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*				
BTCS601N	DCC	Compiler Design	60	20	20	30	20	2	1	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. To introduce the major concept areas of language translation and compiler design
2. To enrich the knowledge in various phases of compiler and its use
3. To provide understanding of steps of programming necessary for constructing a compiler

COURSE OUTCOMES:
Upon completion of the subject, students will be able to:
1. Ability to apply the knowledge of lex tool & yacc tool to develop a scanner & parser
2. Ability to design and develop software system for backend of the compiler
3. Ability to comprehend and adapt to new tools and technologies in compiler design

SYLLABUS
UNIT I   8 HOURS
Introduction: Compiler**,** Compilers analysis of the source program**,** Phases of a compiler**,** Cousins of the Compiler, Grouping of Phases and Compiler construction tools, Lexical Analysis, Role of Lexical Analyzer, Input Buffering and Specification of Tokens.

UNIT II   10 HOURS
Syntax Analysis: Role of the parser, Writing Grammars, Context-Free Grammars, Top-Down parsing, Recursive Descent Parsing, Predictive Parsing, Bottom-up parsing, Shift Reduce Parsing, Operator Precedent Parsing, LR Parsers, SLR Parser – Canonical LR Parser – LALR Parser.

UNIT III   9 HOURS
Intermediate Code Generation: Syntax Directed Definitions, Evaluation Orders for Syntax Directed Definitions, Intermediate languages**,** Declarations, Assignment Statements, Boolean Expressions, Case Statements, Three Address code, Back patching, Procedure calls.

UNIT IV   10 HOURS
Code Optimization and Run Time Environments: Introduction, Principal Sources of Optimization, Optimization of basic Blocks, DAG representation of Basic Blocks - Introduction to Global Data Flow Analysis, Runtime Environments, Source Language issues, Storage Organization, Storage Allocation strategies, Access to non-local names, Parameter Passing, Error detection and recovery.

UNIT V   9 HOURS
Code Generation: Issues in the design of code generator, The target machine, Runtime Storage management, Basic Blocks and Flow Graphs, Next-use Information, A simple Code generator, Peephole Optimization.

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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*				
BTCS601N	DCC	Compiler Design	60	20	20	30	20	2	1	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. Alfred V. Aho, Jeffrey D. Ullman, *Compilers: Principles, Techniques and Tools*, Pearson Education Asia, 2012
2. Jean Paul Tremblay, Paul G Serenson, *The Theory and Practice of Compiler Writing*, BS Publications, 2005

REFERENCE:
1. Allen I. Holub, *Compiler Design in C*, Prentice Hall of India, 2003
2. C. N. Fischer and R. J. LeBlanc, *Crafting a compiler with C*, Benjamin Cummings, 2003
3. Henk Alblas and Albert Nymeyer, *Practice and Principles of Compiler Building with C*, PHI, 2001
4. Kenneth C. Louden, *Compiler Construction: Principles and Practice*, Thompson Learning, 2003
5. D. M. Dhamdhere, *Compiler Construction Principles and Practice*, 2nd Ed., Macmillan India Ltd., New Delhi, 2008

LIST OF PRACTICALS
1. To study the Lex Tool.
2. To study the Yacc Tool.
3. Write a program to implement Lexical Analyzer to recognize few patterns of C.
4. Write a program to implement the Recursive Descent Parser.
5. Write a program to implement the Computation of FIRST and FOLLOW of variables of grammar.
6. Write a program to compute the leading and trailing symbols of grammar.
7. Write a program to implement Operator Precedence Parser.
8. Write a program to implement SLR parser.
9. Write a program to check the data types.
10. Write a program to implement the generation of three address code.
11. Write a program to implement the computation of postfix notation.
12. Write a program to implement the computation of Quadruple.

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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*				
BTCS602N	DCC	Object Oriented Analysis and Design	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. To learn the concept of Object-Oriented Software Development Process
2. To get acquainted with UML Diagrams
3. To understand Object Oriented Analysis Processes

COURSE OUTCOMES:
Upon completion of the subject, students will be able to:
1. Understand Object Oriented Software Development Process
2. Gain exposure to Object Oriented Methodologies & UML Diagrams
3. To apply Object Oriented Analysis Processes for projects

SYLLABUS
UNIT I   10 HOURS
Introduction: Object Orientated Technology, Development and OO Modeling History. Modeling Concepts: Modeling design Technique, Three Models, Class Model, State Model and Interaction model.

UNIT II   9 HOURS
Class Modeling: Object and class concepts, link and association, Generalization and Inheritance, Advanced class modeling- aggregation, Abstract class meta data, constraints. State Modeling: Event, state, Transition and conditions, state diagram, state diagram behavior, concurrency, Relation of Class and State models. Interaction Modeling: Use case Models, sequence models, activity models

UNIT III   8 HOURS
Analysis and Design: Development Life cycle, Development stages, Domain Analysis-Domain class model, domain state model, domain interaction model, Iterating and analysis. Application Interaction model, Application class model, Application state Model, Adding operation.

UNIT IV   7 HOURS
System Design: Estimating Performance, Making a reuse plan, breaking system into sub systems identifying concurrency, allocation of subsystems, management of data storage, Handling Global resources, choosing a software control strategy, Handling boundary condition, common Architectural style.

UNIT V   8 HOURS
Class design: Overview of class design, designing algorithms recursing downward, refactoring, design optimization, Adjustment of Inheritance, Rectification of Behavior.

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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*				
BTCS602N	DCC	Object Oriented Analysis and Design	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. Michael Blaha and J. Rumbugh, *Object oriented Modeling and design with UML*, Pearson Education

REFERENCE:
1. Satzinger, Jackson and Burd, *Object oriented Analysis and design with the Unified Process*, CENGAGE Learning.
2. O. Docherty, *Object Oriented Analysis and Design Understanding, System Development with UML2.0*, Wiley India.

LIST OF PRACTICALS
1. How to write a Problem Statement
2. Perform the system analysis: Requirement analysis, SRS.
3. Perform the function oriented diagram: DFD and Structured chart.
4. Perform the user's view analysis: Use case diagram.
5. Draw the structural view diagram: Class diagram, object diagram.
6. Draw the behavioral view diagram: Sequence diagram, Collaboration diagram.
7. Draw the behavioral view diagram: State-chart diagram, Activity diagram.
8. Draw the implementation view diagram: Component diagram.
9. Draw the environmental view diagram: Deployment diagram.

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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*				
BTCS603N	DCC	Introduction to Cloud Computing	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. Analyze the SAAS, PAAS IAAS services of Cloud Computing to represent how engineering agility in an organization can be created.
2. Assess the exploitation of web services from cloud computing.
3. Configure essential infrastructural components used for implementing Cloud.
4. Significantly study case studies to derive the most excellent practice model to be appropriate when deploying cloud-based applications.

COURSE OUTCOMES:
Upon completion of the subject, students will be able to:
1. Investigate the trade-offs among deploying applications in the cloud and over the local infrastructure.
2. Compute real-world problems security, privacy issues using cloud computing through group collaboration.
3. Development and Deployment applications over commercial cloud computing infrastructures.
4. Analyze and investigation of application & hardware performance, scalability, and availability of the underlying cloud technologies and software.

SYLLABUS
UNIT I   10 HOURS
Overview of Cloud Computing: Introduction- Evolution, Shift from distributed computing to cloud computing; principles and characteristics of cloud computing- IaaS, PaaS, SaaS; service-oriented computing and cloud environment, Advantages, Service & Deployment Models, Infrastructure, and Consumer View, Functioning of Cloud Computing, Cloud Architecture, Cloud Storage, Cloud Services, Industrial Applications.

UNIT II   8 HOURS
Cloud Computing Technology- Client systems, Networks, server systems and security from services perspectives, security and privacy issues; accessing the cloud with platforms and applications; Cloud storage

UNIT III   9 HOURS
Working with Cloud: Infrastructure as a Service – conceptual model and working, Platform as a Service – conceptual model and functionalities. Software as a Service –conceptual model and working. Trends in Service provisioning with clouds. Working on Microsoft Azure & IBM Smart Cloud.

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BTCS603N	DCC	Introduction to Cloud Computing	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 IV   9 HOURS

Using Cloud Services: Cloud collaborative applications and services – case studies with calendars, schedulers, and event management; cloud applications in project management. Amazon Web Services & applications, AWS EC2, S3, Cloud Analytics, Cloud Open Stack

UNIT V   8 HOURS

Case studies- Microsoft Azure, Google App Engine, IBM Smart Cloud and Open source clouds,-Open-Nebula, Sales force and Eucalyptus, Cloud Simulation

TEXTBOOKS:
1. Anthony T. Velte, Toby J. Velte and Robert Elsenpeter, *Cloud Computing: A Practical Approach*, The McGraw-Hill, 2010.

REFERENCE:
1. Kumar Saurabh, *Cloud Computing*, Wiley Pub, 2012.
2. Krutz , Vines, *Cloud Security*, Wiley Pub, 2013.
3. Sosinsky, *Cloud Computing*, Wiley Pub, 2012.
4. Murray Woodside, John Chinneck and Marin Litiou, *Adaptive Cloud Deployment Using Persistence Strategies and Application Awareness,* Page(s): 277–290, IEEE Xplore, 2017.
5. Buyya, Selvi , *Mastering Cloud Computing*, The McGraw-Hill.
6. Michael Miller, *Cloud computing – Web based Applications*, Pearson Publishing, 2011

LIST OF PRACTICALS
1. Service deployment & Usage over cloud using Virtual Box.
2. Performance evaluation of services over cloud using VMware tool.
3. Working of Goggle Drive to make spreadsheet.
4. Working on Heroku for Cloud application deployment.
5. Working on Aneka services for Cloud application.
6. Working on services of Google App Engine.
7. Working on Application deployment & services of Microsoft Azure.
8. Working on Application deployment & services of IBM Smart Cloud.
9. Working and configuration of Euceliptus.
10 Deployment &Services of Amazon Web Services.

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COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME					L	T	P	CREDITS
			THEORY			PRACTICAL					
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BTDSE551	DSE	**Mobile App Development VI**	0	0	0	60	40	0	0	4	2

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 illustrate the use of animation in I OS applications.
2. To design complex I OS application
3. To introduce Swift UI.

COURSE OUTCOMES:
Upon completion of the subject, students will be able to:
1. Implement animations in I OS applications
2. Implement complex applications that use notifications and advance layouts
3. Create applications using third party APIs
4. Understand new features of Swift UI

SYLLABUS
UNIT I
Animations and Collection Views: How do the pieces fit together?, Conveying an app's personality, Why animate? , What can be animated? , UI View animation methods, Animation closures, the transform property, Animation in practice.
Collection Views: UI Collection View, Collection View Examples, Anatomy of a Collection View, Collection view cells, UI Collection View Layout, Compositional layout**.**

UNIT II
Generics and Dynamic Data Generics: Array, Dictionary, Type constraints, Functions and methods, Associated types. Dynamic Data: Search Controllers, Handling Data Changes, Diffable Data Sources.

UNIT III
Layout and Notifications Compositional Layout: UI Collection View Compositional Layout, Core components, Compositional Layout Sizes, Compositional Layout Items, Compositional Layout Groups, Compositional Layout Sections, Compositional Layout Supplementary Views, Multiple Layouts. Advanced Layout: Advanced Compositional Layout, Section providers, unique sections, Orthogonal scrolling. Local Notifications: Overview, Local and remote notifications, Best practices, requesting permission, scheduling local notifications, Handling and responding to notifications, actionable notifications.

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COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME					L	T	P	CREDITS
			THEORY			PRACTICAL					
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BTDSE5551	DSE	Mobile App Development VI	0	0	0	60	40	0	0	4	2

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UNIT IV
Cloud Based Backend And User Authentication: Integrate Third party APIs, Store data in Cloud using Firebase, Query Firebase, and Firebase for user Authentication

UNIT V
Introduction to Swift UI: Overview: App Structure and behavior, User Interface: Views and controls, View Layout and presentation, Drawing and Animation, Framework Integration; Data and Events: Events and Data flow, Gestures**.**

TEXTBOOKS:
1. Develop in Swift Data Collections. (As available on Apple Book Store)
2. Develop in Swift Fundamentals.

REFERENCE:
1. Jon Hoffman, Mastering Swift 5: Deep dive into the latest edition of the Swift programming language, 5th Edition
2. Matthew Mathias, John Gallagher, Swift Programming: The Big Nerd Ranch Guide 4th edition, 2018
3. Matt Neuberg , I OS 12 Programming Fundamentals with Swift, OReilly; 5 th edition.
4. Paris Butt field-Addison, Jonathon Manning, Tim Nugent Learning Swift: Building Apps for mac OS, I OS, and Beyond, O'Reilly Media, Inc., 3rd ad, 2018
5. Vandad Nahavandipoor. iOS 11 Swift Programming Cookbook, O'Reilly Media, 2020

List of Practical: Complete All the Lab Exercises, playgrounds and projects given in student material of Develop in swift Data Collections.
1. Create different apps using view-based animations and UI dynamics.
2. Create different apps using different Advance layout.
3. Create an App to Handle Local and Remote Notifications.
4. Create different apps using third party APIs.
5. Create an App for User Authentication using Fire Base.
6. Create an App that Uses Cloud based Storage.
7. Create different applications using new features of SwiftUI.
8. Create an App to recognize gestures.

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COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME					L	T	P	CREDITS
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BTCS708N	DCC	Introduction to Data science	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. The objective of this course is to impart necessary knowledge of the mathematical foundations needed for data science and develop programming skills required to build data science applications.

COURSE OUTCOMES:
Upon completion of the subject, students will be able to:
1. Demonstrate understanding of the mathematical foundations needed for data science.
2. Collect, explore, clean, munge and manipulate data.
3. Implement models such as k-nearest Neighbors, Naive Bayes, linear and logisticregression,decision trees, neural networks and clustering.
4. Build data science applications using Python based toolkits

SYLLABUS
UNIT I
Introduction to Data Science: Concept of Data Science, Traits of Big data, Web Scraping, Analysis's Reporting.

UNIT II
Introduction to Programming Tools for Data Science: Toolkits using Python: Matplotlib, NumPy,Scikit-learn, NLTK, Visualizing Data: Bar Charts, Line Charts, Scatterplots, Working with data: Reading Files, Scraping the Web, Using APIs (Example: Usingthe Twitter APIs),Cleaning and Munging, Manipulating Data, Rescaling, Dimensionality Reduction.

UNIT III
Mathematical Foundations: Linear Algebra: Vectors, Matrices, Statistics: Describing a Single Set of Data, Correlation, Simpson's Paradox, Correlation and Causation, Probability: Dependence and Independence, Conditional Probability, Bayes's Theorem, Random Variables, Continuous Distributions, The Normal Distribution, The Central Limit Theorem, Hypothesis and Inference: Statistical Hypothesis Testing, Confidence Intervals, Phacking, Bayesian Inference.

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COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME					L	T	P	CREDITS
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BTCS708N	DCC	Introduction to Data science	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 IV
Machine Learning: Overview of Machine learning concepts – Over fitting and train/test splits, Types of Machine learning – Supervised, Unsupervised, Reinforced learning, Introduction to
Bayes Theorem, Linear Regression- model assumptions, regularization (lasso, ridge, elastic net), Classification and Regression algorithms- Naïve Bayes, K-Nearest Neighbors, logistic regression, support vector machines (SVM), decision trees, and random forest, Classification Errors, Analysis of Time Series- Linear Systems Analysis, Nonlinear Dynamics, Rule Induction, Neural Networks-Learning And Generalization, Overview of Deep Learning.

UNIT V
Case Studies of Data Science Application: Weather forecasting, Stock market prediction, Object recognition, Real Time Sentiment Analysis.

TEXTBOOKS:
1. Joel Grus, "Data Science from Scratch: First Principles with Python", O'Reilly Media.
2. Aurélien Géron, "Hands-On Machine Learning with Scikit-Learn and Tensor Flow: Concepts, Tools, and Techniques to Build Intelligent Systems", 1st Edition, O'Reilly Media.
3. Jain V.K., "Data Sciences", Khanna Publishing House, Delhi
4. Jain V.K., "Big Data and Hadoop", Khanna Publishing House, Delhi.
5. Jeeva Jose, "Machine Learning", Khanna Publishing House, Delhi.
6. Chopra Rajiv, "Machine Learning", Khanna Publishing House, Delhi.
7. Ian Goodfellow, YoshuaBengio and Aaron Courville, "Deep Learning", MIT Press http://www.deeplearningbook.org
8. Jiawei Han and Jian Pei, "Data Mining Concepts and Techniques", Third Edition, MorganKaufmann Publishers

REFERENCE:
1. Write a programme in Python to predict the class of the flower based on available attributes.
2. Write a programmer in Python to predict if a loan will get approved or not
3. Write a programmer in Python to predict the traffic on a new mode of transport.
4. Write a programmer in Python to predict the class of user.
5. Write a programmer in Python to in identify the tweets which are hate tweets and which are not.
6. Write a programmer in Python to predict the age of the actors.
7. Mini project to predict the time taken to solve a problem given the current status of the user

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			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTIT508M	DSE	No SQL and Mongo DB	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 OUTCOMES:
Upon completion of the subject, students will be able to:
1. Understanding No SQL Database Concepts
2. Demonstrate Proficiency in Mongo DB Operations
3. Investigate Advanced Mongo DB Features
4. Design Data baseand 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   7 HOURS
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 Modelling: Types of data relationships, modelling, embedding data in documents, referencing data in documents, scaling data model, Using Atlas Tools for Schema Help, MongoDB transactions

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Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore
Shri Vaishnav Institute of Information Technology
Choice Based Credit System (CBCS) in the light of NEP-2020
B.Tech Computer Science and Engineering-Mobile Applications-Apple Authorized
Training Center
SEMESTER-VI (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*				
BTIT50 8M	DSE	**No SQL and Mongo DB**	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 Mini Projects:
1. **Build a Mini-Application:** Create a sample application (e.g., a task manager, blog platform, or e-commerce site) using Mongo DB 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 Mongo DB

Books:
1. Mongo DB University, https://learn.mongodb.com/
2. Marko Aleksendric, Arek Borucki, Leandro Domingues. Mastering MongoDB 7.0 - Fourth Edition: Achieve data excellence by unlocking the full potential of MongoDB, 4th Edition. MongoDB Press
3. Rachelle Palmer, Ben Perlmutter, Ashwin Gangadhar, Nicholas Larew, Sigfrido Narváez , Thomas Rueckstiess, Henry Weller, Richmond Alake, Shubham Ranjan. Building AI Intensive Python Applications: Create intelligent apps with LLMs and vector databases. 1st Edition. MongoDB Press

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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*				
BTCS607N	PW	Minor Project	0	0	0	60	40	0	0	4	2

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:

This course is the masters by coursework Minor Project.
A Minor Project is a substantial work of supervised research or development, requiring the equivalent of about four to six months full-time work from start to finish. A Project involves identifying a task or problem, searching and reviewing relevant literature, a proposed, implemented, and critically analyzed solution to the task or problem, and a written report describing the problem, the relevant literature, the solution, and its relation to other work in the area.

Note: This course includes a work integrated learning experience in which your knowledge and skills will be applied and assessed in a real or simulated workplace context and where feedback from industry and/ or community is integral to your experience.

COURSE OUTCOMES

This course contributes to the following program learning outcomes:

 Enabling Knowledge:

You will gain skills as you apply knowledge with creativity and initiative to new situations. In doing so, you will:

➢ Demonstrate mastery of a body of knowledge that includes recent developments in Information Technology

Recognize and use research principles and methods applicable to Information Technology.

You will learn to accurately and objectively examine, and critically investigate Information Technology (IT) concepts, evidence, theories or situations, in particular to:

➢ Analyze and model complex requirements and constraints for the purpose of designing and implementing software artifacts and ITsystems

➢ Evaluate and compare designs of software artifacts and IT systems on the basis of organizational and user requirements.

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| COURSE CODE | CATEGORY | COURSE NAME | TEACHING & EVALUATION SCHEME | | | | | L | T | P | CREDITS |
| | | | THEORY | | | PRACTICAL | | | | | |
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☐ **Problem Solving:**

Your capability to analyze complex problems and provide suitable solutions will be extended as you learn to: design and implement software solutions that accommodate specified requirements and constraints, based on analysis or modeling or requirements specification.

☐ **Communication:**

You will learn to communicate effectively with a variety of audiences through a range of modes and media, in particular to: interpret abstract theoretical propositions, choose methodologies, justify conclusions and defend professional decisions to both IT and non-IT personnel via technical reports of professional standard and technical presentations.

☐ **Responsibility:**

You will be required to accept responsibility for your own learning and make informed decisions about judging and adopting appropriate behavior in professional and social situations. This includes accepting the responsibility for independent life-long learning and a high level of accountability. Specifically, you will learn to: effectively apply relevant standards, ethical considerations, and an understanding of legal and privacy issues to designing software applications and IT systems.

☐ **Research and Scholarship:**

You will have technical and communication skills to design, evaluate, implement, analyze and theorize about developments that contribute to professional practice or scholarship; specifically you will have cognitive skills:

➢ To demonstrate mastery of theoretical knowledge and to reflect critically on theory and professional practice or scholarship

➢ To plan and execute a substantial research-based project, capstone experience and/or piece of scholarship.

Course Learning Outcomes

Upon successful completion of this course you should be able to:

☐ Identify a task or problem relevant to /or IT

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- ☐ Search and review of the relevant literature
- ☐ Propose a solution to the task or problem
- ☐ Develop a software and/or algorithmic solution to the task or problem
- ☐ Implement solutions to meet high quality requirements developed by the supervisor
- ☐ Carry out research under supervision
- ☐ Present the research in a written form like that used for published papers
- ☐ Present the research in an oral seminar.

Overview of Learning Activities

A Minor project is a substantial work of supervised research or software development. You will choose an academic staff member as your supervisor to work on a research project. To successfully complete the course, you must demonstrate research skills: ability to undertake research under supervision, ability to analyze, develop, and present the research in a written form like that used for published papers, and ability to present the research in an oral seminar.

In this course, you are expected to carry out research activities including implementing a complete solution to the problems identified by the supervisor, critical analysis of results, and completing a written Project. The major deadline for this course is the delivery of the Minor Project by the end of the semester.

Overview of Assessment

You must satisfactorily complete each of the following assessment tasks for this course:

➢ Research project comprising an implemented and critically analyzed solution to the task or problem.

➢ Written report (final Project) describing the problem, the relevant literature, the solution, and its relation to other work in the area

➢ Seminar on your research (of 20 minutes) soon after your Project is submitted.

The Minor Project is assessed on its merits as a research publication. Each Project is examined by two academics, usually from within the Institute.

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