BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(Autonomous Institution Affiliated to VTU, Belagavi)
Scheme of Teaching and Examinations – 2024 Scheme
Outcome-Based Education (OBE)and Choice Based Credit System (CBCS)

I Semester M Tech COMPUTER SCIENCE AND ENGINEERING

Sl. No.	Course Category	Course Code	Course Name	Teaching Department	Credits Distribution				Examination				Contact Hours/week
					L	T	P	Total	CIE Marks	SEE Marks	Total Marks	SEE Duration (H)	
1	BSC	MAT11	Applied Mathematics	MT	2	1	0	3	50	50	100	3	4
2	IPCC	MCS12	Advanced Algorithms	CS	3	0	1	4	50	50	100	3	5
3	PCC	MCS13	Artificial Intelligence	CS	3	0	0	3	50	50	100	3	3
4	PCC	MCS14	Fundamentals of Data Science	CS	3	0	0	3	50	50	100	3	3
5	PCC	MCS15	Cryptography and Network security	CS	3	0	0	3	50	50	100	3	3
6	PCCL	MCSL16	Artificial Intelligence Laboratory	CS	0	1	1	2	50	50	100	3	4
7	PCCL	MCSL17	No SQL Database Laboratory	CS	0	1	1	2	50	50	100	3	4
8	NCMC	MRMI18	Research Methodology and IPR	-	-	-	-	PP	Online courses (online.vtu.ac.in)				4
TOTAL					**14**	**3**	**3**	**20**	**350**	**350**	**700**		

Note: **BSC**-Basic Science Courses, **PCC**: Professional core. **IPCC**-Integrated Professional Core Courses, **PCC(PB)**: Professional Core Courses (Project Based), **PCCL**-Professional Core Course lab , **NCMC**- None Credit Mandatory Course, ,**L**-Lecture, **P**-Practical, **T/SDA**-Tutorial / Skill Development Activities (Hours are for Interaction between faculty and students)
MRMI18- Research Methodology and IPR (**Online**) for the students who have **not studied** this course in the Undergraduate level. This course is not counted for vertical progression, Students have to qualify for the award of the master's degree.

M- Master program **xx** – **ME** for Mechanical Engineering Stream, **CV** for Civil Engineering Stream, **EE** – Electrical & Electronics Engineering Stream, **EC**-Electronics and Communication Engineering Stream, **CS**- Computer Science and Engineering **BA** - Business Administration **AR**- Architecture- etc.

13/11/25
Dr. Usha B.A
PG - Coordinator
M.Tech - CSE

13/11/25
Cluster 2 - Head

HOD - CSE

BSC: Basic Science Courses: Courses like Mathematics/ Science are the prerequisite courses that the concerned engineering stream board of Studies will decide. **PCC: Professional Core Course:** Courses related to the stream of engineering, which will have both CIE and SEE components, students have to qualify in the course for the award of the degree. **Integrated Professional Core Course (IPCC):** Refers to a Professional Theory Core Course Integrated with practical of the same course. The IPCC's theory part shall be evaluated by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE). However, questions from the practical part of IPCC shall be included in the SEE question paper. **Project Based Learning Course (PCC(PB):** Project Based Learning course is a professional core Course only Students have to complete a project out of learning from the course and SEE will be viva voce on project work. **PCCL: Professional Core Course Laboratory:** Practical courses whose CIE will be evaluated by the class teacher and SEE will be evaluated by the two examiners.

Skill development activities: Under Skill development activities in a concerning course, the students should

1. Interact with industry (small, medium, and large).
2. Involve in research/testing/projects to understand their problems and help creative and innovative methods to solve the problem.
3. Involve in case studies and field visits/ fieldwork.
4. Accustom to the use of standards/codes etc., to narrow the gap between academia and industry.
5. Handle advanced instruments to enhance technical talent.
6. Gain confidence in the modelling of systems and algorithms for transient and steady-state operations, thermal study, etc. Work on different software/s (tools) to simulate, analyze and authenticate the output to interpret and conclude.

All activities should enhance student's abilities to employment and/or self-employment opportunities, management skills, Statistical analysis, fiscal expertise, etc. Students and the course instructor/s are to be involved either individually or in groups to interact together to enhance the learning and application skills of the study they have undertaken. The students with the help of the course teacher can take up relevant technical –activities that will enhance their skills. The prepared report shall be evaluated for CIE marks.

MRMI18-Research Methodology and IPR- None Credit Mandatory Course (NCMC) if students have not studied this course in their undergraduate program then he /she has to take this course at **http://online.vtu.ac.in** and to qualify for this course is compulsory before completion of the minimum duration of the program (Two years), however, this course will not be considered for vertical progression.

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Scheme of Teaching and Examinations – 2024 Scheme

Outcome-Based Education (OBE) and Choice Based Credit System (CBCS)

II Semester M Tech Computer Science and Engineering

Sl. No.	Course Category	Course Code	Course Name	Teaching Department	Credits Distribution				Examination				Contact Hours/week
					L	T	P	Total	CIE Marks	SEE Marks	Total Marks	SEE Duration (H)	
1	IPCC	MCS21	Machine Learning	CS	3	0	1	4	50	50	100	3	5
2	IPCC	MCS22	Internet of Things	CS	3	0	1	4	50	50	100	3	5
3	PEC	MCS23X	Specialization Course-I	CS	3	0	0	3	50	50	100	3	4
4	PEC	MCS24X	Specialization Course-II	CS	3	0	0	3	50	50	100	3	4
5	PEC	MCS25X	Specialization Course-III	CS	3	0	0	3	50	50	100	3	3
6	PCCL	MCSL26	Web Applications Development Laboratory	CS	0	1	1	2	50	50	100	3	4
7	AEC/SEC	MCS27X	Ability/Skill Enhancement Course (Offline/Online)	CS	0	0	1	1	50	50	100	3	2
TOTAL					**15**	**1**	**4**	**20**	**350**	**350**	**700**	**-**	**-**

Note: **PCC**: Professional core. **IPCC**-Integrated Professional Core Courses, **PCC(PB)**: Professional Core Courses (Project Based), **PCCL**-Professional Core Course lab,**PEC**- Professional Elective Courses, **MDC**- Multi-Disciplinary Courses

, L-Lecture, P-Practical, T/SDA-Tutorial / Skill Development Activities (Hours are for Interaction between faculty and students)

L-Lecture, P-Practical, T/SDA-Tutorial / Skill Development Activities (Hours are for Interaction between faculty and students) **PBLC**: Project Based Learning Course,

Note: **xxx** means specialization code for example **MDE- Design** Engineering, **LDN**- Digital Communication and Networking, **SCE**- Computer Engineering, **CCT**- Construction Technology, **AUD**- Urban Design, **MBA**- Master of Business Administration, **MCA**-Master of Computer Application, etc

13/11/2024.
[PG - Coordinator]

13/11/24
Cluster - 2 - Head

T. Sathish
HOD - CSE 13/11/24

Specialization Basket 3			
Course Code	**Course Title**	**Course Code**	**Course Title**
MCS25A	Agile Technology	MCS25B	Web Engineering
MCS25C	Object Oriented Analysis and Design	MCS25D	Program Management

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III Semester M. Tech. COMPUTER SCIENCE AND ENGINEERING

Sl. No.	Course Category	Course Code	Course Name	Teaching Department	Credits Distribution				Examination				Contact Hours
					L	T	P	Total	CIE Marks	SEE Marks	Total Marks	SEE Duration	
1	PCC	NPTEL Course	Online Course (12 weeks duration)	CS	3	0	0	3	-	100	100	-	
2	PCC	NPTEL Course	Online Course (12 weeks duration)	CS	3	0	0	3	-	100	100	-	
3	PCC	NPTEL Course	Online Course (12 weeks duration)	CS	3	0	0	3	-	100	100	-	
4	INT	MINT34	Internship Phase I (Research/Industry Internship leading to Project work)	CS	0	0	5	5	100	---	100	-	10
5	PW	MPROJ35	Project Phase I	CS	0	0	4	4	100	---	100	-	8
			TOTAL		9	0	9	18	275	225	500		

- **Professional Core Course (PCC):** It is an Online course and been proctored by the faculty throughout the semester. Students can choose the online course/certification programs from NPTEL (The courses are identified by BOS). They may present the final certificate for internal assessment. Student can take the course during II semester break and need to submit the course completion certificate before semester end examination for evaluation.
- **Project Work Phase-1:** Students in consultation with the guide/co-guide if any shall pursue literature survey and complete the preliminary requirements of selected Project work. Each student shall prepare relevant introductory project document and present a seminar. CIE marks shall be awarded by a committee comprising of HoD as Chairman, Guide/co-guide if any, and a senior faculty of the department. The CIE marks awarded for project work phase -1 shall be based on the evaluation of Project Report, Project Presentation skill and Question and Answer session in the ratio 50:25:25.
- **Internship Phase-1:** All the students shall have to undergo mandatory internship of 4-6 weeks during the semester. Those, who have not pursued /completed the internship, shall be declared as fail in internship course and have to complete the same during subsequent semester end examinations after satisfying the internship requirements.

13/11/24
Dr. Usha. B.A

13/11/24
Head

HoD - CSE

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IV Semester M Tech COMPUTER SCIENCE AND ENGINEERING

Sl. No.	Course Category	Course Code	Course Name	Teaching Department	Credits Distribution				Examination				Contact Hours
					L	T	P	Total	CIE Marks	SEE Marks	Total Marks	SEE Duration	
1	INT	MINT41	Internship Phase II (Research/Industry Internship leading to Project work)	CS	0	0	10	10	100	100	200	3	20
2	PW	MPROJ42	Project Phase II	CS	0	0	12	12	100	100	200	3	24
TOTAL					**0**	**0**	**22**	**22**	**200**	**200**	**400**	**-**	**44**

- **Internship Phase-2:** All the students shall have to undergo mandatory internship of 6-8 weeks during the semester. Those, who have not pursued /completed the internship, shall be declared as fail in internship course and have to complete the same during subsequent semester end examinations after satisfying the internship requirements.
- **Project Work Phase-2:** CIE marks shall be awarded by a committee comprising of HoD as Chairman, Guide/co-guide, if any, and a senior faculty of the department. The CIE marks awarded for project work phase -2 shall be based on the evaluation of Project Report subjected to plagiarism check, Project Presentation skill and Question and Answer session in the ratio 50:25:25. SEE shall be at the end of IV semester. Project work evaluation and Viva-Voce examination (SEE), after satisfying the plagiarism check (below 20%).

13/11/2025
[PG- Coordinator]

13/11/25
Cluster-2-Head

13/11/25
HOD- CSE

Online Course Pool for M.TECH. COMPUTER SCIENCE AND ENGINEERING

NPTEL Courses (Currently Offered) July-2024

Sl no.	Course ID	Course Name	SME Name	Institute	UG/PG
1	noc24-cs86	Distributed Optimization and Machine Learning	Prof. Mayank Baranwal	IIT Bombay	PG
2	noc24-cs112	Secure Computation: Part II	Prof. Ashish Choudhury	IIIT Bangalore	PG
3	noc24-cs85	Practical Cyber Security for Cyber Security Practitioners	Prof. Sandeep K. Shukla	IIT Kanpur	UG/PG
4	noc24-cs100	Randomized Methods in Complexity	Prof. Nitin Saxena	IIT Kanpur	UG/PG
5	noc24-cs87	Computational Arithmetic - Geometry for Algebraic Curves	Prof. Nitin Saxena	IIT Kanpur	UG/PG
6	noc24-cs102	Reinforcement Learning	Prof. Balaraman Ravindran	IIT Madras	UG/PG
7	noc24-cs89	Deep Learning for Computer Vision	Prof. Vineeth N Balasubramanian	IIT Hyderabad	UG/PG
8	noc24-cs117	Parameterized Algorithms	Prof. Neeldhara Misra Prof. Saket Saurabh	IIT Gandhinagar	UG/PG
9	noc24-cs104	Applied Accelerated Artificial Intelligence	Prof. Satyajit Das Prof. Satyadhyan Chickerur Prof. Bharatkumar Sharma Prof. Adesuyi Tosin	IIT Palakkad KLE Technological University NVIDIA	PG
10	noc24-cs90	Social Network Analysis	Prof. Tanmoy Chakraborty	IIT Delhi	UG/PG
11	noc24-cs119	Software Engineering	Prof. Rajib Mall	IIT Kharagpur	PG
12	noc24-cs106	Computational Complexity	Prof. Subrahmanyam Kalyanasundaram	IIT Hyderabad	PG
13	noc24-cs114	Deep Learning - IIT Ropar	Prof. Sudarshan Iyengar Prof. Sukrit Gupta	IIT Ropar	UG/PG
14	noc24-cs121	Cyber Security and Privacy	Prof. Saji K Mathew	IIT Madras	PG
15	noc24-cs93	Multi-Core Computer Architecture	Prof. John Jose	IIT Guwahati	UG/PG
16	noc24-cs107	Statistical Learning for Reliability Analysis	Prof. Monalisa Sarma	IIT Kharagpur	UG/PG
17	noc24-cs94	Ethical Hacking	Prof. Indranil Sengupta	IIT Kharagpur	UG/PG
18	noc24-cs125	Programming in Modern C++	Prof. Partha Pratim Das	IIT Kharagpur	UG/PG
19	noc24-cs95	Introduction to Industry 4.0 and Industrial Internet of Things	Prof. Sudip Misra	IIT Kharagpur	PG
20	noc24-cs116	Introduction To Algorithms and Analysis	Prof. Sourav Mukhopadhyay	IIT Kharagpur	UG/PG
21	noc24-cs109	Algorithmic Game Theory	Prof. Palash Dey	IIT Kharagpur	PG
22	noc24-cs126	Design & Implementation of Human-Computer Interfaces	Prof. Samit Bhattacharya	IIT Guwahati	UG/PG
23	noc24-cs97	Approximation Algorithm	Prof. Palash Dey	IIT Kharagpur	UG/PG
24	noc24-cs132	Responsible & Safe AI Systems	Prof. Ponnurangam Kumaraguru Prof. Balaraman Ravindran Prof. Arun Rajkumar	IIIT Hyderabad and IIT Madras	UG/PG

[Dr. Usha B.A
PG-Coordinator]

22/11/25
[Dr. Shoba M]

SEMESTER – I

M.TECH. COMPUTER SCIENCE AND ENGINEERING

Choice Based Credit System (CBCS)

SEMESTER - I

Applied Mathematics (3:0:0) 3

(Effective from the academic year 2024-25)

Course Code	MAT11	**CIE Marks**	50
Teaching Hours/Week (L:T:P)	2:2:0	**SEE Marks**	50
Total Number of Contact Hours	40	**Exam Hours**	3

Course Objectives: This course will enable students to:

1. Explore the foundational aspects of statistical methods and Linear Algebra.
2. Apply the concept of probability distribution of discrete and continuous random variables.
3. Apply the concept of Linear Algebra and Vector Spaces to solve real world problems.
4. Analyze the statistical data for testing of hypothesis and draw inferences using Number Theory.

Preamble: Applied Mathematics is a branch of mathematics that focuses on the practical application of mathematical techniques to solve real-world problems across various fields such as science, engineering, economics, and industry. It involves using mathematical models, algorithms, and computational methods to analyze and predict the behavior of complex systems. Applied mathematicians work on problems like optimizing processes, modeling natural phenomena, and designing systems for efficiency and reliability. The field bridges the gap between theoretical mathematics and practical applications, enabling innovations in areas such as cryptography, data analysis, fluid dynamics, financial Modeling, and more.

Module – 1

Vector Spaces

Introduction, Vector spaces, Subspaces, Linearly independent and dependent vectors, Basis and dimension, Coordinate vectors - Illustrative examples, Linear transformations, Representation of transformations by matrices. (8 hours)

Module – 2

Eigen Decomposition

Introduction, Eigenvalues and Eigenvectors, Orthogonal vectors and orthogonal basis, Orthonormal vectors and basis. Gram-Schmidt orthogonalization process, Algorithms for Matrix factorization: Diagonalization, QR decomposition, Singular value decomposition. (8 hours)

Module – 3

Random Variables and Probability Distributions

Introduction, Review of basic probability theory, Random variables (discrete and continuous), Probability Distributions: Binomial distribution, Poisson distribution, Normal distribution, Exponential distribution and Uniform distribution. (8 hours)

Module – 4

Joint Probability Distributions and Stochastic Processes

Introduction, Joint probability distribution (both discrete and continuous), Covariance and Correlation, Stochastic Processes: Introduction, Classification of stochastic processes, discrete time processes, Stationary processes, Ergodicity. (8 hours)

Module – 5

Number Theory

Introduction, Divisibility, GCD, Euclidean algorithm, Congruences, Linear Congruences, The Chinese Remainder theorem, Solving Polynomials, Linear Diophantine Equation, System of Linear Congruences, Euler's Theorem, Fermat's Little Theorem. (8 hours)

Course outcome (Course Skill Set)

At the end of the course, the student will be able to:

1. Explore the foundational aspects of Vector Spaces and Matrix decomposition using eigenvalues.
2. Interpret the probability distribution arising in the study of engineering problems and their applications.
3. Apply the statistical tools in multi variable distributions.
4. Demonstrate knowledge and critical understanding of the well-established principles in Number Theory.

Question paper pattern:

- **SEE** will be conducted for 100 marks.
- Each full question is for 20 marks. (Answer five full questions out of 10 questions with intra modular choice). In every question, there will be a maximum of three sub-questions.
- **CIE** will be announced prior to the commencement of the course.
- 25 marks for test. An average of three tests will be taken.
- 25 marks for Flexible Assessment Method.

Text books:

1. Neal Coblitz, "A Course in Number Theory and Cryptography", Springer Verlag, Second edition.
2. David C. Lay, Steven R. Lay and J. J. McDonald, "Linear Algebra and its Applications", 5th Edition, Pearson Education Ltd., 2015.
3. Douglas C. Montgomery, George C. Runger, "Applied Statistics and Probability for Engineers", John Wiley & Sons, Inc. 3rd Ed.

Reference books:

1. C.L. Liu, 'Elements of Discrete Mathematics', McGraw Hill, 2008.
2. P. K. Saikia, "Linear Algebra", Pearson Education.
   Niven, H.S. Zuckerman and H. L. Montgomery, "An Introduction to the Theory of Numbers",John Wiley and Sons.

Web links and Video Lectures (e-Resources):

1. Introduction to Probability and Statistics by the University of London: University of London. "Introduction to Probability and Statistics" Coursera www.coursera.org/learn/probability-statistics.
2. Introduction to Number Theory by Stanford University (offered through Stanford Online but listed on Coursera) Stanford University. "Introduction to Number Theory" Coursera, www.coursera.org/learn/number-theory

Dr. Rakesh Bharati

M.TECH. COMPUTER SCIENCE AND ENGINEERING

Choice Based Credit System(CBCS)

SEMESTER -I

Advanced Algorithms(3:0:2)4

(Effective from the academic year 2024-25)

Course Code	MCS12	**CIE Marks**	50
Teaching Hours/Week (L:T:P)	3:0:2	**SEE Marks**	50
Total Number of Contact Hours	50	**Exam Hours**	3

Course Objectives:

This course will enable students to:

1. Develop skills in analyzing and implementing advanced sorting algorithms and matrix multiplication techniques.
2. Master string-matching techniques and probabilistic algorithms for efficient data processing.
3. Explore graph algorithms and tackle NP-complete problems using various strategies.
4. Design parallel algorithms using OpenMP and MPI libraries.

Preamble: The Advanced Algorithms course provides learners with a comprehensive understanding of how to create efficient algorithms and analyze their performance. This course covers fundamental algorithmic techniques such as divide-and-conquer, dynamic programming, greedy algorithms, and graph algorithms, as well as complexity analysis to evaluate their efficiency in terms of time and space. Students learn to design algorithms to solve complex computational problems and gain the skills to critically assess the trade-offs between different approaches. By the end of the course, students are well-prepared to apply these principles in both academic and real-world scenarios, ensuring optimal solutions in software development and problem-solving tasks.

Module –1

Algorithm Analysis:

Algorithm complexity - Growth of functions, Master method solution, Sorting Techniques & their time Complexity: Insertion Sort, Merge Sort, Heap Sort and Quick Sort, Sorting in Linear Time, Amortized Analysis, aggregation method, counting method, Strassen's algorithm for matrix multiplication. The recurrence – tree method.

Lab Programs/Experiments:

1. Program to implement Merge Sort, Heap Sort and Quick Sort algorithms.
2. Program to implement Strassen's algorithm for matrix multiplication.
3. Solving Algorithm Analysis problems. (10hours)

Module –2

String-Matching Algorithms:

Naïve string Matching, Rabin - Karp algorithm; String matching with finite automata, Knuth-Morris-Pratt algorithm; Boyer – Moore algorithms.

Probabilistic and Randomized Algorithms: Probabilistic algorithms; Randomizing deterministic algorithms, Monte Carlo and Las Vegas algorithms; Probabilistic numeric algorithms.

Lab Programs:

1. Program to implement Naive algorithm.
2. Program to implement Rabin - Karp algorithm.
3. Program to implement Boyer – Moore algorithm.
4. Program to implement Monte Carlo algorithm. (10 hours)

Module –3

Graph Algorithms:

Bellman - Ford Algorithm; Single source shortest paths in a DAG; Johnson's Algorithm for sparse graphs; Flow networks and Ford-Fulkerson method; Maximum bipartite matching. Polynomials and the FFT: Representation of polynomials; The DFT and FFT; Efficient implementation of FFT.

Lab Programs:

Program to implement Ford-Fulkerson method.

Program to implement Johnson's Algorithm. (10hours)

Module –4

Distributed Memory Programming with MPI:

Distributed Memory Programming with MPI Getting Started, The Trapezoidal Rule in MPI, Dealing with I/O, Collective Communication, MPI Derived Data types, A Parallel Sorting Algorithm.

Shared Memory Programming with OpenMP: Introduction to OpenMP, The Trapezoidal Rule, Scope of Variables, The Reduction Clause, The Parallel For Directive.

Lab Programs:

Compare the speedup of the parallel implementation of Quick sort using MPI (On a cluster of 5 Nodes) and OpenMP (Shared Memory Implementation on multicore machine).

Compare the speedup of the parallel implementation of Merge sort using MPI (On a cluster of 5 Nodes) and OpenMP (Shared Memory Implementation on multicore machine). (10hours)

Module –5

NP-Complete Problems:

Polynomial-time solvable problems, NP-Completeness and Reducibility, NP-Complete problems, NP-Hard Problems, Cooke's theorem, Clique decision problem, Graph coloring problem, Directed Hamiltonian cycle problem, Traveling salesman problem.

Lab Programs:

Traveling Salesman Problem (TSP)

Description: Given a list of cities and the distances between each pair, find the shortest possible route that visits each city exactly once and returns to the origin city.

Implementation: Use a brute force approach to calculate all possible permutations of city tours and find the shortest one, or use heuristics like nearest neighbour, genetic algorithms, or dynamic programming (e.g., Held-Karp algorithm).

Graph Coloring Problem

Description: Assign colours to the vertices of a graph so that no two adjacent vertices share the same colour using the minimum number of colours.

Implementation: Use backtracking to try all possible colourings or employ heuristic algorithms like the greedy colouring algorithm. (10hours)

Course outcomes:

The students will be able to

CO1: Apply algorithms to solve problems in engineering domains.
CO2: Develop and implement algorithms in any programming language.
CO3: Examine the algorithms with respect to time and space complexity.
CO4: Analyze the given problem and devise algorithms to solve them.

Question paper pattern:

- **SEE**willbeconductedfor100marks.
- Each full question is for 20 marks. (Answer five full questions out of 10 questions with intra modular choice). In every question, there will be a maximum of three sub-questions.
- **CIE** will be announced prior to the commencement of the course.
- 25 marks for test. Average of three tests will be taken.
- 25marks for Flexible Assessment Method.

Text books:

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, Introduction to Algorithms, MIT Press, 3rd Edition, 2009.
2. Michael T. Goodrich and Roberto Tamassia, Algorithm Design Foundations, Analysis, and Internet Examples, John Wiley & Sons, Inc., 2nd Edition, 2009.
3. Peter S Pacheco and Matthew Malensek An introduction to parallel programming, Second Edition, Morgan Kaufmann Publishers, 2021.
4. Grama, Ananth, Anshul Gupta, George Karypis, and Vipin Kumar. Principles of parallel algorithm design. Introduction to Parallel Computing, 2nd ed. Addison Wesley, Harlow (2003).

References:

1. Dave and Dave, Design and Analysis of Algorithms, Pearson Education.
2. A.V. Aho, J.E. Hopcroft, Design & Analysis of Computer Algorithms, 2nd Edition, PHI.

Web Resources:

1. "Algorithms Specialization." Coursera, offered by Stanford University, https://www.coursera.org/specializations/algorithms. Accessed 28 Aug. 2024.
2. "Advanced Algorithms and Complexity." Coursera, offered by University of California, San Diego, https://www.coursera.org/learn/advanced-algorithms. Accessed 28 Aug. 2024.

Namatha.M

M.TECH. COMPUTER SCIENCE AND ENGINEERING

Choice Based Credit System (CBCS)

SEMESTER – I

Artificial Intelligence (3:0:0) 3

(Effective from the academic year 2024-25)

Course Code	MCS13	CIE Marks	50
Teaching Hours/Week (L: T:P)	3:0:0	SEE Marks	50
Total Number of Contact Hours	40	Exam Hours	3

Course Objectives

- Apply the basic principles, models, and algorithms of Artificial and Agentic Intelligence.
- Recognize, model, and solve problems in the analysis and design of intelligent systems.
- Explore structures and algorithms of a selection of techniques related to searching, reasoning, learning, and language processing.
- Implement AI models using industry-standard tools and frameworks.
- Develop and validate AI solutions for real-world domains using ethical, unbiased approaches.

Preamble

Artificial Intelligence bridges human ingenuity with cutting-edge technology. This course deepens understanding of intelligent agents and learning systems that perceive, reason, and act. Students will explore agentic AI, ethical reasoning, and the development of algorithms from scratch. The course links AI concepts to applied mathematics, enabling learners to apply AI in diverse sectors such as power systems, EV batteries, UAVs, agriculture, and healthcare. Hands-on components and expert interactions ensure industry-readiness and exposure to tools such as MongoDB and Kafka for large-scale AI data handling.

Module – 1

Intelligent and Agentic Systems

Introduction to Intelligent Agents: How agents act, mapping percept sequences to actions, environments, and rationality. **Structure of intelligent agents**: Reflex, model-based, goal-based, utility-based, and learning agents. **Agentic AI**: Autonomous decision-making, multi-agent coordination, modern frameworks such as LangChain and LLM-based agent architectures. **Case study:** Agentic reasoning for automated energy management. (8 Hours)

Module – 2

Problem Solving and Agents

Problem-solving and Search: Uniform Cost Search, Best-First Search, Hill Climbing, Simulated Annealing. **Software Agents** – Concepts, Definition, Characteristics; Designing Agents as if People Mattered. **Scenario-based Learning:** Real-world applications—AI for Predictive Maintenance in EV batteries, AI in Power Systems. **Mathematical link:** Search algorithms and optimization using linear algebra. (7 Hours)

Module – 3

Knowledge Representation and Mathematical Foundations

Representations and Mappings, Approaches and Issues in Knowledge Representation. Ontologies and Ontological Engineering. **Predicate Logic:** Representing facts, instance relationships, computable functions, forward chaining. Parse Tree Representation of Knowledge. **Mathematical Integration:** Role of Linear Algebra, Probability, and Advanced Algorithms in Knowledge Representation and Reasoning. (9 Hours)

Module – 4
Uncertain Knowledge and Reasoning Acting under Uncertainty, Bayes' Rule and Applications. Probabilistic Reasoning using Bayesian Networks. Utility Theory and Decision Making. **Industry-Relevant Algorithms:** Random Forests, Gradient Boosting, and ensemble reasoning models.**Tool Introduction:** Handling AI datasets with MongoDB and Kafka for large-scale applications. (8 Hours)
Module – 5
Representing and Using Domain Knowledge, Expert System Shells, and Knowledge Acquisition. **Genetic Algorithms:** Biological inspiration, operators, and termination parameters. **Ethics and Bias in AI:** Bias detection, fairness evaluation, responsible AI. **Case Studies:** KAoS Open Agent Architecture, Semantic AI, eXplainable AI, and real-time applications in Healthcare, UAVs, and Agriculture. (8 Hours)
Course Outcomes: The students will be able to: CO1: Illustrate and apply fundamental and emerging principles of Artificial and Agentic Intelligence. CO2: Apply search and reasoning algorithms to solve real-world problems effectively. CO3: Integrate mathematical concepts (linear algebra, probability) with AI reasoning and representation. CO4: Design AI solutions for domains like energy, healthcare, UAVs, and agriculture while validating outcomes for bias and fairness. CO5: Utilize industry tools such as MongoDB and Kafka to manage and analyze large-scale AI datasets.
Question paper pattern: • **SEE** will be conducted for 100 marks. • Each full question is for 20 marks. (Answer five full questions out of 10 questions with intra modular choice). In every question, there will be a maximum of three sub- questions. • **CIE** will be announced prior to the commencement of the course. • 25 marks for the test. Average of three tests will be taken. • 25 marks for Flexible Assessment Method.

Textbooks:

1. Kevin Knight, Elaine Rich and B. Nair, Artificial Intelligence, Third Edition, 2017.
2. Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach, Fourt Edition, 2020.
3. Jeffrey M Bradshaw, An introduction to software agents, Software agents 4 (2012): 3-46.

References:

1. Flasinski M, Introduction to Artificial Intelligence, SPRINGER 2017.
2. Elaine Rich and Kevin Knight, "Artificial Intelligence", 3rd Edition, Tata McGraw-Hill, 2003

Web Resources:

1. AI Foundations for Everyone by IBM: IBM. "AI Foundations for Everyone." Coursera, www.coursera.org/learn/ai-foundations-for-everyone.
2. Deep Learning Specialization by Andrew Ng (DeepLearning.AI): DeepLearning.AI. "Deep Learning Specialization." Coursera, www.coursera.org/specializations/deep-learning.
3. Artificial Intelligence: Principles and Techniques by Stanford University: Stanford University. "Artificial Intelligence: Principles and Techniques." Coursera, www.coursera.org/learn/artificial-intelligence.

Neetha PU

[Dr. Neetha PU]

M.TECH. COMPUTER SCIENCE AND ENGINEERING

Choice Based Credit System (CBCS)

SEMESTER – I

Fundamentals of Data Science (3:0:0) 3

(Effective from the academic year 2024-25)

Course Code	MCS14	**CIE Marks**	50
Teaching Hours/Week (L:T:P)	3:0:0	**SEE Marks**	50
Total Number of Contact Hours	40	**Exam Hours**	3

Course Objectives: This course will enable students to:

1. Understand the foundational aspects of data science and the role of a data scientist in the analytics process.
2. Explore the mathematical concepts for Data Science.
3. Apply concepts of linear algebra and statistical models for data analytics.
4. Develop skills for interpretation of types of data Visualization techniques and Model Evaluations.
5. Explore Linear Algebra concepts and Big Data Algorithmic operations.

Preamble: In today's data-driven world, the field of data science has become a pivotal force in shaping decisions and strategies across various sectors. At its core, data science involves harnessing vast amounts of data to extract meaningful insights and drive informed decisions.

Module – 1

Introduction To Data Science:

Definition, Big Data and Data Science Hype, Datafication , Data Science Profile, Meta-Definition, Data Scientist, Statistical Inference, Populations and Samples, Populations and Samples of BigData, Big Data Can Mean Big Assumptions, Modeling, Philosophy of Exploratory Data analysis, The data Science Process. (8 hours)

Module – 2

Mathematical Preliminaries:

Probability, Descriptive Statistics, Correlation Analysis.

Data Munging: Properties of Data, Languages for Data Science, Collecting Data, Cleaning Data, Crowd sourcing. (8 hours)

Module – 3

Scores and Rankings:

Developing Scoring Systems, Z-scores and Normalization, Advanced Ranking Techniques.

Statistical Analysis: Sampling from Distributions, Statistical Distributions, Statistical Significance, Permutation Tests and P-values. (8 hours)

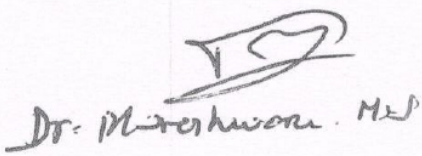
Module – 4

Visualizing Data:

Exploratory Data Analysis, Developing a Visualization Aesthetic, Chart Types, Great Visualizations.

Mathematical Models: Philosophies of Modeling, A Taxonomy of Models, Baseline Models, Evaluating Models, Evaluation Environment. (8 hours)

Module – 5
Big Data: Achieving Scale: What is Big Data? Algorithmic for Big Data, Filtering and Sampling, Parallelism, MapReduce. **Big Data Programming models:** Introduction, Distributed File Systems Case Study: Splunk, HDFS and GFS. (8 hours)
Course outcomes: The students will be able to CO1: Apply the fundamental aspects of data science for problem solving. CO2: Make use of mathematical concepts and statistical models for analyzing data. CO3: Develop Bigdata programming models and algorithm for data analytics. CO4: Analyze data using various visualization tools and techniques.
Question paper pattern: 1. **SEE** will be conducted for 100 marks. 2. Each full question is for 20 marks. (Answer five full questions out of 10 questions with intra modular choice). In every question, there will be a maximum of three sub-questions. 3. **CIE** will be announced prior to the commencement of the course. 4. 25 marks for test. Average of three tests will be taken. 5. 25 marks for Flexible Assessment Method.
Textbooks: 1. Steven S. Skiena, "The Data Science Design Manual", Springer 2017. 2. Rachel Schutt & O'neil, "Doing Data Science", Straight Talk from The Frontline O'REILLY, ISBN:978-1-449-35865-5, 1st edition, October 2013. 3. "Hadoop: The Definitive Guide, Tom White", 4th Edition, O"Reilly,2015 **References:** 1. Joel Grus," Data Science from Scratch" First Edition, April 2015 2. Gareth James, Daniela Witten, Trevor Hatie, RoberstTibhirani , "An Introduction to Statistical Learning-with Applications in R", 2013 3. Jure Leskovek, Anand Rajaraman and Jeffrey Ullman. Mining of Massive Datasets. v2.1, Cambridge University Press. 2 edition (30 September 2014) 4. R Programming for Data Science, Roger D. Peng, LeanPub, 2015. **Web Resources:** • "Data science for engineers" https://nptel.ac.in/noc/courses/noc20/SEM1/noc20-cs28/ • " Python for DataScience"https://archive.nptel.ac.in/noc/courses/noc22/SEM1/noc22-cs32/



M.TECH. COMPUTER SCIENCE AND ENGINEERING

Choice Based Credit System (CBCS)

SEMESTER – I

Cryptography and Network Security (3:0:0) 3

(Effective from the academic year 2024-25)

Course Code	MCS15	**CIE Marks**	50
Teaching Hours/Week (L: T:P)	3:0:0	**SEE Marks**	50
Total Number of Contact Hours	40	**Exam Hours**	3

Course Objectives:

This course will enable students to:

1. Explain standard algorithms used to provide confidentiality, integrity and authenticity.
2. Distinguish key distribution and management schemes.
3. Apply encryption techniques to secure data in transit across data networks
4. Implement security applications in the field of Information technology.

Preamble: Embarking on the study of "Advanced Cryptography" delves into the intricate world of securing digital communication and information. This field explores advanced cryptographic algorithms and protocols, essential for safeguarding sensitive data in an increasingly interconnected world. Its significance lies in thwarting cyber threats and ensuring privacy and integrity in digital transactions and communications. As cybersecurity concerns escalate, expertise in advanced cryptography becomes pivotal for protecting critical infrastructure and preserving digital trust. Pursuing this specialization promises a deep dive into the forefront of cryptographic techniques, offering opportunities to innovate and defend against evolving cyber threats.

Module – 1

Computer and Network Security: Computer Security Concepts, The OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms, Fundamental Security Design Principles, Attack Surfaces and Attack Trees, A Model for Network Security, and Standards.

Symmetric Ciphers, Classical encryption techniques: Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Rotor Machines, Stenography. (Chapter 1 , 2 & 3) (8 Hours)

Module – 2

Block Ciphers and the Data Encryption Standard: Traditional Block Cipher Structure, The Data Encryption Standard, A DES Example, The Strength of DES, Block cipher design principles and modes of operation. **Advanced Encryption Standard:** Finite Field Arithmetic, AES Structure, AES Transformation Functions, AES Key Expansion, An AES Example and AES Implementation. **Asymmetric Ciphers: Public-Key Cryptography and RSA:** Principles of Public-Key Cryptosystems, The RSA Algorithm and Diffie-Hellman Key Exchange, Elliptic Curve Arithmetic, Elliptic Curve Cryptography.

(Topics from Chapter 4, 6, 9 & 10.1-10.4) (8 Hours)

Module – 3

Cryptographic Data Integrity Algorithms

Cryptographic Hash Functions : Applications of Cryptographic Hash Functions Two Simple Hash Functions, Requirements and Security, Hash Functions Based on Cipher Block Chaining, Secure Hash Algorithm (SHA), & SHA-3. **Message Authentication Codes**: Message Authentication Requirements, Message Authentication

Functions, Requirements for Message Authentication Codes, Security of MACs, MACsBased on Hash Functions: HMAC, Digital Signatures
(Topics from Chapter 11, 12, & 13.1) (8 Hours)

Module – 4

Mutual Trust
Key Management and Distribution: Symmetric Key Distribution Using Symmetric Encryption, Symmetric Key Distribution Using Asymmetric Encryption, Distribution of Public Keys, X.509 Certificates, public-Key Infrastructure.
User Authentication: Remote User-Authentication Principles, Remote User-authentication Using Symmetric Encryption, Kerberos, Remote User-Authentication Using Asymmetric Encryption.
Network Access Control and Cloud Security : Network Access Control, Extensible Authentication Protocol, IEEE 802.1X Port-Based Network Access Control, Cloud Computing , Cloud Security Risks and Countermeasures , Data Protection in the Cloud, CloudSecurity as a Service, Addressing Cloud Computing Security Concerns.
(Topics from Chapter 14, 15.1 to 15.6, & 16) (8 Hours)

Module – 5

Transport Layer Security: HTTPS, Secure Shell (SSH), Wireless Security, Mobile Device Security, IEEE 802.11 Wireless LAN Overview, IEEE 802.11i Wireless LAN Security.
Electronic Mail Security: Internet Mail Architecture, Email Formats, Email Threats and Comprehensive Email Security , S/MIME, Pretty Good Privacy, DNSSEC,
DNS-Based Authentication of Named Entities.
IP Security Overview: IP Security Policy, Encapsulating Security Payload, Combining Security Associations, Internet Key Exchange, Cryptographic Suite.

Recap/Summary of the course.
(Topics from Chapter 17, 18, & 19) (8 Hours)

Course Outcomes: The students will be able to:
CO1: Apply the OSI security architecture, number theory and cipher techniques for the given problem.
CO2: Compare the performance of various cryptographic data integrity techniques for the identified problem.
CO3: Analyze the vulnerabilities in any computing system and apply the cryptographic solution for the given problem/case study
CO4: Examine the techniques used for Mutual trust and security on internet and compare their performance.

Question paper pattern:
- **SEE** will be conducted for 100 marks.
- Each full question is for 20 marks. (Answer five full questions out of 10 questions with intra modular choice). In every question, there will be a maximum of three sub-questions.
- **CIE** will be announced prior to the commencement of the course.
- 25 marks for test. Average of three tests will be taken.
- 25 marks for Flexible Assessment Method.

13/11/2015

[Dr. Usha B.A
Course Coordinator]

Textbooks:

1. William Stallings, Cryptography and Network Security Principles and Practice, 7th edition, Pearson, 2019.

References:

1. Damien Vergnaud and Michel Abdalla, Applied Cryptography and Network Security, 7th International Conference, ACNS 2009, Paris-Rocquen court, France, June 2-5, 2009, Proceedings.
2. B. Schneier, "Applied Cryptography: Protocols, Algorithms, and Source Code in C", 2nd Edition, John Wiley & Sons, 1995.
3. Mihir Bellare and Phillip Rogaway, "Introduction to Modern Cryptography", 2005.
4. Alfred J. Menezes, Paul C. van Oorschot and Scott A. Vanstone, "Handbook of Applied Cryptography" CRC Press.
5. Neal Koblitz, A Course in Number Theory and Cryptology, Springer 1987.

Web Resources:

1. "Cryptography" by Stanford University: Stanford University. "Cryptography." Coursera, www.coursera.org/learn/crypto.
2. "Applied Cryptography" by the University of Colorado System: University of Colorado System. "Applied Cryptography." Coursera, www.coursera.org/learn/applied-cryptography.
3. "Introduction to Cryptography" by the University of London: University of London. "Introduction to Cryptography." Coursera, www.coursera.org/learn/crypto-introduction.

M.TECH. COMPUTER SCIENCE AND ENGINEERING

Choice Based Credit System (CBCS)

SEMESTER – I

Artificial Intelligence Laboratory (0:1:2) 2

(Effective from the academic year 2024-25)

Course Code	MCSL16	**CIE Marks**	50
Teaching Hours/Week (L: T:P)	0:1:2	**SEE Marks**	50
Total Number of Contact Hours	30	**Exam Hours**	2

Course Objectives

- Implement AI algorithms from scratch, emphasizing understanding of their working principles.
- Apply Artificial Intelligence techniques to real-world domains such as Power Systems, EV Batteries, Healthcare, UAVs, and Agriculture.
- Develop intelligent systems incorporating reasoning, optimization, and decision-making.
- Validate AI models for bias, fairness, and ethical aspects in deployment scenarios.

Preamble: This laboratory provides hands-on experience in Artificial Intelligence by focusing on the development of algorithms from scratch and their application to real-time, domain-specific problems. Students will learn to design, implement, and evaluate AI algorithms, integrate modern tools such as MongoDB and Kafka, and apply AI to solve practical challenges in energy, healthcare, UAVs, and agriculture.

Part A- Tutorial

- Overview of Artificial Intelligence and its real-world applications.
- Search Algorithms – DFS, BFS, A*, Hill Climbing, Simulated Annealing.
- Algorithm Development – Implementing Decision Tree, Random Forest, and Genetic Algorithms from scratch.
- Data Handling for AI – Introduction to MongoDB and Kafka for scalable AI pipelines.
- Responsible AI – Understanding fairness, transparency, and bias detection.

PART-B: Experiments

1. Implement DFS, A*, and Hill Climbing algorithms from scratch for optimal path finding problems.
2. Develop Decision Tree, Random Forest, and Genetic Algorithm models manually (without library support).
3. Apply AI techniques to real-world datasets (EV Battery, Crop Yield, UAV path planning, Healthcare diagnostics).
4. Integrate AI pipelines using MongoDB and Kafka for data collection, storage, and real-time analytics.
5. Validate developed AI models for bias, fairness, and ethical decision-making using appropriate metrics.

PROJECT

Each student or group shall develop a project demonstrating an AI application in one of the focus domains (Power Systems, EV Batteries, Healthcare, UAVs, and Agriculture). The project must include:

- Algorithm design and implementation from scratch.
- Dataset collection and preprocessing.
- Integration with MongoDB/Kafka where applicable.
- Evaluation for bias, fairness, and accuracy.
- Presentation and documentation of outcomes.

Course Outcomes:

The students will be able to:

CO1: Design and implement AI algorithms from scratch for classical problem-solving.
CO2: Apply AI methodologies to real-world domains such as Power Systems, EV Batteries, Healthcare, UAVs, and Agriculture.
CO3: Integrate AI pipelines using MongoDB and Kafka for data-driven analytics.
CO4: Validate AI models for bias, fairness, and responsible use.
CO5: Develop domain-specific mini projects demonstrating innovation and ethical AI practices.

Textbooks

- Stuart J. Russell and Peter Norvig, Artificial Intelligence – A Modern Approach, 4th Edition, Pearson, 2021.
- Saroj Kaushik, Artificial Intelligence, 2nd Edition, Cengage Learning India Pvt. Ltd., 2023.
- Kevin Knight, Elaine Rich, and B. Nair, Artificial Intelligence, 3rd Edition, 2017.Web Resources

Web Resources

- AI For Everyone – Coursera (Andrew Ng): https://www.coursera.org/learn/ai-for-everyone
- NPTEL – Search Methods for Problem Solving: https://onlinecourses.nptel.ac.in/noc22_cs56
- Kaggle Datasets for AI Applications: https://www.kaggle.com/datasets

Neethu P.O
[Dr. Neethu P.O]

M.TECH. COMPUTER SCIENCE AND ENGINEERING

Choice Based Credit System (CBCS)

SEMESTER – I

No SQL Database Laboratory (0:1:2) 2

(Effective from the academic year 2024-25)

Course Code	MCSL17	**CIE Marks**	50
Teaching Hours/Week (L: T:P)	0:1:2	**SEE Marks**	50
Total Number of Contact Hours	30	**Exam Hours**	2

Course Objectives:

This course will enable students to:

1. Understand various NoSQL database types and their applications.
2. Explore various concepts in NoSQL database technologies to develop advanced data models.
3. Apply NoSQL solutions to solve complex data storage and retrieval challenges.

Course Preamble: NoSQL databases have become essential for handling large-scale, distributed, and unstructured data in modern applications. This lab provides hands-on experience with various NoSQL databases, including key-value stores, document stores, column-family stores, and graph databases. Students will learn to design, implement, and manage NoSQL databases, focusing on scalability, performance, and data modeling. The lab emphasizes practical skills in solving real- world data storage and retrieval challenges across different domains such as e-commerce, social media, IoT, and big data analytics. By the end of the lab, students will be well-prepared to utilize NoSQL databases effectively in their future projects and professional roles.

Part A- Tutorial

Introduction to NoSQL Databases: Understand what NoSQL databases are and how they differ from traditional SQL databases. Types of NoSQL databases: document stores, key-value stores, column-family stores, and graph databases.

Data Models and Schema Design: different data models used in NoSQL databases. Basic schema design principles for document, key-value, column-family, and graph databases.

CRUD Operations: Basic CRUD operations (Create, Read, Update, Delete) in NoSQL databases. NoSQL database-specific commands for these operations.

Query Languages and APIs: Get acquainted with the query languages and APIs of various NoSQL databases (e.g., MongoDB Query Language, Redis commands, Cassandra Query Language (CQL), Cypher for Neo4j).

Data Storage and Retrieval: stored and retrieved in NoSQL databases. Understand the basics of data indexing and retrieval techniques. Scaling and Performance: Understand the concepts of scalability and performance in NoSQL databases. Learn about sharding, replication, and partitioning.

PART-B: List of Experiments

Exp. No	Experiments
1	Create and query a simple database using MongoDB.
2	Implement CRUD operations in MongoDB using Python.
3	Perform aggregation operations in MongoDB.
4	Perform map-reduce queries in MongoDB.
5	Design a schema for a MongoDB database.
6	Implement indexing in MongoDB to optimize query performance.
7	Set up a replica set in MongoDB for high availability.
8	Use MongoDB Atlas to deploy a cloud-based MongoDB cluster.
9	Perform text search operations in MongoDB.
10	Implement transactions in MongoDB for multi-document operations.

PART-C: Mini Project

The objective of the mini project is to provide students with hands-on experience in solving real world problems using various NoSQL databases. Students will explore different types of NoSQL databases (Document, Key-Value, Column-family, and Graph) and use suitable tools and technologies to manage and process large datasets. The project will also help students understand how NoSQL databases handle scalability, performance, and real-time data processing.

Course Outcomes:

The students will be able to:

CO1: Apply different NoSQL databases determining the most suitable choice for specific real-world scenarios.

CO2: Analyze NoSQL database architectures for horizontal scaling and distributed data management.

CO3: Design suitable NoSQL database queries for given problems.

CO4: Develop NoSQL-based applications addressing real-world data challenges.

Text Books:

1. Sadalage, P. & Fowler, NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence, Wiley Publications, 1st Edition, 2019.
2. MongoDB:The Definitive Guide- Powerful and Scalable Data Storage Third Edition 2020

References:

1. Strauch, Christoph. NoSQL Databases: A Step-by-Step Guide for Beginners. Springer, 2018.
2. Sadalage, Patrick, and Martin Fowler. NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence. Addison-Wesley, 2012.
3. Harrison, C.J. Seven Databases in Seven Weeks: A Guide to Modern Databases and the NoSQL Movement. Pragmatic Bookshelf, 2012.
4. Robinson, Ian, Jim Webber, and Emil Eifrem. Graph Databases: New Opportunities for Connected Data. O'Reilly Media, 2015.

Web Resources:

1. "Databases and SQL for Data Science with Python." Coursera, offered by IBM, https://www.coursera.org/learn/sql-data-science. Accessed 28 Aug. 2024.
2. "NoSQL Database Systems." Coursera, offered by University of California, San Diego, https://www.coursera.org/learn/nosql-database-systems. Accessed 28 Aug. 2024.
3. "Introduction to MongoDB." Coursera, offered by MongoDB University, https://www.coursera.org/learn/introduction-to-mongodb. Accessed 28 Aug. 2024.

Note:

1. In the examination each student will be given one question from part B and implement the same with modification as per examiner instructions.
2. Change of experiment is allowed only once and marks allotted to the procedure part to be made zero.
3. Each student must develop mini project and demonstrate the project individually.
4. Every student must submit a brief mini project report with plagiarism report (20-30 pages).

Conduction of Practical Examination:

1. All laboratory experiments from part B are to be included for practical examination.
2. Students are allowed to pick one experiment from the lot.
3. Strictly follow the instructions as printed on the cover page of answer script
4. Mini project Report should be prepared in a standard format prescribed for projectwork.

Practical SEE Examination Marks distribution:

a) Part B: Procedure + Conduction + Viva=5+ 20 +5 =30 Marks

b) Part C: Procedure + Conduction + Viva voce = 10+50+10 = 70 Marks

13.11.25

[Dr. Giresh Babu CN]