Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Shri Vaishnav Institute of Information Technology

Choice Based Credit System (CBCS) in the light of NEP-2020

B.Tech. (CSE- Artificial Intelligence and Machine Learning-Microsoft)

SEMESTER-V(2023-2027)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME					L	T	P	CREDITS
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCS501N	DCC	Theory of Computation	60	20	20	-	-	3	1	0	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES:

The student will have ability to:

1. To introduce concepts in automata theory and theory of computation.
2. To identify different formal language classes and their relationships.
3. To design grammars and recognizers for different formal languages.

COURSE OUTCOMES:

Upon completion of the subject, students will be able to:

1. Ability to relate practical problems to languages, automata, and computability.
2. Ability to demonstrate an increased level of mathematical sophistication.
3. Ability to apply mathematical and formal techniques for solving problems.

SYLLABUS

UNIT I — 10 HOURS

Introduction: Alphabets, Strings and Languages; Automata and Grammars, Deterministic finite Automata (DFA)-Formal Definition, Simplified notation: State transition graph, Transition table, Language of DFA, Nondeterministic finite Automata (NFA), NFA with epsilon transition, Language of NFA, Equivalence of NFA and DFA, Minimization of Finite Automata, Distinguishing one string from other, Myhill-Nerode Theorem.

UNIT II — 8 HOURS

Regular Expression (RE): Definition, Operators of regular expression and their precedence, Algebraic laws for Regular expressions, Kleen's Theorem, Regular expression to FA, DFA to Regular expression, Arden's Theorem, Non-Regular Languages, Pumping Lemma for regular Languages. Application of Pumping Lemma, Closure properties of Regular Languages, Decision properties of Regular Languages, FA with output: Moore and Mealy machine, Equivalence of Moore and Mealy Machine, Applications and Limitation of FA.

UNIT III — 9 HOURS

Context Free Grammar (CFG) and Context Free Languages (CFL): Definition, Examples, Derivation, Derivation trees, Ambiguity in Grammar, Inherent ambiguity, Ambiguous to Unambiguous CFG, Useless symbols, Simplification of CFGs, Normal forms for CFGs: CNF and GNF, Closure properties of CFLs, Decision Properties of CFLs: Emptiness, Finiteness and Membership, Pumping lemma for CFLs.

UNIT IV — 7 HOURS

Push Down Automata (PDA): Description and definition, Instantaneous Description, Language of PDA, Acceptance by Final state, Acceptance by empty stack, Deterministic PDA, Equivalence of PDA and CFG, CFG to PDA and PDA to CFG.

Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Shri Vaishnav Institute of Information Technology

Choice Based Credit System (CBCS) in the light of NEP-2020

B.Tech. (CSE- Artificial Intelligence and Machine Learning-Microsoft)

SEMESTER-V(2023-2027)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME					L	T	P	CREDITS
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCS501N	DCC	Theory of Computation	60	20	20	-	-	3	1	0	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

UNIT V **8 HOURS**

Turing machines (TM): Basic model, definition and representation, Instantaneous Description, Language acceptance by TM, Variants of Turing Machine, TM as Computer of Integer functions, Universal TM, Church's Thesis, Recursive and recursively enumerable languages, Halting problem, Introduction to undecidability, undecidable problems about TM, NP hard and NP complete problem, Post correspondence problem (PCP), Modified PCP, Introduction to recursive function theory.

TEXTBOOKS:

1. J. E. Hopcraft, R. Motwani and J. D. Ullman, *Introduction to Automata Theory, Languages, and Computation*, 3rd Ed., Pearson, 2013.
2. P. Linz, S. H. Rodger, *An Introduction to Formal Languages and Automata*, 7th Ed., Jones & Bartlett Learning, 2023.

REFERENCE:

1. J. C. Martin, *Introduction to Languages and Theory of Computations*, 4th Ed., Tata McGraw Hill, 2010.
2. C. Papadimitriou, and C. L. Lewis, *Elements of the Theory of Computation*, PHI, 1997.
3. Michael Sipser, *Introduction to Theory of Computation*, 3th Ed., Cengage Learning, 2013.
4. K. L. P Mishra & N. Chandrasekaran, *Theory of Computer Science*, 3th Ed., PHI Learning, 2006

Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Shri Vaishnav Institute of Information Technology

Choice Based Credit System (CBCS) in the light of NEP-2020

B.Tech. (CSE- Artificial Intelligence and Machine Learning-Microsoft)

SEMESTER-V(2023-2027)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME					L	T	P	CREDITS
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCS502N	DCC	**Introduction to Artificial Intelligence**	**60**	**20**	**20**	**30**	**20**	**3**	**0**	**2**	**4**

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES:

The student will have ability to:

1. Know how computer system adapts, evolves and learns.
2. To gain expertise in one of fastest growing areas of Computer Science that covers topics related to human intelligence and its applications in industry, defense, healthcare, agriculture and many other areas.
3. Provides a rigorous, advanced and professional graduate-level foundation in Artificial Intelligence

COURSE OUTCOMES:

Upon completion of the subject, students will be able to:

1. Build intelligent agents for search and games
2. Solve AI problems through programming with Python
3. Learning optimization and inference algorithms for model learning
4. Design and develop programs for an agent to learn and act in a structured environment.

SYLLABUS

UNIT I — 10 HOURS

Introduction: Concept of AI, history, current status, scope, agents, environments, Problem Formulations, Review of tree and graph structures, State space representation, Search graph and Search tree.

UNIT II — 9 HOURS

Search Algorithms: Random search, Search with closed and open list, Depth first and Breadth first search, Heuristic search, Best first search, A* algorithm, Game Search.

UNIT III — 8 HOURS

Probabilistic Reasoning: Probability, conditional probability, Bayes Rule, Bayesian Networks- representation, construction and inference, temporal model, hidden Markov model.

UNIT IV — 7 HOURS

Markov Decision process: MDP formulation, utility theory, utility functions, value iteration, policy iteration and partially observable MDPs.

UNIT V — 8 HOURS

Reinforcement Learning: Passive reinforcement learning, direct utility estimation, adaptive dynamic programming, temporal difference learning, active reinforcement learning- Q learning.

Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Shri Vaishnav Institute of Information Technology

Choice Based Credit System (CBCS) in the light of NEP-2020

B.Tech. (CSE- Artificial Intelligence and Machine Learning-Microsoft)

SEMESTER-V(2023-2027)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME					L	T	P	CREDITS
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCS502N	DCC	**Introduction to Artificial Intelligence**	**60**	**20**	**20**	**30**	**20**	**3**	**0**	**2**	**4**

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

TEXTBOOKS:

1. Stuart Russell and Peter Norvig, *Artificial Intelligence: A Modern Approach*, 3rd Ed., Prentice Hall.
2. Elaine Rich and Kevin Knight, *Artificial Intelligence*, Tata McGraw Hill.

REFERENCE:

1. M. C. Trivedi, *A Classical Approach to Artificial Intelligence*, Khanna Publishing House, Delhi.
2. Saroj Kaushik, *Artificial Intelligence*, Cengage Learning India, 2011.
3. David Poole and Alan Mackworth, *Artificial Intelligence: Foundations for Computational Agents*, Cambridge University Press, 2010.
4. https://nptel.ac.in/courses/106105077
5. https://nptel.ac.in/courses/106106126
6. https://aima.cs.berkeley.edu
7. https://ai.berkeley,edu/project_overview.html (for Practical)

LIST OF PRACTICALS

1. Write a program to conduct uninformed and informed search.
2. Write a program to conduct game search.
3. Write a program to construct a Bayesian network from given data.
4. Write a program to infer from the Bayesian network.
5. Write a program to run value and policy iteration in a grid world.
6. Write a program to do reinforcement learning in a grid world.
7. Mini Project work.

Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Shri Vaishnav Institute of Information Technology

Choice Based Credit System (CBCS) in the light of NEP-2020

B.Tech. (CSE- Artificial Intelligence and Machine Learning-Microsoft)

SEMESTER-V(2023-2027)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME					L	T	P	CREDITS
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCS503M	DCC	Network Security & Cryptography	60	20	20	30	20	3	0	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES:

The student will have ability to:

1. Understand and describe the fundamental concepts of network security.
2. Explain and analyze key cryptographic concepts.
3. Demonstrate and apply knowledge of symmetric key algorithms.
4. Evaluate and compare the effectiveness of asymmetric key algorithms.
5. Assess and create an understanding of industry-standard internet security protocols.

COURSE OUTCOMES:

Upon completion of the subject, students will be able to:

1. Identify and explain the key principles of network security.
2. Summarize and differentiate between various cryptographic techniques.
3. Execute and demonstrate encryption and decryption processes.
4. Critically evaluate the strengths and weaknesses of different asymmetric key algorithms.
5. Design and implement a secure communication protocol.

SYLLABUS

UNIT I — 8 HOURS

Introduction to Network Security: Computer Security Concept, Need for Security, Security in Networks: Threats in networks, Network Security Controls– The OSI Security Architecture, Fundamental Security Design Principle, Security Attacks, Security Services, Security mechanism, Attack Surface and Attack trees, A Model of Network Security Content Integrity, Strong Authentication, Access Controls, Wireless Security, Honey pots. Proxy Servers and Anonymizers, Firewall, Types of firewall, Password Cracking Techniques.

UNIT II — 9 HOURS

Cryptography Concepts & Techniques: Introduction, Plaintext & Cipher text, Creaser Cipher, Substitution Techniques, Substitution Boxes (S-Boxes), Permutation Cipher, Transposition Techniques, Encryption & Decryption, Symmetric & Asymmetric key Cryptography, Key Range & Key Size, Cryptographic Attacks.

UNIT III — 8 HOURS

Symmetric Key Algorithm: Introduction of Block Ciphers, Overview of Symmetric Key Cryptography, DES (Data Encryption Standard) algorithm, Double DES Triple DES, AES, IDEA (International Data Encryption Algorithm) algorithm.

UNIT IV — 10 HOURS

Asymmetric Key Algorithm: Overview of Asymmetric key Cryptography, RSA algorithm, Symmetric & Asymmetric key Cryptography together, Random Oracle Model, Diffie-Hellman Key Exchange, Digital Signature, Basic concepts of Message Digest and Hash Function. Man in Middle Attack, DoS and DDoS Attacks.

Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Shri Vaishnav Institute of Information Technology

Choice Based Credit System (CBCS) in the light of NEP-2020

B.Tech. (CSE- Artificial Intelligence and Machine Learning-Microsoft)

SEMESTER-V(2023-2027)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME					L	T	P	CREDITS
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCS503M	**DCC**	**Network Security & Cryptography**	**60**	**20**	**20**	**30**	**20**	3	0	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

UNIT V — 9 HOURS

Internet Security Protocols: User Authentication Basic Concepts, SSL Architecture, SSL protocol Authentication Basics, Password, Authentication Token, Certificate based Authentication, Biometric Authentication. Steganography its importance. Basics of mail security, Pretty Good Privacy, S/MIME, ISAKMP.

TEXTBOOKS:

1. William Stallings, *Cryptography and Network Security*, 2nd Ed., Pearson Education Asia.
2. C. Kaufman, R. Perlman and M. Speciner, *Network Security private communication in a public world*, Pearson.

REFERENCE:

1. William Stallings, *Cryptography And Network Security Principles And Practice*, 4th Ed., Pearson Education
2. Wenbo Mao, *Modern Cryptography: Theory and Practice*, Prentice Hall PTR
3. William Stallings, *Network Security Essentials: Applications and Standards*, Prentice Hall
4. Douglas R. Stinson, *Cryptography: Theory and Practice*, CRC press.
5. Elizabeth D. Zwicky, Simon Cooper, D. Brent Chapman, *Building Internet Firewalls*, 2nd Ed., O'Reilly.
6. Atul Kahate, *Cryptography & Network Security*, Tata McGraw Hill.
7. http://nptel.ac.in/

LIST OF PRACTICALS

1. Write a Program to implement Ceaser Cipher
2. Write a Program to implement Substitution Cipher with equation c=3x+12
3. Write a Program to implement poly alphabetic Cipher
4. Write a Program to implement Rail fence technique
5. Write a Program to implement Simple Columner Transposition technique
6. Write a Program to implement Advanced Columner Transposition technique
7. Write a Program to implement Rotation Cipher
8. Create a Virtual Private Network.
9. Write a Program to implement Simple RSA Algorithm with small numbers.
10. Write a Program to implement Simple Diffie- Hellman Key Exchange Algorithms with small numbers.

Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Shri Vaishnav Institute of Information Technology

Choice Based Credit System (CBCS) in the light of NEP-2020

B.Tech. (CSE- Artificial Intelligence and Machine Learning-Microsoft)

SEMESTER-V(2023-2027)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME					L	T	P	CREDITS
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTAIML504N	DSC	Deep Learning	60	20	20	30	20	3	1	2	5

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES:

The student will have ability to:

1. To provide an overview of an exciting field of Deep Learning.
2. Develop an understanding of the complete process of deep learning project and it's near term future direction.
3. To introduce the tools required to manage and analyses deep learning project like: Jupyter Notebook and tensor flow.
4. To teach the fundamental techniques and principles in achieving deep learning with scalability and streaming capability.
5. To enable students to have skills that will help them to solve complex real-world problems in for business decisions with neural networks.

COURSE OUTCOMES:

Upon completion of the subject, students will be able to:

1. Understand the concept of Deep Learning from a global context.
2. To understand and apply Neural Networks in Market perspective of Deep Learning Projects. Applying and analyzing architecture of Convolution Neural Networks to achieving data learning models.
3. Be able to design and implement recurrent neural network and LSTM systems.
4. Be able to design and implement RBM sand understand auto encoders concept in deep learning. Be able to design and implement various Neural Networks models in a range of real world applications. Creating projects and research activities based on Neural Networks Deep Learning using Python.

SYLLABUS

UNIT I — 10 HOURS

Introduction to Deep Learning : Why Deep Learning? Introduction to Neural Networks. Neural Network Architecture. Full-cycle of a Deep Learning Project. Activation Functions. Gradient Descent, Derivatives.

UNIT II — 8 HOURS

Computation Graphs , Vectorization , Deep Learning with Keras, Tensor Flow, PyTorch, Predicting house prices with Regression using Tensor Flow, Sentiment analysis using Keras and Tensor Flow, Image noise reduction using Tensor Flow.

UNIT III — 9 HOURS

Neural Network: Building blocks of Deep Neural Networks, Forward and Backward Propagation. , Parameters versus Hyper-parameters , Optimization , Loss function and optimization functions.

Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Shri Vaishnav Institute of Information Technology

Choice Based Credit System (CBCS) in the light of NEP-2020

B.Tech. (CSE- Artificial Intelligence and Machine Learning-Microsoft)

SEMESTER-V(2023-2027)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME					L	T	P	CREDITS
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTAIML504N	DSC	Deep Learning	60	20	20	30	20	3	1	2	5

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

UNIT IV **7 HOURS**

Convolutional Networks : Introduction to convolutional networks. CNN Architecture. Understanding Convolutions. CNN for Classification.

UNIT V **8 HOURS**

Applications of Convolution Neural Networks: Object Detection, Face Recognition , Classification.

TEXTBOOKS:

1. Deep Learning with Python by François Chollet.
2. Hands-On Machine Learning with Scikit-Learn, Keras and Tensor Flow: Concepts, Tools and Techniques to Build Intelligent Systems by Aurelien Geron.
3. Deep Learning (Adaptive Computation and Machine Learning series)by Ian Goodfellow.

REFERENCE:

1. Machine learning with Tensor Flow for Dummies by Matthew Scarpino.
2. Machine Learning for Big Data: Hands-On for Developers and Technical Professionals" by Jason Bell.

LIST OF PRACTICALS

1. Predicting house prices with Regression using Tensor Flow.
2. Image noise reduction using TensorFlow
3. Object Detection
4. Face Recognition
5. Classification

Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Shri Vaishnav Institute of Information Technology

Choice Based Credit System (CBCS) in the light of NEP-2020

B.Tech. (CSE- Artificial Intelligence and Machine Learning-Microsoft)

SEMESTER-V(2023-2027)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME					L	T	P	CREDITS
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCS707N	**SEC**	**Technical Presentation skill**	0	0	0	0	50	0	0	2	1

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES:

The student will have ability to:

1. To encourage the students to study advanced engineering developments.
2. To prepare and present technical reports.
3. To prepare technical material using audiovisual materials.
4. To encourage the students to use various teaching aids such as overhead projectors, PowerPoint presentation and demonstrative models.

COURSE OUTCOMES:

Upon completion of the subject, students will be able to:

1. Ability to review, prepare and present technological developments.
2. Ability to face the placement interviews.
3. Ability to effectively communicate technical material in print.
4. Ability to present technical material orally with confidence and poise.
5. Ability to present technical material using audiovisual materials.
6. Ability to communicate technical material to a variety of audiences, from members of the building and engineering trades and medical fields to government representatives and the public.
7. Ability to work well in teams.

GUIDELINES:

1. During the Presentation Session each student is expected to prepare and present a topic on engineering/technology, for duration of about 15-20 minutes. Each student is expected to present at least twice during the semester and the student is evaluated based on that. At the end of the semester, he / she can submit a report on his / her topic of presentation and marks are given based on the report.

Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Shri Vaishnav Institute of Information Technology

Choice Based Credit System (CBCS) in the light of NEP-2020

B.Tech. (CSE- Artificial Intelligence and Machine Learning-Microsoft)

SEMESTER-V(2023-2027)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME					L	T	P	CREDITS
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTIT508M	SEC	**No SQL and MongDB**	0	0	0	30	20	0	0	2	1

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES:

The student will have ability to:

1. Understand NoSQL
2. Analyze the MongoDB Architecture
3. Understand the working of Atlas Search

COURSE OUTCOMES:

Upon completion of the subject, students will be able to:

1. Understanding NoSQL Database Concepts
2. Demonstrate Proficiency in MongoDB Operations
3. Investigate Advanced MongoDB Features
4. Design Database and Data Modelling Skills
5. Apply NoSQL development tools on Real-World Scenarios

SYLLABUS

UNIT I

NoSQL Database: Types of NoSQL Database, Brief History of NoSQL Databases, NoSQL Database Features, Relational database vs NoSQL database example, Differences between RDBMS and NoSQL databases, NoSQL use cases, NoSQL Database Misconceptions

UNIT II

Introduction to MongoDB: MongoDB Atlas, MongoDB and Document Object Model, CRUD Operation, MongoDB Aggregation, Using $match and $group Stages in a MongoDB Aggregation Pipeline, Using $sort and $limit Stages in a MongoDB Aggregation Pipeline, Using $project, $count, and $set Stages in a MongoDB Aggregation Pipeline, Using $out Stage in a MongoDB Aggregation Pipeline

UNIT III

MongoDB Indexes: Using MongoDB Indexes in Collections, Creating a Single Field Index in MongoDB, Creating a Multikey Index in MongoDB, Working with Compound Indexes in MongoDB, Deleting MongoDB Indexes

UNIT IV

Atlas Search: Using Relevance-Based Search and Search Indexes, creating a Search Index with Dynamic Field Mapping, Creating a Search Index with Static Field Mapping, Using $search and Compound Operators, Grouping Search Results by Using Facets

UNIT V

MongoDB Data Modeling: Types of data relationships, modeling, embedding data in documents, referencing data in documents, scaling data model, Using Atlas Tools for Schema Help, MongoDB transactions

Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Shri Vaishnav Institute of Information Technology

Choice Based Credit System (CBCS) in the light of NEP-2020

B.Tech. (CSE- Artificial Intelligence and Machine Learning-Microsoft)

SEMESTER-V(2023-2027)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME					L	T	P	CREDITS
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTIT508M	SEC	**No SQL and MongDB**	0	0	0	30	20	0	0	2	1

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

LIST OF PROJECTS

1. **Build a Mini-Application**: Create a sample application (e.g., a task manager, blog platform, or e-commerce site) using MongoDB as the database backend. Implement all CRUD functionalities and data modeling techniques learned in class.
2. **Performance Benchmarking**: Conduct performance tests comparing the execution time of queries on indexed versus non-indexed collections to understand the importance of indexing in MongoDB

TEXTBOOKS:

1. Marko Aleksendric, Arek Borucki and Leandro Domingues, *Mastering MongoDB 7.0: Achieve data excellence by unlocking the full potential of MongoDB*, 4th Ed., MongoDB Press.
2. Rachelle Palmer, Ben Perlmutter, Ashwin Gangadhar, Nicholas Larew, Sigfrido Narváez , Thomas Rueckstiess, Henry Weller, Richmond Alake and Shubham Ranjan, *Building AI Intensive Python Applications: Create intelligent apps with LLMs and vector databases*, 1st Ed., MongoDB Press

REFERENCE:

1. MongoDB University, https://learn.mongodb.com/