

BHAKTA KAVI NARSINH MEHTA UNIVERSITY, JUNAGADH



Curriculum Framework for Post-Graduate Programme in

M.Sc. (I.T & C.A)

As Per National Education Policy (NEP)-2020

TWO YEARS P.G. Programme

Semester- I

Effective June-2026

BHAKTA KAVI NARSINH MEHTA UNIVERSITY**Major/Minor****Syllabus of M.Sc. (I.T & C.A) as per NEP-2020 (Two Year Program)****Faculty of Science****Effective from June 2026****Subject: Computer Science****SEMESTER- I****SUMMARY OF THE SYLLABUS**

Sem No.	Sr. No.	Category of Course	Course Title	Course Code	Course Level	Credit	ESE Marks	CIA Marks	Total Marks	Exam Duration
Sem-1	1	DSC-1	Application Development Using Flutter (Theory)	FLUDSC1	6.0	Theory – 04	70	30	100	02:30 Hrs
	2	DSC-2	Application Development Using Flutter (Practical)	FLUDSC2	6.0	Practical – 04	100	00	100	03:00 Hrs
	3	DSC-3	Advanced Web Development using Laravel (Theory)	LARDSC3	6.0	Theory – 04	70	30	100	02:30 Hrs
	4	DSC-4	Advanced Web Development using Laravel (Practical)	LARDSC4	6.0	Practical – 04	100	00	100	03:00 Hrs
	5	DSC-5	In House Project	PRJDSC5	6.5	Practical – 04	100	00	100	03:00 Hrs
	6	SEC-1	NoSQL Database: MongoDB	MONSEC1	6.0	Theory – 02	35	15	50	01:00 Hrs

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Course Level	6.0	Internal Marks	30
Programme	M.Sc. (I.T & C.A)	External Marks	70
Semester	1	Practical Internal	0
Category of Course	DSC-1	Practical External	0
Course Credit	4	Prac. External Exam Duration	-
Teaching Hours	Theory-60 Practical-0	Total	100
Course Code	FLUDSC1	Exam Duration	2:30 Hrs
Course Title	Application Development Using Flutter (Theory)		

Objectives:

- To introduce the fundamentals and history of Flutter and its role in cross-platform mobile application development.
- To understand the architecture and features of Flutter framework.
- To learn the basics of Dart programming language including data types, variables, operators, and control statements.
- To develop understanding of Object-Oriented Programming (OOP) concepts used in Dart.
- To explore different Flutter widgets and layouts for building user interfaces.
- To design interactive user interfaces using various Flutter controls and containers.
- To learn handling of gestures, forms, dialogs, and navigation components in Flutter.
- To understand the use of animations, themes, and UI customization in Flutter applications.
- To develop Flutter applications that integrate Firebase, local storage, HTTP services, camera, and notifications.

Outcomes:

- Explain the architecture, features, advantages, and limitations of Flutter.
- Install and configure Flutter development environment on Windows.
- Apply Dart programming concepts to build Flutter applications.
- Develop applications using Flutter widgets and layout structures.
- Design UI components using containers, text fields, buttons, lists, grids, and navigation widgets.
- Implement forms, validations, gestures, and user interactions in Flutter apps.
- Create visually appealing applications using themes, animations, and UI customization techniques.
- Integrate Flutter applications with Firebase, SQLite, and HTTP services.
- Build complete cross-platform mobile applications using Flutter framework.

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Course Contents

UNIT		Hours
Unit 1 Introduction to Flutter and Dart Programming	Introduction to Flutter - History of Flutter - Features of Flutter - Advantage of Flutter - Disadvantages of Flutter - Flutter Installation for windows - Flutter Architecture Introduction to Dart Programming - Data Type - Variables and Functions - Operators - Decision Making and Loops - Continue and Break - Final and Const Keyword - OOP Concepts	15
Unit 2 Flutter Widgets, Layouts and State Management	Flutter Basics - Flutter Widget - Types Of Widgets - State Management Widget - Flutter Scaffold - constructor and properties of the Scaffold widget class - Flutter Layouts - Flutter Gestures system - Gestures and pointers - Gesture Detector - Flutter State Management - Flutter IDE	15
Unit 3 Flutter UI Components and Controls	Flutter Container and Controls - Flutter Container - Flutter Row and Column - Flutter Text - Flutter TextField - Flutter Buttons	15

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	- Flutter Stack - Flutter Forms - Flutter Alert Dialogs - Flutter Icons - Flutter Images - Flutter Card - Flutter Tabbar - Flutter Drawer - Flutter Lists - Flutter GridView - Flutter Toast - Flutter Checkbox - Flutter Radio Button - Flutter Progress Bar - Flutter SnackBar - Flutter Tooltip - Flutter Slider - Flutter Switch - Flutter Charts - Bottom Navigation Bar - Flutter Themes - Flutter Table - Flutter Calendar - Flutter Animation	
Unit 4 Flutter Design, Animations and Data Handling	Design & Animations - Customizing Fonts in Flutter - Flutter - Skeleton Text - Flutter - Themes - Flutter - Lazy Loader - Flutter - UI Orientation - Flutter - Animation in Route Transition - Flutter - Physics Simulation in Animation - Flutter - Radial Hero Animation - Flutter - Hinge Animation - Flutter - Lottie Animation	15

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	Forms & Gestures • Form Validation in Flutter • Designing a Form Submission Page in Flutter • Flutter - Gestures • Flutter - Read and Write Data on Firebase • Gallery Access and Camera in Flutter • Camera Access in Flutter • SQLite and local storage • Shared preferences • Background local notifications in Flutter • HTTP GET Response in Flutter	
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Suggested Reading:

References Book:

- Flutter in Action By Eric Windmill 1st Edition Manning Publications
- Beginning Flutter: A Hands-On Guide to App Development By Marco L. Napoli 1st Edition Wiley Publications
- Flutter Cookbook By Simone Alessandria 1st Edition Packt Publishing
- Learning Dart By Ivo Balbaert 2nd Edition Packt Publishing
- Programming Flutter: Native, Cross-Platform Apps the Easy Way By Carmine Zaccagnino 1st Edition Pragmatic Bookshelf Publications
- Flutter Complete Reference: Create beautiful, fast and native apps for any device
- Beginning App Development with Flutter By Rap Payne 1st Edition Apress Publications

Web site References:

- <https://flutter.dev>
- <https://dart.dev>
- <https://docs.flutter.dev/reference/tutorials>
- <https://www.javatpoint.com/flutter>
- <https://www.geeksforgeeks.org/flutter>
- <https://www.tutorialspoint.com/flutter>
- <https://www.w3schools.com/flutter>

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Course Level	6.0	Internal Marks	00
Programme	M.Sc. (I.T & C.A)	External Marks	00
Semester	1	Practical Internal	00
Category of Course	DSC-2	Practical External	100
Course Credit	4	Prac. External Exam Duration	3:00 Hrs
Teaching Hours	Theory-0 Practical-120	Total	100
Course Code	FLUDSC2	Exam Duration	-
Course Title	Application Development Using Flutter (Practical)		

Objectives:

- To introduce the fundamentals and history of Flutter and its role in cross-platform mobile application development.
- To understand the architecture and features of Flutter framework.
- To learn the basics of Dart programming language including data types, variables, operators, and control statements.
- To develop understanding of Object-Oriented Programming (OOP) concepts used in Dart.
- To explore different Flutter widgets and layouts for building user interfaces.
- To design interactive user interfaces using various Flutter controls and containers.
- To learn handling of gestures, forms, dialogs, and navigation components in Flutter.
- To understand the use of animations, themes, and UI customization in Flutter applications.
- To develop Flutter applications that integrate Firebase, local storage, HTTP services, camera, and notifications.

Outcomes:

- Explain the architecture, features, advantages, and limitations of Flutter.
- Install and configure Flutter development environment on Windows.
- Apply Dart programming concepts to build Flutter applications.
- Develop applications using Flutter widgets and layout structures.
- Design UI components using containers, text fields, buttons, lists, grids, and navigation widgets.
- Implement forms, validations, gestures, and user interactions in Flutter apps.
- Create visually appealing applications using themes, animations, and UI customization techniques.
- Integrate Flutter applications with Firebase, SQLite, and HTTP services.
- Build complete cross-platform mobile applications using Flutter framework.

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UNIT		Hours
Unit 1 Introduction to Flutter and Dart Programming	Introduction to Flutter - History of Flutter - Features of Flutter - Advantage of Flutter - Disadvantages of Flutter - Flutter Installation for windows - Flutter Architecture Introduction to Dart Programming - Data Type - Variables and Functions - Operators - Decision Making and Loops - Continue and Break - Final and Const Keyword - OOP Concepts	30
Unit 2 Flutter Widgets, Layouts and State Management	Flutter Basics - Flutter Widget - Types Of Widgets - State Management Widget - Flutter Scaffold - constructor and properties of the Scaffold widget class - Flutter Layouts - Flutter Gestures system - Gestures and pointers - Gesture Detector - Flutter State Management - Flutter IDE	30
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Unit 4 Flutter Design, Animations and Data Handling	Design & Animations • Customizing Fonts in Flutter • Flutter - Skeleton Text • Flutter - Themes • Flutter - Lazy Loader • Flutter - UI Orientation • Flutter - Animation in Route Transition • Flutter - Physics Simulation in Animation • Flutter - Radial Hero Animation • Flutter - Hinge Animation • Flutter - Lottie Animation	30

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	Forms & Gestures • Form Validation in Flutter • Designing a Form Submission Page in Flutter • Flutter - Gestures • Flutter - Read and Write Data on Firebase • Gallery Access and Camera in Flutter • Camera Access in Flutter • SQLite and local storage • Shared preferences • Background local notifications in Flutter • HTTP GET Response in Flutter	
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- <https://flutter.dev>
- <https://dart.dev>
- <https://docs.flutter.dev/reference/tutorials>
- <https://www.javatpoint.com/flutter>
- <https://www.geeksforgeeks.org/flutter>
- <https://www.tutorialspoint.com/flutter>
- <https://www.w3schools.com/flutter>

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Course Level	6.0	Internal Marks	30
Programme	M.Sc. (I.T & C.A)	External Marks	70
Semester	1	Practical Internal	00
Category of Course	DSC-3	Practical External	00
Course Credit	4	Prac. External Exam Duration	-
Teaching Hours	Theory- 60 Practical-00	Total	100
Course Code	LARDSC3	Exam Duration	2:30 Hrs
Course Title	Advanced Web Development using Laravel (Theory)		

Objectives:

- Understand and apply fundamental concepts of PHP programming and Object-Oriented Programming (OOP).
- Develop the ability to design and implement classes, objects, inheritance, and advanced OOP features in PHP.
- Gain proficiency in designing responsive web interfaces using the Bootstrap framework and UI components.
- Understand the architecture, features, and installation process of the Laravel framework.
- Apply the MVC architecture to develop structured and maintainable web applications.
- Configure Laravel applications using environment settings, database configuration, and Artisan tools.
- Implement core Laravel functionalities including routing, controllers, middleware, sessions, and request-response handling.
- Perform database operations using migrations, seeding, raw queries, and transactions in Laravel.
- Develop dynamic web pages using Blade templating engine and form handling techniques.
- Utilize Eloquent ORM and validation mechanisms to manage data and ensure data integrity in web applications.

Outcomes:

- Apply basic and advanced concepts of PHP and Object-Oriented Programming to develop web applications.
- Design and implement modular and reusable code using OOP principles such as inheritance, interfaces, and encapsulation.
- Develop responsive and user-friendly interfaces using the Bootstrap framework and its components.
- Understand and implement the Laravel framework for modern web application development.

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- Apply MVC architecture to structure web applications efficiently.
- Configure and manage Laravel applications using environment settings, database connectivity, and Artisan commands.
- Implement application logic using routing, controllers, sessions, and request-response handling in Laravel.
- Perform database operations using migrations, seeding, and transactions in Laravel.
- Create dynamic views and handle user input using Blade templating and form handling techniques.
- Apply Eloquent ORM and validation techniques to ensure efficient data handling and data integrity.

Course Contents

UNIT		Hours
Unit 1 Object-Oriented PHP & Bootstrap Fundamentals	Object-Oriented Programming in PHP • Revision of PHP Basics: Syntax, Variables, Data Types, Operators, Arrays, Functions • Introduction to OOP: Classes, Objects, Properties, Methods • Constructors and Destructors • Visibility: Public, Private, Protected • Class Constants and Static Keyword • Inheritance and Scope Resolution Operator (::) • Interfaces • Magic Methods • Object Cloning and Comparing Objects • Final Keyword Bootstrap Framework • Introduction to Bootstrap and File Structure • Basic HTML Template and Global Styles • Grid System: Default Grid, Fluid Grid, Offsetting and Nesting Columns • Container Layouts • Implementation of UI Components: • Typography • Tables • Forms • Buttons	15

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SEMESTER- I

	• Images and Icons • Navigation and Navbar • Pagination • Labels and Badges • Progress Bars and Wells	
Unit 2 Introduction to Laravel & Application Configuration	Laravel Framework Overview • Introduction to Laravel and its Features • MVC Architecture • Laravel Directory Structure • Installation using Composer and Laravel Installer • Understanding Composer and Package Management Configuration and Environment Setup • Environment Configuration (.env file) • Protecting Sensitive Data • Database Configuration • Artisan Command Line Tool Overview • Maintenance Mode and Application Settings	15
Unit 3 Laravel Core Concepts & Database Interaction	Core Laravel Concepts • Namespaces • Controllers • Routing: • Basic Routing • Route Parameters • Named Routes • Route Groups and Prefixing • Sub-Domain Routing • Route Model Binding • Request and Response Handling • Redirection • Cookies and Sessions • Views and Passing Data Database Handling	15

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	• Creating Models with Migration • Migration Structure and Execution • Database Seeding • Running Raw SQL Queries • Database Transactions • Clearing Cache and Compiled Views	
Unit 4 Blade Templates, Eloquent ORM & Validation	Blade Template Engine • Introduction to Blade • Template Inheritance and Master Layouts • Displaying Variables • Conditional Statements • Loops • Executing PHP Functions in Blade Form Handling • Creating Forms in Laravel • Form Controls: Text, Password, File Input • Checkboxes and Radio Buttons • Drop-down Lists • Submit Buttons • Localization Eloquent ORM • Introduction to Eloquent • Model Naming Conventions • Table Names and Primary Keys • Timestamps • CRUD Operations (Create, Retrieve, Update, Delete) • Displaying Data in Views Validation • Defining Routes for Validation • Writing Validation Rules • Displaying Validation Errors	15

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SEMESTER- I

	• Array Validation • Custom Validators • Available Validators: • Accepted • Date (After/Before) • Alpha/Numeric • Between • Boolean • Email • Exists • Image • Integer • Max/Min • Regular Expressions	
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Suggested Reading:

References Book:

- Modern PHP (Updated Edition) – Josh Lockhart
- Laravel: Up & Running (3rd Edition) – Matt Stauffer
- Clean Code in PHP – Carsten Windler & Alexander Makarov
- Hands-On Full Stack Web Development with Laravel – Fernando Monteiro
- Mastering Bootstrap 4 (2nd Edition) – Benjamin Jakobus & Jason Marah
- Learning PHP, MySQL & JavaScript (5th Edition) – Robin Nixon

Web site References:

- Laravel Docs → <https://laravel.com/docs>
- PHP Official → <https://www.php.net>
- Bootstrap → <https://getbootstrap.com>
- GeeksforGeeks → <https://www.geeksforgeeks.org/php/laravel/>
- Tutorialspoint → <https://www.tutorialspoint.com/laravel/index.htm>

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Course Level	6.0		Internal Marks	00
Programme	M.Sc. (I.T & C.A)		External Marks	00
Semester	1		Practical Internal	00
Category of Course	DSC-4		Practical External	100
Course Credit	4		Prac. External Exam Duration	-
Teaching Hours	Theory- 00 Practical - 120		Total	100
Course Code	LARDSC4		Exam Duration	3:00 Hrs
Course Title	Advanced Web Development using Laravel (Practical)			

Objectives:

- Understand and apply fundamental concepts of PHP programming and Object-Oriented Programming (OOP).
- Develop the ability to design and implement classes, objects, inheritance, and advanced OOP features in PHP.
- Gain proficiency in designing responsive web interfaces using the Bootstrap framework and UI components.
- Understand the architecture, features, and installation process of the Laravel framework.
- Apply the MVC architecture to develop structured and maintainable web applications.
- Configure Laravel applications using environment settings, database configuration, and Artisan tools.
- Implement core Laravel functionalities including routing, controllers, middleware, sessions, and request-response handling.
- Perform database operations using migrations, seeding, raw queries, and transactions in Laravel.
- Develop dynamic web pages using Blade templating engine and form handling techniques.
- Utilize Eloquent ORM and validation mechanisms to manage data and ensure data integrity in web applications.

Outcomes:

- Apply basic and advanced concepts of PHP and Object-Oriented Programming to develop web applications.
- Design and implement modular and reusable code using OOP principles such as inheritance, interfaces, and encapsulation.
- Develop responsive and user-friendly interfaces using the Bootstrap framework and its components.
- Understand and implement the Laravel framework for modern web application development.

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- Apply MVC architecture to structure web applications efficiently.
- Configure and manage Laravel applications using environment settings, database connectivity, and Artisan commands.
- Implement application logic using routing, controllers, sessions, and request-response handling in Laravel.
- Perform database operations using migrations, seeding, and transactions in Laravel.
- Create dynamic views and handle user input using Blade templating and form handling techniques.
- Apply Eloquent ORM and validation techniques to ensure efficient data handling and data integrity.

Course Contents

UNIT		Hours
Unit 1 Object-Oriented PHP & Bootstrap Fundamentals	Object-Oriented Programming in PHP • Revision of PHP Basics: Syntax, Variables, Data Types, Operators, Arrays, Functions • Introduction to OOP: Classes, Objects, Properties, Methods • Constructors and Destructors • Visibility: Public, Private, Protected • Class Constants and Static Keyword • Inheritance and Scope Resolution Operator (::) • Interfaces • Magic Methods • Object Cloning and Comparing Objects • Final Keyword Bootstrap Framework • Introduction to Bootstrap and File Structure • Basic HTML Template and Global Styles • Grid System: Default Grid, Fluid Grid, Offsetting and Nesting Columns • Container Layouts • Implementation of UI Components: • Typography • Tables • Forms • Buttons	30

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	• Images and Icons • Navigation and Navbar • Pagination • Labels and Badges • Progress Bars and Wells	
Unit 2 Introduction to Laravel & Application Configuration	Laravel Framework Overview • Introduction to Laravel and its Features • MVC Architecture • Laravel Directory Structure • Installation using Composer and Laravel Installer • Understanding Composer and Package Management Configuration and Environment Setup • Environment Configuration (.env file) • Protecting Sensitive Data • Database Configuration • Artisan Command Line Tool Overview • Maintenance Mode and Application Settings	30
Unit 3 Laravel Core Concepts & Database Interaction	Core Laravel Concepts • Namespaces • Controllers • Routing: • Basic Routing • Route Parameters • Named Routes • Route Groups and Prefixing • Sub-Domain Routing • Route Model Binding • Request and Response Handling • Redirection • Cookies and Sessions • Views and Passing Data Database Handling	30

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	• Creating Models with Migration • Migration Structure and Execution • Database Seeding • Running Raw SQL Queries • Database Transactions • Clearing Cache and Compiled Views	
Unit 4 Blade Templates, Eloquent ORM & Validation	Blade Template Engine • Introduction to Blade • Template Inheritance and Master Layouts • Displaying Variables • Conditional Statements • Loops • Executing PHP Functions in Blade Form Handling • Creating Forms in Laravel • Form Controls: Text, Password, File Input • Checkboxes and Radio Buttons • Drop-down Lists • Submit Buttons • Localization Eloquent ORM • Introduction to Eloquent • Model Naming Conventions • Table Names and Primary Keys • Timestamps • CRUD Operations (Create, Retrieve, Update, Delete) • Displaying Data in Views Validation • Defining Routes for Validation • Writing Validation Rules • Displaying Validation Errors	30

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SEMESTER- I

	• Array Validation • Custom Validators • Available Validators: • Accepted • Date (After/Before) • Alpha/Numeric • Between • Boolean • Email • Exists • Image • Integer • Max/Min • Regular Expressions	
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Suggested Reading:

References Book:

- Modern PHP (Updated Edition) – Josh Lockhart
- Laravel: Up & Running (3rd Edition) – Matt Stauffer
- Clean Code in PHP – Carsten Windler & Alexander Makarov
- Hands-On Full Stack Web Development with Laravel – Fernando Monteiro
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Web site References:

- Laravel Docs → <https://laravel.com/docs>
- PHP Official → <https://www.php.net>
- Bootstrap → <https://getbootstrap.com>
- GeeksforGeeks → <https://www.geeksforgeeks.org/php/laravel/>
- Tutorialspoint → <https://www.tutorialspoint.com/laravel/index.htm>

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Course Level	6.5	Internal Marks	00
Programme	M.Sc. (I.T & C.A)	External Marks	00
Semester	1	Practical Internal	00
Category of Course	DSC-5	Practical External	100
Course Credit	4	Prac. External Exam Duration	-
Teaching Hours	Theory- 00 Practical - 120	Total	100
Course Code	PRJDSC5	Exam Duration	3:00 Hrs
Course Title	In House Project Development		

Course Contents

Module	Content	Hours
1	Project Development (In House) With any of the Minor or Major Subject Basics.	120

Suggestive assessment scheme:

Component	Marks	Type
External Practical	25	Proposal, Flowcharts and Diagrams, attendance
	25	Code Implementation and Testing
	50	Final report, viva, project presentation

Guidelines:

- Project must be developed in the computer laboratory of concern institute under the supervision of faculties of concern institute on any subject of previous semester or current semester.
- At the time of Project-Viva examination student must show all the Workouts, SDLC, Documentation, Program codes and project in running mode.

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- The guide shall monitor progress of the student continuously. A student is required to present the progress of the Project work during the semester as per the schedule provided by the Guide.
- Student has to submit a hard copy of Project Report, workbook and a copy of Project as per guide suggestion.
- Project submission should follow the guide's schedule, with a mandatory live demonstration during the viva, supported by a multimedia presentation.

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Course Level	6.0		Internal Marks	15
Programme	M.Sc. (I.T & C.A)		External Marks	35
Semester	1		Practical Internal	00
Category of Course	SEC-1		Practical External	00
Course Credit	2		Prac. External Exam Duration	-
Teaching Hours	Theory-30 Practical-00		Total	50
Course Code	MONSEC1		Exam Duration	1:00 Hrs
Course Title	NoSQL Database: MongoDB			

Objectives:

- Understand the fundamentals of database systems and the limitations of traditional RDBMS.
- Explain the concept of NoSQL databases, their features, advantages, and real-world use cases.
- Identify and differentiate between various types of NoSQL databases such as key-value, document, column-oriented, and graph databases.
- Compare SQL and NoSQL databases based on structure, scalability, and performance.
- Understand MongoDB architecture including databases, collections, documents, and JSON/BSON formats.
- Perform CRUD operations in MongoDB using various methods and query operators.
- Apply querying techniques such as filtering, projection, sorting, and pagination (limit/skip).
- Design efficient data models using schema design principles, relationships, and embedding vs referencing.
- Implement indexing and aggregation techniques to optimize performance and analyze data.
- Manage MongoDB databases through backup, restore, security (authentication/authorization), and integrate MongoDB with applications using Node.js.

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Outcomes:

- Describe the basic concepts of database systems and identify limitations of relational databases.
- Explain NoSQL database concepts, types, features, and their practical applications.
- Differentiate between SQL and NoSQL databases based on use cases, scalability, and data models.
- Demonstrate understanding of MongoDB architecture including collections, documents, and data formats (JSON/BSON).
- Perform CRUD operations in MongoDB using appropriate commands and query operators.
- Apply filtering, projection, sorting, and pagination techniques to retrieve specific data efficiently.
- Design effective MongoDB data models using embedding, referencing, and relationship concepts.
- Implement indexing and aggregation framework to improve query performance and data analysis.

UNIT		Hours
Unit 1 Introduction to NoSQL and MongoDB	• Introduction to Database Systems • Limitations of Relational Databases (RDBMS) • What is NoSQL? • Types of NoSQL Databases ○ Key-Value Stores ○ Document Databases ○ Column-Oriented Databases ○ Graph Databases • Features and Advantages of NoSQL • Use cases of NoSQL databases • SQL vs NoSQL comparison • MongoDB concepts - Databases, collections, and documents • Downloading Installing MongoDB, MongoDB shell and Compass • Introduction to JSON and BSON format CRUD Operations and Querying • Creating Databases and Collections • Insert Operations ○ insertOne()	15

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	○ insertMany() • Read Operations ○ find(), findOne() • Update Operations ○ updateOne(), updateMany() • Delete Operations ○ deleteOne(), deleteMany() • Projection in MongoDB • Query Operators ○ Comparison Operators (\$gt, \$lt, \$eq) ○ Logical Operators (\$and, \$or, \$not) ○ Element Operators ○ Array Operators • Sorting Documents • Limit and Skip methods	
Unit 2 Advanced MongoDB	• MongoDB Data Modeling Concepts • Schema Design Principles • Embedded vs Referenced Documents • Relationships in MongoDB ○ One-to-One ○ One-to-Many ○ Many-to-Many • Indexing in MongoDB • Types of Indexes • Creating and Dropping Indexes • Performance Optimization • Aggregation Framework • Aggregation Pipeline Stages ○ \$match ○ \$group ○ \$project ○ \$sort • Backup and Restore Database • Import and Export Data • User Authentication and Authorization • Role-Based Access Control	15

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	• Replication Concept • Sharding Concept • MongoDB with Node.js Introduction • Connecting MongoDB with Application • CRUD Operations using Node.js	
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References Book:

- Mastering MongoDB 7.0 (Fourth Edition) – Marko Aleksendrić et al. (2024)
- Mastering NoSQL Databases with MongoDB – Greyson Chesterfield (2024)
- Mastering MongoDB: A Comprehensive Guide to NoSQL Database Excellence – Frahaan Hussain & Kameron Hussain (2024)
- MongoDB in Action (Third Edition) – Arek Borucki (2025)
- MongoDB: Learning NoSQL Databases Made Easy – Feri Sulianta (2025)

Web site References:

- MongoDB Inc. Documentation → <https://www.mongodb.com/docs/>
- W3Schools MongoDB Tutorial → <https://www.w3schools.com/mongodb/>
- GeeksforGeeks MongoDB Guide → <https://www.geeksforgeeks.org/mongodb-tutorial/>
- MongoDB University → <https://university.mongodb.com/>
- TutorialsPoint MongoDB Tutorial → <https://www.tutorialspoint.com/mongodb/index.htm>
- freeCodeCamp → <https://www.freecodecamp.org/>

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INTERNAL EVALUATION SCHEME

Sr. No.	Evaluation Component	4-Credit Subjects (Marks)	2-Credit Subjects (Marks)
1	Assignments, seminars, quizzes, mid-term tests, lab records, presentations, Term Paper, Viva-voce, Projects/Surveys/Field visits, Journal Writing (Any three – 5 marks each for 4-credit; any one – 5 marks for 2-credit)	15	05
2	Mid-Term Evaluation	15	10
TOTAL		30	15

Structure of the External Question Paper (4 Credit)

Ques. No.	Particulars	From which Unit	Marks
1	Questions (Any Two Out Of Four)	1	14
2	Questions (Any Two Out Of Four)	2	14
3	Questions (Any Two Out Of Four)	3	14
4	Questions (Any Two Out Of Four)	4	14
5	Questions (Any Two Out Of Four)	From Each Unit	14
		Total Marks	70

Structure of the External Question Paper (2 Credit)

Ques. No.	Particulars	From which Unit	Marks
1	Questions (Any Two Out Of Four)	1	14
2	Questions (Any Two Out Of Four)	2	14
3	Questions (Any Two Out Of Four)	From Each Unit	07
		Total Marks	35

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Note: This syllabus has been prepared in accordance with the Regulations for Curriculum and Credit Framework for Postgraduate Programmes (Effective from Academic Year 2026–2027) of Bhakta Kavi Narsinh Mehta University (BKNMU) and is aligned with the National Education Policy (NEP) 2020 and the UGC Curriculum and Credit Framework for Postgraduate Programmes (CCFPG), 2024. The teaching-learning process, assessment, examination, credit requirements, and all other academic provisions shall be governed by the applicable regulations, ordinances, notifications, and guidelines issued by BKNMU from time to time.

This syllabus is prepared with reference to BKNMU Reference No.: બીકેએનએમયુ / એકેડેમિક / ૧૪૪૮ / ૨૦૨૬, Dated: 16/06/2026, titled Regulations for Curriculum and Credit Framework for Postgraduate Programmes (Effective from Academic Year 2026–2027).

The official regulations are available at:

<https://bknmu.edu.in/uploads/assest/regulationsforcurriculumandcreditframeworkforpostgraduateprogrammes06162026014654800.pdf>