21CS73**	**CIE Marks**	**50**
Number of Lecture Hours/Week	**03**	**SEE Marks**	**50**
Total Number of Lecture Hours	**40**	**Exam Hours**	**03**

CREDITS – 03

Course Objectives:

1. Know the theory behind convolution neural networks, AUTO ENCODERS, RNN.
2. Illustrate the strength and weaknesses of many popular deep learning approaches.
3. Introduce major deep learning algorithms, the problem settings, and their applications to solve real world problems.
4. Learn the open issues in deep learning, and have a grasp of the current research directions.

Modules	**Hours**
Module I	
Introduction to deep learning: introduction, deep learning model, historical trends in deep learning, machine learning basics: learning algorithms, supervised learning algorithms, unsupervised learning algorithms.	**08**
Module II	
Feed forward networks: introduction to feed forward neural networks, gradient based learning, back propagation and other differentiation algorithms. regularization for deep learning	**08**
Module III	
Optimization for training deep models: empirical risk minimization, challenges in neural network optimization, basic algorithms: stochastic gradient descent, parameter initialization strategies, algorithms with adaptive learning rates: the adagrad algorithm, the rmsprop algorithm, choosing the right optimization algorithm.	**08**
Module IV	
Convolution networks: the convolution operation, pooling, convolution and pooling as an infinitely strong prior, variants of the basic convolution function, structured outputs, data types, efficient convolution algorithms, random or unsupervised features- lenet, alexnet	**08**
Module V	
Recurrent and recursive neural networks: unfolding computational graphs, recurrent neural network, bidirectional rnns, deep recurrent networks, recursive neural networks, the long short term memory and other gated rnns. applications: large-scale deep learning, computer, speech recognition, natural language processing and other applications.	**08**

Question paper pattern:

- The question paper will have ten questions.

- There will be 2 questions from each module.
- Each question will have questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Text Books:

1. Ian Goodfellow, Yoshua Bengio, Aaron Courville, "Deep Learning", Mit Press, 2016.

Reference Books:

1. Bengio, Yoshua. "learning deep architectures for ai." foundations and trends in machine learning, 2009.
2. N.D.Lewis, "deep learning made easy with r: a gentle introduction for data science", january 2016.
3. Nikhil Buduma, "fundamentals of deep learning: designing next-generation machine intelligence algorithms", o'reilly publications.

E-books and Online course materials

Online Courses and Video Lectures

1. https://nptel.ac.in/courses/106106184

CO#	COURSE OUTCOMES
CO1	Demonstrate The Basics Of Deep Learning For A Given Context.
CO2	Design And Train Feed Forward Neural Networks For Classification.
CO3	Adapt Optimization Algorithms To Effectively Train The Neural Networks.
CO4	Identify Various Challenges Involved In Designing And Implementing Convolution Algorithms.
CO5	Relate The Deep Learning Algorithms For Recursive Neural Networks and Generative AI.

CO PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	-	-	-	2	-	-	-	-	2	2	3	-
CO2	3	2	2	-	-	-	2	-	-	-	-	2	2	3	-
CO3	3	2	2	-	-	-	2	-	-	-	-	2	2	3	-
CO4	3	2	2	-	-	-	2	-	-	-	-	2	2	3	-
CO5	3	2	2	-	-	-	2	-	-	-	-	2	2	3	-

BLOCKCHAIN TECHNOLOGY
[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2024-2025)
SEMESTER – VII

Course Code	**21CS741**	**CIE Marks**	**50**
Number of Lecture Hours/Week	**03**	**SEE Marks**	**50**
Total Number of Lecture Hours	**40**	**Exam Hours**	**03**

CREDITS – 03

Course Objectives:

1. Define and Explain the fundamentals of Blockchain
2. Illustrate the technologies of blockchain
3. Decribe the models of blockchain
4. Analyze and demonstrate the Ethereum

Modules	**Hours**
Module I	
Blockchain 101: Distributed systems, History of blockchain, Introduction to blockchain, Types of blockchain, CAP theorem and blockchain, Benefits and limitations of blockchain.	**08**
Module II	
Decentralization and Cryptography: Decentralization using blockchain, Methods of decentralization, Routes to decentralization, Decentralized organizations. Cryptography and Technical Foundations: Cryptographic primitives, Asymmetric cryptography, Public and private keys	**08**
Module III	
Bitcoin and Alternative Coins A: Bitcoin, Transactions, Blockchain, Bitcoin payments B: Alternative Coins Theoretical foundations, Bitcoin limitations, Namecoin, Litecoin, Primecoin, Zcash.	**08**
Module IV	
Smart Contracts and Ethereum 101: Smart Contracts: Definition, Ricardian contracts. Ethereum 101: Introduction, Ethereum blockchain, Elements of the Ethereum blockchain, Precompiled contracts.	**08**
Module V	
Alternative Blockchains: Blockchains Blockchain-Outside of Currencies: Internet of Things, Government, Health, Finance, Media	**08**

Question paper pattern:

- The question paper will have ten questions.
- There will be 2 questions from each module.
- Each question will have questions covering all the topics under a module.

- The students will have to answer 5 full questions, selecting one full question from each module.

Text Books:

1. Mastering Blockchain - Distributed ledgers, decentralization and smart contracts explained, Imran Bashir, Packt Publishing Ltd, Second Edition, ISBN 978-1-78712-544-5, 2017

Reference Books:

1. Bitcoin and Cryptocurrency Technologies, Arvind Narayanan, Joseph Bonneau, Edward Felten, 2016
2. Blockchain Basics: A Non-Technical Introduction in 25 Steps, Daniel Drescher, Apress, First Edition, 2017
3. Mastering Bitcoin: Unlocking Digital Cryptocurrencies, Andreas M. Antonopoulos, O'Reilly Media, First Edition, 2014

CO#	COURSE OUTCOMES
CO1	Describe the foundational concepts of blockchain, including its evolution, types, CAP theorem implications, and the benefits and limitations of blockchain in distributed systems.
CO2	Apply decentralization methods and demonstrate the use of cryptographic primitives such as public and private keys in blockchain systems.
CO3	Analyze the architecture and transaction flow of Bitcoin and evaluate the limitations and innovations introduced by alternative coins.
CO4	Develop and test smart contracts using Ethereum by understanding its blockchain components and contract models.
CO5	Evaluate the application of blockchain technology beyond cryptocurrencies in sectors such as IoT, government, finance, and healthcare

CO PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	2	2	-	-	-	-	2	2	3	-
CO2	3	2	-	-	-	2	2	-	-	-	-	2	2	3	-
CO3	3	2	-	-	-	2	2	-	-	-	-	2	2	3	-
CO4	3	2	-	-	-	2	2	-	-	-	-	2	2	3	-
CO5	3	2	-	-	-	2	2	-	-	-	-	2	2	3	-

SOFT COMPUTING **[As per Choice Based Credit System (CBCS) scheme]** **(Effective from the academic year 2024-2025)** **SEMESTER – VII**			
Course Code	**21CS742**	**CIE Marks**	**50**
Number of Lecture Hours/Week	**03**	**SEE Marks**	**50**
Total Number of Lecture Hours	**40**	**Exam Hours**	**03**
CREDITS – 03			

Course Objectives:

1. Understand soft computing techniques
2. Apply the learned techniques to solve realistic problems
3. Differentiate soft computing with hard computing techniques

Modules	**Hours**
Module I	
Introduction: Introduction, soft computing vs. hard computing, various types of soft computing techniques, and applications of soft computing. Basic tools of soft computing – Fuzzy logic, neural network, evolutionary computing. Introduction: Neural networks, application scope of neural networks, fuzzy logic, genetic algorithm, and hybrid systems	**08**
Module II	
Fuzzy Sets and Logic: Basic concepts of fuzzy logic, Fuzzy sets and Crisp sets, Fuzzy set theory and operations, Properties of fuzzy sets, Fuzzy and Crisp relations, Fuzzy to Crisp conversion. Membership functions, interference in fuzzy logic, fuzzy if-then rules, Fuzzy implications and Fuzzy algorithms, Fuzzyfications and Defuzzifications	**08**
Module III	
Evolutionary Computing: Basic Evolutionary Processes, EV: A Simple Evolutionary System, Evolutionary Systems as Problem Solvers, A Historical Perspective, Canonical Evolutionary Algorithms - Evolutionary Programming, Evolution Strategies, A Unified View of Simple EAs- A Common Framework, Population Size	**08**
Module IV	
Hybrid Soft Computing Techniques: Introduction, Neuro Fuzzy Hybrid Systems, Comparison of Fuzzy Systems with Neural Networks, Characteristics of Neuro-Fuzzy Hybrids, Classification of Neuro Fuzzy Hybrid Systems, Genetic Neuro-Hybrid Systems: Properties of Genetic Neuro Hybrid Systems.	**08**
Module V	
Neuro Fuzzy Modeling: **ANFIS:** Adaptive Neuro Fuzzy Inference Systems: Introduction, ANFIS Architecture, Hybrid Learning Algorithm, Learning Methods that cross fertilize ANFIS and RBFN, ANFIS as a Universal Approximator	**08**

Co-active Neuro Fuzzy Modeling: Towards Generalized ANFIS: Introduction, Framework, Neuron Functions for Adaptive networks, Neuro Fuzzy Spectrum.	

Question paper pattern:

- The question paper will have ten questions.
- There will be 2 questions from each module.
- Each question will have questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Text Books:

1. Principles of soft computing S.N.Sivanandam, S.N.Deepa 3rd Wiley India 2019

2. Neuro-Fuzzy and Soft Computing J. S. R. Jang, C. T. Sun, E. Mizutani 1st Pearson Education 2004

3. Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis and Applications S. Rajsekaran,
G. A. Vijayalakshmi Pai 1st Prentice Hall of India 2003.

4. Evolutionary Computation: A Unified Approach De Jong 1st MIT Press 2006.

Reference Books:

1. Soft Computing & Intelligent Systems Theory & Applications N. K. Sinha , M. M. Gupta 1st Academic Press 2009.

2. Computational Intelligence: Concepts to Implementation R. Eberhart , Y. Shi 1st Morgan Kaufman 2007.

3. Fuzzy Logic with engineering applications Timothy J. Ross 3rd Wiley India 2011

COURSE OUTCOMES:

CO1	Apply soft computing techniques and genetic algorithms to solve complex and uncertain real-world problems.
CO2	Understand and apply fuzzy logic concepts to model and solve problems involving uncertainty and imprecision.
CO3	Apply and analyze basic evolutionary processes, canonical evolutionary algorithms, and unified frameworks to solve problems,
CO4	Understand and analyze hybrid soft computing techniques.
CO5	Develop a neuro-fuzzy modeling technique.

CO PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	-	-	2	2	-	-	-	-	2	2	3	-
CO2	3	2	2	-	-	2	2	-	-	-	-	2	2	3	-
CO3	3	2	2	-	-	2	2	-	-	-	-	2	2	3	-
CO4	3	2	2	-	-	2	2	-	-	-	-	2	2	3	-
CO5	3	2	2	-	-	2	2	-	-	-	-	2	2	3	-

Edge Computing
[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2024-2025)
SEMESTER – VII

Course Code	**21CS743**	**CIE Marks**	**50**
Number of Lecture Hours/Week	**03**	**SEE Marks**	**50**
Total Number of Lecture Hours	**40**	**Exam Hours**	**03**

CREDITS – 03

Course Objectives:

- Understand use of the IoT architecture with its entities and protocols, from the IoT devices
- Security and privacy issues related to the area of edge computing and IoT
- Understand the RaspberryPi architecture and its components
- Work with RaspberryPi components and evaluate its performance.

Modules	**Hours**
Module I	
IoT and Edge Computing Definition and Use Cases Introduction to Edge Computing Scenario's and Use cases - Edge computing purpose and definition, Edge computing use cases, Edge computing hardware architectures.	**08**
Module II	
Edge platforms, Edge vs Fog Computing, Communication Models - Edge, Fog and M2M, IoT Architecture and Core IoT Modules-A connected ecosystem, IoT versus machine-to-machine versus, SCADA, The value of a network and Metcalfe's and Beckstrom's laws	**08**
Module III	
IoT and edge architecture, Role of an architect, Understanding Implementations with examples-Example use case and deployment, Case study – Telemedicine palliative care, Requirements, Implementation, Use case retrospective.	**08**
Module IV	
Implementation of Microcomputer RaspberryPi and device Interfacing, Edge to Cloud Protocols- Protocols, MQTT, MQTT publish-subscribe, MQTT architecture details, MQTT state transitions, MQTT packet structure, MQTT data types, MQTT communication formats.	**08**
Module V	
Edge computing with RaspberryPi, Industrial and Commercial IoT and Edge, Edge computing and solutions.	**08**

Question paper pattern:

- The question paper will have ten questions.
- There will be 2 questions from each module.
- Each question will have questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Text Books:

1. IoT and Edge Computing for Architects - Second Edition, by Perry Lea, Publisher: Packt Publishing, 2020, ISBN: 9781839214806
2. 2. Raspberry Pi Cookbook, 3rd Edition, by Simon Monk, Publisher: O'Reilly Media, Inc., 2019, ISBN: 978149204322.

Reference Books:

1. Fog and Edge Computing: Principles and Paradigms by Rajkumar Buyya, Satish Narayana Srirama, wiley publication, 2019, ISBN: 9781119524984.
2. David Jensen, "Beginning Azure IoT Edge Computing: Extending the Cloud to the Intelligent Edge, MICROSOFT AZURE

Course Outcomes (Cos):

CO1	Comprehend the fundamentals of IoT and Edge Computing.
CO2	Gain insights into Edge and Fog computing platforms.
CO3	Develop IoT and Edge architectures and real-world implementations through case studies.
CO4	Implement microcomputing and device interfacing, along with an in-depth understanding of MQTT protocols.
CO5	Explore the integration of Edge computing and understand industrial and commercial IoT applications.

CO PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	-	-	-	2	-	-	-	-	-	2	3	-
CO2	3	2	2	-	-	-	2	-	-	-	-	-	2	3	-
CO3	3	2	2	-	-	-	2	-	-	-	-	-	2	3	-
CO4	3	2	2	-	-	-	2	-	-	-	-	-	2	3	-
CO5	3	2	2	-	-	-	2	-	-	-	-	-	2	3	-

ADHOC NETWORKS
[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2024-2025)
SEMESTER – VII

Course Code	**21CS751**	**CIE Marks**	**50**
Number Lecture Hour/Week	**04**	**SEE Marks**	**50**
Number of Lecture Hours	**50**	**Exam Hours**	**03**

CREDITS-04

Course Objectives

1. To understand the basics of Ad-hoc Networks.
2. To learn various fundamental and emerging protocols
3. To study about the issues pertaining to major obstacles in establishment and efficient management of Ad-hoc networks.
4. To understand the nature and applications of Ad-hoc networks.

Modules	**Hours**
Module I	
Ad-hoc Wireless Networks: Introduction, Issues in Ad-hoc Wireless Networks, Ad-hoc Wireless Internet; MAC Protocols for Ad-hoc Wireless Networks: Introduction, Issues in Designing a MAC Protocol, Design Goals of MAC Protocols, Classification of MAC protocols, Contention- Based Protocols, Contention-Based Protocols with Reservation Mechanisms, Contention-Based Protocols with Scheduling Mechanisms, MAC Protocols that Use Directional Antennas.	**10**
Module II	
Routing Protocols for Ad-hoc Wireless Networks: Introduction, Issues in Designing a Routing Protocol for Ad-hoc Wireless Networks; Classification of Routing Protocols; Table Driven Routing Protocols; On-Demand Routing Protocols, Hybrid Routing Protocols, Hierarchical Routing Protocols	**10**
Module III	
Multicast Routing in Ad-hoc Wireless Networks: Introduction, Issues in Designing a Multicast Routing Protocol, Operation of Multicast Routing Protocols, An Architecture Reference Model for Multicast Routing Protocols, Classifications of Multicast Routing Protocols, Tree-Based Multicast Routing Protocols and Mesh-Based Multicast Routing Protocols.	**10**
Module IV	
Transport Layer and Security Protocols for Ad-hoc Networks: Introduction, Issues in Designing a Transport Layer Protocol; Design Goals of a Transport Layer Protocol; Classification of Transport Layer Solutions; TCP over Transport Layer Solutions; Other Transport Layer Protocols for Ad-hoc Networks; Security in Ad-hoc Wireless Networks, Issues and Challengesin Security Provisioning, Network Security Attacks, Key Management and Secure Touting Ad-hoc Wireless Networks.	**10**
Module V	
Quality of Service and Energy Management in Ad-hoc Wireless Networks: Introduction, Issues and Challenges in Providing QoS in Ad-hoc Wireless Networks, Classification of QoS Solutions, MAC Layer Solutions, Network Layer Solutions; Energy Management in Ad-hoc Wireless Networks: Introduction, Need for Energy Management in Ad-hoc Wireless Networks, Classification of Energy Management Schemes, Battery Management Schemes, Transmission Management Schemes, System Power Management Schemes.	**10**

Question paper pattern:

- The question paper will have ten questions.
- There will be 2 questions from each module.
- Each question will have questions covering all the topics under a module.

The students will have to answer 5 full questions, selecting one full question from each module.

Text Books:

1.Ad-hoc Wireless Networks, C. Siva Ram Murthy& B. S. Manoj, Pearson Education, 2nd Edition, 2011.

Reference Books:

1. Ad-hoc Wireless Networks, Ozan K. Tonguz and John Wiley, 2007 ,Gianguigi Ferrari

2. Ad-hoc Wireless Networking. Xiuzhen Cheng, Xiao Hung, Ding-Zhu Du, Kluwer Academic Publishers, 2004

3. Ad-hoc Mobile Wireless Networks- Protocols and Systems, C.K. Toh, Pearson Education, 2002

CO#	COURSE OUTCOMES
CO1	Describe the overview of Ad-hoc networks and various concepts for assignment of MAC address.
CO2	Apply the design principles of Ad-hoc wireless networks ,Classify and compare different types of ad-hoc routing protocols.
CO3	Understand the concept of multicast communication and its importance in ad-hoc wireless networks.
CO4	Evaluate security mechanisms such as key management and secure routing protocols in ad-hoc wireless systems.
CO5	Understand the fundamentals, challenges, and importance of providing QoS in ad-hoc wireless networks.

CO PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	-	-	-	2	-	-	-	-	-	2	3	-
CO2	3	2	2	-	-	-	2	-	-	-	-	-	2	3	-
CO3	3	2	2	-	-	-	2	-	-	-	-	-	2	3	-
CO4	3	2	2	-	-	-	2	-	-	-	-	-	2	3	-
CO5	3	2	2	-	-	-	2	-	-	-	-	-	2	3	-

Object-Oriented Programming with JAVA
[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2024-2025)
SEMESTER – VII

Course Code	**21CS752**	**CIE Marks**	**50**
Number of Lecture Hours/Week	**04**	**SEE Marks**	**50**
Total Number of Lecture Hours	**50**	**Exam Hours**	**03**

CREDITS – 04

Course Objectives: This course will enable students

- To impart the basic concepts of data structures and algorithms.
- To understand concepts about searching and sorting techniques
- To understand basic concepts about stacks, queues, lists, trees and graphs.
- To enable them to write algorithms for solving problems with the help of fundamental data structures

Module I	**Hours**
Introduction to Object Oriented Concepts: Procedure–Oriented and Object Oriented Programming System, Principles of Object Oriented Programming, Differences between C , C++ and Java, Console I/O, variables and reference variables, Function Prototyping, Function Overloading. Class and Objects: Introduction, member functions and data, objects and functions.	**10**
Module II	
Introduction to Java: Bytecode, Features of Java, Java Applications, Building and Running Java Program, Java Tokens, Data Types, Variables, Operators, Type Conversion and Casting, Arrays, Access Specifiers, Control Statements. **Classes**: Classes fundamentals, Declaring objects, Constructors, this keyword, garbage collection.	**10**
Module III	
Inheritance & Exception Handling: Inheritance: inheritance basics, using super, creating multi level hierarchy, method overriding. Exception Handling: Exception handling in Java. **Packages & Interfaces:** Defining Package, Access Protection, and Importing Packages; Interfaces: Defining and Implementing Interfaces, Nested Interfaces.	**10**
Module IV	
Multi Threaded Programming: Multi Threaded Programming: What are threads? How to make the classes threadable ; Extending threads; Implementing runnable; Synchronization; Changing state of the thread; Bounded buffer problems, producer consumer problems. Event Handling: Two event handling mechanisms; The delegation event model; Event classes; Sources of events; Event listener interfaces; Using the delegation event model;	**10**
Module V	

Applets: Applet basics, Applet Skeleton, Simple Applet Display Methods, Repaint method, Simple Banner Applet, HTML Applet Tag, Passing Parameters to Applet, getDocumentBase and getCodeBasemethods,AppletContext Interface. Java Input/Output: Stream classes, Byte Streams: InputStream, OutputStream, FileInputStream, FileOutputStream, PrintStream, DataInputStream, DataOutputStream;	**10**

Question paper pattern:

- The question paper will have ten questions.
- There will be 2 questions from each module.
- Each question will have questions covering all the topics under a module.

The students will have to answer 5 full questions, selecting one full question from each module

Text Books:

1. Sourav Sahay, Object Oriented Programming with C++ , 2nd Ed, Oxford University Press, New Delhi, 2012.
2. Herbert Schildt, Java the Complete Reference, 7th Edition, Tata McGraw Hill, 2007.

Reference Books:

1. Mahesh Bhave and Sunil Patekar, "Programming with Java", First Edition, Pearson Education,2008, ISBN:9788131720806.
2. Rajkumar Buyya,SThamarasiselvi, xingchen chu, Object oriented Programming with java, Tata McGraw Hill education private limited.
3. E Balagurusamy, Programming with Java A primer, Tata McGraw Hill companies.
4. Anita Seth and B L Juneja, JAVA One step Ahead, Oxford University Press, 2017.

CO#	COURSE OUTCOMES
CO1	Use the concepts of object-oriented programming.
CO2	Demonstrate the ability to develop Java applications for a variety of use cases.
CO3	Apply the concepts of inheritance and exceptions for solving in real world problems
CO4	Illustrates the concepts of Multi Threaded Programming and event handling
CO5	Use the concepts of Applet to create Simple web applications.

CO PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	-	-	-	2	-	-	-	-	2	2	3	-
CO2	3	3	3	-	-	-	2	-	-	-	-	2	2	3	-
CO3	3	3	3	-	-	-	2	-	-	-	-	2	2	3	-
CO4	3	3	3	-	-	-	2	-	-	-	-	2	2	3	-
CO5	3	3	3	-	-	-	2	-	-	-	-	2	2	3	-

OPERATING SYSTEM

[As per Choice Based Credit System (CBCS) scheme]

(Effective from the academic year 2024-2025)

SEMESTER – VII

Course Code	**21CS753**	**CIE Marks**	**50**
Number of Lecture Hours	**04**	**SEE Marks**	**50**
Total Number of Lecture Hours	**50**	**Exam Hours**	**3**

CREDITS – 04

Course Objectives:

1. Demonstrate the need for OS and different types of OS.
2. Apply suitable techniques for management of different resources
3. Use processor, memory, storage and file system commands
4. Analyze deadlock identification and prevention mechanisms, segmentation and paging techniques
5. Realize the different concepts of OS in platform of usage through case studies

Modules	**Hours**
Module I	
Introduction to operating systems: What operating systems do Computer System organization, Computer System architecture, Operating System structure, Operating System operations, Process management, Memory management, Storage management, Protection and Security, Distributed system, Special-purpose systems, and Computing environments? 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, Virtual machines, Operating System generation, System boot.	**10**
Module II	
Process Management: Process concept, Process scheduling, Operations on processes, Inter process communication. -threaded Programming: Overview, Multithreading models, Thread Libraries, Threading issues .Process Scheduling: Basic concepts, Scheduling Criteria, Scheduling Algorithms, Thread scheduling, Multiple-processor scheduling	**10**
Module III	
Process Synchronization: The critical section problem,Peterson‟s solution, Synchronization hardware, Semaphores, Classical problems of synchronization. Deadlocks: System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock	**10**
Module IV	
Memory Management: Background, Swapping, Contiguous memory allocation, Paging, Structure of page table, Segmentation. Virtual Memory Management :Background ,Demand paging, Copy-on-write, Page replacement, Allocation of frames.	**10**
Module V	

File System: File concept, Access methods, Directory structure, File system mounting, File sharing. Implementing File system: File system structure, File system implementation, Directory implementation, Allocation methods. Secondary Storage Structures: Overview of Mass storage structures, Disk structure, Disk attachment, Disk scheduling-FCFS Scheduling, SSTF Scheduling SCANN Scheduling, LOOK Scheduling**.**	**10**

Question paper pattern:

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

Marks scored by the student shall be proportionally scaled down to 50 Marks.

Text Books:

1.Operating System Concepts, by Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, 9th Edition, Wiley India, 2012.

Reference Books:

1. Operating Systems, A Concept-Based Approach, by DM Dhamdhere, 3rd Edition, Tata Mcgraw-Hill, 2012.
2. Modern Operating Systems, by Andrew S. Tanenbaum and Herbert Bos, 4th Edition, Pearson, 2014.
3. Ann McHoes Ida M Fylnn, Understanding Operating System, Cengage Learning, 6th Editi
4. D.M Dhamdhere, Operating Systems: A Concept Based Approach 3rd Ed, McGraw- Hill, 2013.
5. P.C.P. Bhatt, An Introduction to Operating Systems: Concepts and Practice 4th Edition, PHI(EEE), 2014.
6. William Stallings Operating Systems: Internals and Design Principles, 6th Edition, Pearson.

E-books and Online course materials

1. https://deepakdvallur.weebly.com/uploads/8/9/7/5/89758787/18cs43-os-module1.pdf https://de https://deepakdvallur.weebly.com/uploads/8/9/7/5/89758787/18cs43-os-module1.pdfepakdvallur.weebly.com/uploads/8/9/7/5/89758787/module_2.pdf

CO#	COURSE OUTCOMES
CO1	Investigate and evaluate the fundamental concepts and functions of operating systems, including their structure, operations, and various computing environments.
CO2	Analyze process management and multi-threaded programming, and evaluate different process scheduling algorithms.
CO3	Experiment with process synchronization techniques and develop methods to handle deadlocks in an operating system.
CO4	Research memory management concepts including paging, segmentation, and virtual memory management.
CO5	Design file system structures and implement secondary storage structures and protection mechanisms.

CO PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	-	-	-	-	-	-	-	-	2	2	3	-
CO2	3	3	3	-	-	-	-	-	-	-	-	2	2	3	-
CO3	3	3	3	-	-	-	-	-	-	-	-	2	2	3	-
CO4	3	3	3	-	-	-	-	-	-	-	-	2	2	3	-
CO5	3	3	3	-	-	-	-	-	-	-	-	2	2	3	-

BIG DATA ANALYTICS LAB

[As per Choice Based Credit System (CBCS) scheme] (Effective from the academic year 2024-2025) SEMESTER – VII

Course Code	**21CSL76**	**CIE Marks**	**50**
Number of Lecture Hours/Week	**02**	**SEE Marks**	**50**
Total Number of Lecture Hours	**30**	**Exam Hours**	**03**

CREDITS – 01

Course Objectives:

- To implement MapReduce programs for processing big data.
- To understand the data manipulations using hadoop tools
- To analyze big data using machine learning techniques such as Decision tree classification and clustering

List of experiments

1. Hadoop Programming: Word Count MapReduce Program
2. Implementing Matrix Multiplication Using Map-Reduce.
3. Implementing Relational Algorithm on Pig.
4. Implementing database operations on Hive.
5. Implementing Frequent Item set algorithm using Map-Reduce.
6. Implementing Clustering algorithm using Map-Reduce
7. Implementing Page Rank algorithm using Map-Reduce
8. Develop a MapReduce to find the maximum electrical consumption in each year given electrical consumption for each month in each year.
9. Develop a MapReduce to analyze weather data set and print whether the day is shinny or cool day.

Conduct of Practical Examination:

• Experiment distribution

a) For laboratories having only one part: Students are allowed to pick one experiment from the lot with equal opportunity.

b) For laboratories having PART A and PART B: Students are allowed to pick one experiment from PART A and one experiment from PART B, with equal opportunity.

• Change of experiment is allowed only once and marks allotted for procedure to be made zero of the changed part only.

• Marks Distribution

SEE are mentioned here, writeup-15%, Conduction procedure and result in -70%, Viva-voce 15% of maximum marks. SEE for practical shall be evaluated for 5 0 marks

CO#	COURSE OUTCOMES
CO1	Demonstrate theoretical concept of bigdata analytics through series of experiment**.**
CO2	Develop a Program using hadoop, pig and hive software tools.
CO3	Debug and troubleshoot issues effectively.
CO4	Analyze the data and interpret the results.
CO5	Prepare a well-organized laboratory report.

CO-PO-PSO mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	-	2	-	-	-	-	-	-	-	2	-	3
CO2	3	2	3	-	2	-	-	-	-	-	-	-	2	-	3
CO3	3	2	3	-	2	-	-	-	-	-	-	-	2	-	3
CO4	3	2	3	-	2	-	-	-	-	-	-	-	2	-	3
CO5	3	2	3	-	2	-	-	-	-	-	-	-	2	-	3

INTERNET OF THINGS LAB

[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2024-2025)
SEMESTER – VII

Course Code	**21CSL77**	**CIE Marks**	**50**
Number of Lecture Hours/Week	**02**	**SEE Marks**	**50**
Total Number of Lecture Hours	**30**	**Exam Hours**	**03**

CREDITS – 01

Course Objectives:

1. Describe IoT is and how it works today
2. Design and develop IoT applications

List of experiments

1. Getting started with raspberry Pi and ESP32 controller downloading OS, connecting to PC monitor and initial setup.
2. Study of various sensors- i) GAS Sensor ii) Soil Moisture Sensor iii) Light Sensor iv) Ultrasonic Distance Sensor v) Temperature and Humidity Sensor.
3. Interfacing GAS sensor to the Respberry pi/ESP 32 Controller and test the working of the following:
4. GAS sensor and make the buzzer on.
5. soil moisture sensor and send the data to cloud.
6. light sensor and send the data to the cloud.
7. Interfacing Ultrasonic distance to the Respberry pi/ESP 32 and test the working of ultrasonic distance senor and Temperature & Humidity sensor.
8. Live weather broadcasting using DHT11 and Things Speak cloud
9. Smart gas leakage email alerts using Things Speak.
10. Weather display system using DHT11 and LCD.
11. Object distance display using the 7-segment display and Ultrasonic sensor and Read the sensor data when the specified key is pressed.

Conduct of Practical Examination:

• Experiment distribution

a) For laboratories having only one part: Students are allowed to pick one experiment from the lot with equal opportunity.

b) For laboratories having PART A and PART B: Students are allowed to pick one experiment from PART A and one experiment from PART B, with equal opportunity.

• Change of experiment is allowed only once and marks allotted for procedure to be made zero of the changed part only.

• Marks Distribution

SEE are mentioned here, writeup-15%, Conduction procedure and result in -70%, Viva-voce 15% of maximum marks. SEE for practical shall be evaluated for 5 0 marks

CO#	COURSE OUTCOMES
CO1	Demonstrate theoretical concept of internet of things.
CO2	Develop a Program using ESP32 / Raspberry Pi
CO3	Debug and troubleshoot issues effectively.
CO4	Analyze the data and results.
CO5	Prepare a well-organized laboratory report.

CO-PO-PSO mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	-	2	-	-	-	-	-	-	-	2	-	3
CO2	3	2	3	-	2	-	-	-	-	-	-	-	2	-	3
CO3	3	2	3	-	2	-	-	-	-	-	-	-	2	-	3
CO4	3	2	3	-	2	-	-	-	-	-	-	-	2	-	3
CO5	3	2	3	-	2	-	-	-	-	-	-	-	2	-	3

DEEP LEARNING LABORATORY

[As per Choice Based Credit System (CBCS) scheme]

(Effective from the academic year 2024-2025)

SEMESTER – VII

Course Code	**21CSL78**	**CIE Marks**	**50**
Number of Lecture Hours/Week	**02**	**SEE Marks**	**50**
Total Number of Lecture Hours	**30**	**Exam Hours**	**03**

CREDITS – 01

Course Objectives: This course will enable students to:

1. To understand the tools and techniques to implement deep neural networks
2. To apply different deep learning architectures for solving problems
3. To implement generative models for suitable applications
4. To learn to build and validate different models

List of experiments

PART-A

1. Write a program to convert speech into text
2. Write a program to convert text into speech.
3. Write a program to convert video into frames.
4. Write a program for Time-Series Forecasting with the LSTM Model.
5. Build a feed forward neural network for prediction of logic gates.
6. Write a program to implement deep learning Techniques for image segmentation.

PART-B

7. Write a program for object detection using image labelling tools.
8. Write a program to predict a caption for a sample image using LSTM.
9. Write a program for character recognition using CNN.
10. Write a program to predict a caption for a sample image using CNN.
11. Write a program for character recognition using RNN and compare it with CNN.

Conduct of Practical Examination:

• Experiment distribution

a) For laboratories having only one part: Students are allowed to pick one experiment from the lot with equal opportunity.

b) For laboratories having PART A and PART B: Students are allowed to pick one experiment from PART A and one experiment from PART B, with equal opportunity.

• Change of experiment is allowed only once and marks allotted for procedure to be made zero of the changed part only.

• Marks Distribution

SEE are mentioned here, writeup-15%, Conduction procedure and result in -70%, Viva-voce 15% of maximum marks. SEE for practical shall be evaluated for 5 0 marks

CO#	COURSE OUTCOMES
CO1	Implementing Speech recognition.
CO2	Understanding Video Processing.
CO3	Apply deep learning techniques for object identification and segmentation
CO4	Implement LSTM and CNN for multiple problems
CO5	Prepare well organized laboratory report detailing experimental procedure, reports

CO-PO-PSO mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	-	2	-	-	-	-	-	-	-	2	-	3
CO2	3	2	3	-	2	-	-	-	-	-	-	-	2	-	3
CO3	3	2	3	-	2	-	-	-	-	-	-	-	2	-	3
CO4	3	2	3	-	2	-	-	-	-	-	-	-	2	-	3
CO5	3	2	3	-	2	-	-	-	-	-	-	-	2	-	3

PROJECT-VII
[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2024-2025)
SEMESTER – VII

Course Code	**21PRJ79**	**CIE Marks**	**50**
Number of Lecture Hours/Week	**02**	**SEE Marks**	**50**
Total Number of Lecture Hours	**30**	**Exam Hours**	**03**
CREDITS – 01			

Course Objectives: This course will enable students

- Identify real-world problems across programming, databases, and networking domains and understand their business and technical implications.
- Apply systematic methodologies to design, implement, and optimize solutions.
- Resolve technical challenges through debugging, research, and collaboration.
- Take responsibility for specific roles in a team and collaborate effectively to achieve project goals.
- Present project progress and findings clearly and confidently to both technical and non-technical audiences.
- Document the entire project in a structured, professional laboratory report.

Project Guidelines:

- Project work shall preferably be batch wise.
- Evaluation is based on concept clarity, system design, implementation, testing, presentation, and documentation quality, with a focus on proper coding standards, teamwork, and effective communication.
- Viva-voce examination in project work shall be conducted batch-wise.
- Minimum requirement of CIE marks for Project work shall be 50% of the maximum marks.
- Students failing to secure a minimum of 50% of the CIE marks in Project work shall not be eligible for the SEE Project examination.
- For a pass in a Project/Viva-voce examination, a student shall secure a minimum of 40% of the maximum marks prescribed.

CO#	COURSE OUTCOMES
CO1	Identify the topic from various domains (example programming databases, networking) to real world problems.
CO2	Develop methodology for the problem.
CO3	Resolve issues that arise during the project .
CO4	Learn to assign and accept roles and responsibilities within a team and write a good technical reports.
CO5	Exhibit skills in presenting their project findings & progress orally

CO-PO-PSO mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	-	2	2	-	-	2	2	2	-	2	-	3
CO2	3	3	3	-	2	2	-	-	2	2	2	-	2	-	3
CO3	3	3	3	-	2	2	-	-	2	2	2	-	2	-	3
CO4	3	3	3	-	2	2	-	-	2	2	2	-	2	-	3
CO5	3	3	3	-	2	2	-	-	2	2	2	-	2	-	3

INDUSTRIAL PSYCHOLOGY AND ORGANIZATIONAL BEHAVIOR [As per Choice Based Credit System (CBCS) scheme] (Effective from the academic year 2024-2025) SEMESTER – VII			
Course Code	**21HSM710**	**CIE Marks**	**50**
Number of Lecture Hour/Week	**01**	**SEE Marks**	**50**
Total Number of LectureHours	**20**	**Exam Hours**	**03**
CREDITS-01			

Course Objectives: This course will enable students to:

1. **Relating human psychology to science**
2. **Understand the human psychology**
3. **Understand the nature of organization and organization models**
4. **Understand the human social communication**
5. **Understand the leadership qualities**

Modules	Hours
Module -1	
Introduction to I/O psychology:Major fields of I/O psychology, brief history of I/O psychology, employment of I/Opsychology, ethics in I/O psychology.	**4**
Module -2	
Organizational communication:Types of organizational communication, interpersonal communication, improvingemployee communication skills.	**4**
Module -3	
Leadership :Introduction, personal characteristics associated with leadership, interaction between the leadership and the situation specific leader skills, leadership where we are today.	**4**
Module -4	
Group behavior- teams and conflicts: Group dynamics, factors affecting group performance,individual versus group performance, group conflicts.	**4**
Module-5	
Stress management: Dealing with the demands of life and work, stress defined, predisposition to stress, sourcesof stress, consequences of stress, stress reduction intervention related to life /work issues	**4**

Question paper pattern:

- The question paper will have ten questions.
- There will be 2 questions from each module.
- Each question will have questions covering all the topics under a module.

The students will have to answer 5 full questions, selecting one full question from each module

Text Books:

1.Michael G.Aamodt, Industrial/Organizational Psychology: An Applied Approach, 6th Edition, Wadsworth Cengage Learning, ISBN: 978-0-495-60106-7.

Reference Books:

1. Blum M.L. Naylor J.C., Horper & Row, Industrial Psychology, CBS Publisher, 1968

2. Luthans, Organizational Behaviour, McGraw Hill, International, 1997

3. Morgan C.t.,King R.A.,John Rweisz &John Schoples, Introduction to Psychology, McHraw Hill, 1966

4. Schermerhorn J.R.Jr., Hunt J.G &Osborn R.N., Managing, Organizational Behaviour, John Willy

CO#	COURSE OUTCOMES
CO1	Understand the fundamental concepts of Management and Entrepreneurship and opportunities in order to setup a business.
CO2	Identify a best Entrepreneurship model for the required domain of establishment.
CO3	Describe the functions of Managers, Entrepreneurs and their social responsibilities.
CO4	Develop a entrepreneurial mindset and leadership skills to drive organizational success.
CO5	Evaluate and adapt to changing market conditions and entrepreneurial risks.

CO-PO-PSO mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	2	-	-	2	2	-	2	-	3
CO2	3	-	-	-	-	-	2	-	-	2	2	-	2	-	3
CO3	3	-	-	-	-	-	2	-	-	2	2	-	2	-	3
CO4	3	-	-	-	-	-	2	-	-	2	2	-	2	-	3
CO5	3	-	-	-	-	-	2	-	-	2	2	-	2	-	3

RESEARCH PROJECT-VIII
[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2024-2025)
SEMESTER – VIII

Course Code	**21PRJ81**	**CIE Marks**	**50**
Number of Lecture Hours/Week	**--**	**SEE Marks**	**50**
Total Number of Lecture Hours	**--**	**Exam Hours**	**03**

CREDITS – 08

Course Objectives:

- Identify real-world problems across programming, databases, and networking domains and understand their business and technical implications.
- Apply systematic methodologies to design, implement, and optimize solutions.
- Resolve technical challenges through debugging, research, and collaboration.
- Take responsibility for specific roles in a team and collaborate effectively to achieve project goals.
- Present project progress and findings clearly and confidently to both technical and non-technical audiences.
- Document the entire project in a structured, professional laboratory report.

Project Guidelines:

- Project work shall preferably be batch wise.
- Evaluation is based on concept clarity, system design, implementation, testing, presentation, and documentation quality, with a focus on proper coding standards, teamwork, and effective communication.
- Viva-voce examination in project work shall be conducted batch-wise.
- Minimum requirement of CIE marks for Project work shall be 50% of the maximum marks.
- Students failing to secure a minimum of 50% of the CIE marks in Project work shall not be eligible for the SEE Project examination.
- For a pass in a Project/Viva-voce examination, a student shall secure a minimum of 40% of the maximum marks prescribed.

CO#	**COURSE OUTCOMES**
CO1	Identify the topic of real word problem, conduct the relevant literature survey and define the objectives on specific area.
CO2	Develop proper methodology for the problem.
CO3	Resolve issues that arise during the project findings.
CO4	Write good quality technical reports.
CO5	Deliver presentations on project findings.

CO-PO-PSO mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	-	2	2	-	-	2	2	2	-	2	-	3
CO2	3	3	3	-	2	2	-	-	2	2	2	-	2	-	3
CO3	3	3	3	-	2	2	-	-	2	2	2	-	2	-	3
CO4	3	3	3	-	2	2	-	-	2	2	2	-	2	-	3
CO5	3	3	3	-	2	2	-	-	2	2	2	-	2	-	3

INTERNSHIP [As per Choice Based Credit System (CBCS) scheme] (Effective from the academic year 2024-2025) SEMESTER – VIII			
Course Code	**21CS182**	**CIE Marks**	**50**
Number of Lecture Hours/Week	--	**SEE Marks**	**50**
Total Number of Lecture Hours	--	**Exam Hours**	**03**
CREDITS – 07			

Course Objective: This course will enable students to industrial exposure.

- Internship: All the students shall have to undergo mandatory internship of 16 weeks during the 4th semesters. A University examination shall be conducted during semester and the prescribed credit shall be counted in the same semester. Internship shall be considered as a head of passing and shall be considered for the award of degree. Those, who do not take-up/complete the internship shall be declared as fail in internship course and have to complete the same during the subsequent University examination after satisfying the internship requirements
- Internship: Those, who have not pursued /completed the internship, shall be declared as fail in internship course and have to complete the same during subsequent University examinations after satisfying the internship requirements. Internship SEE (University examination) shall be as per the University norms.

INTERNSHIP GUIDELINES:

Note: Internship Comprises Following Subcomponents:

1. Presentation on Internship (After 8 weeks from the date of commencement) CIE for 25 marks.
2. Evaluation of Internship Report (CIE) for 25 marks.
3. Evaluation and Viva-Voce of Internship (SEE) for 50 marks.

- The internship shall be completed during the period specified in the Scheme of Teaching and Examination.
- The internship can be carried out in any industry/R and D Organization/Research Institute/Educational institute of repute.
- (a) The Department/college shall nominate staff members to facilitate, guide and supervise students under internship. (B) The Internal Guide has to visit place of internship at least once during the student's internship.
- The students shall report the progress of the internship to the guide in regular intervals and seek his/her advice.
- After the completion of Internship, students shall submit a report with completion and attendance certificates to the Head of the Department with the approval of both internal and external guides.
- There will be 50 marks for CIE (Seminar: 25, Internship report: 25) and 50 marks for

Viva-Voce conducted during SEE. **The minimum requirement of CIE marks shall be 50% of the maximum marks.**

- The internal guide shall award the marks for seminar and internship report after evaluation. He/she will also be the internal examiner for Viva-Voce conducted during SEE.
- The external guide from the industry shall be an examiner for the viva voce on Internship. Viva-Voce on internship shall be conducted at the college and the date of Viva-Voce shall be fixed in consultation with the external Guide. The Examiners shall jointly award the Viva-Voce marks.
- In case the external Guide expresses his inability to conduct viva voce, the Chief superintended of the college institution shall appoint a senior faculty of the Department of conduct viva-voce along with the internal guide. The same shall be informed in writing to the concerned Chairperson, Board of Examiners (BOE).
- The students are permitted to carry out the internship anywhere in India or abroad. The University will not provide any kind of financial assistance to any student for carrying out the Internship.

CO#	**COURSE OUTCOMES**
CO1	Participate in the projects in industries during her internship
CO2	Learn to use advanced tools and techniques encountered during the visit
CO3	Increase skills for understanding and working with people of diverse backgrounds and culture and to work effectively within diverse environments.
CO4	To deal with Industry-Professionals and ethical issues in the work environment
CO5	Prepare professional work reports and presentations

CO-PO-PSO mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	-	2	2	-	-	2	2	2	-	2	-	3
CO2	3	3	3	-	2	2	-	-	2	2	2	-	2	-	3
CO3	3	3	3	-	2	2	-	-	2	2	2	-	2	-	3
CO4	3	3	3	-	2	2	-	-	2	2	2	-	2	-	3
CO5	3	3	3	-	2	2	-	-	2	2	2	-	2	-	3