



GUJARAT TECHNOLOGICAL UNIVERSITY

**Program Name: Program Name: Bachelor of Computer Applications /
Bachelor of Computer Applications (Honours/Honours with Research) /
Master of Computer Applications (Integrated)**

Level: UG

Course / Subject Code: BC05001051

Course / Subject Name : Full Stack Development

w. e. f. Academic Year:	2026-27
Semester:	5
Category of the Course:	Discipline-Specific Elective-2

Prerequisite:	Introduction to web development, HTML, CSS, Javascript
Rationale:	Web development contains three components: the client side, the server side, and the database. These three are different sides of an application that combine together to build an application; MEAN and MERN are the technologies responsible for developing full-fledged web application.

Course Outcome:

After Completion of the Course, Student will able to:

N o	Course Outcomes	RBT Level
01	Describe client server architecture and communication process.	U
02	Develop front end with React, Angular	A
03	Develop API for backend with Node and Express	A
04	Integrate NOSQL database	A
05	Deploy and host web application	A

**Revised Bloom's Taxonomy (RBT)*

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
L	T	PR	C	Theory		Tutorial / Practical		
				ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
4	0	2	5	70	30	20	30	150



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Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	Client -Server architecture – Advantages of client server computing, Components of Client/Server Applications, The Client: Specialized Software and Hardware , The Client: Operating Systems ,The Server: Hardware and Operating Systems Communication - Foundations: Layered protocols and the OSI model, Remote Procedure Call (RPC): Passing parameters, dynamic binding, and implementation, Message-Oriented Communication: Persistence and synchronicity; Message-Queuing systems, Multicast Communication: Sending data from one server to many clients simultaneously.	08	10
2.	Introduction to MERN Stack Understanding the MERN stack Setting up the development environment Overview of front-end and back-end components Front-end Development with React Introduction to ReactJS Components and state, React Router for navigation, Handling user input and forms, State management with Redux or Context API Advanced React and State Management Advanced state management with Redux or Context API Asynchronous data fetching Integrating third-party APIs Authentication and authorization in the front-end Front-end Development with Angular Introduction to Angular, Components and data binding, Angular routing and navigation, Forms and reactive programming in Angular, State management in Angular (RxJS) Advanced Angular and Angular Material Advanced components and routing in Angular, Implementing Material Design with Angular Material, Form validation and error handling in Angular, Asynchronous data retrieval and integration	15	30



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3.	Node.js and Express.js Introduction to Node.js, Setting up a Node.js server with Express, Creating RESTful APIs, Middleware and routing, Understanding the significance of authentication (verifying user identity) and authorization (controlling access to resources). user authentication using JSON Web Tokens (JWTs) or session-based authentication. Developing secure routes and middleware to protect sensitive data and API endpoints. Managing user roles and permissions.	15	30
4.	MongoDB and Database Management Introduction to NoSQL databases, Setting up MongoDB, Schema design and modeling, Querying and updating data, Connecting the server to MongoDB	12	20
5.	Deployment and Hosting Preparing applications for production, Deploying to platforms like Heroku or AWS, Scaling and load balancing Deployment and Hosting Preparing applications for production, Deploying MEAN stack applications to hosting platforms, CI/CD pipeline setup, Scalability and load balancing	10	10
Total		60	100

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	U Level	A Level	N Level	E Level	C Level
10	20	70	-	-	-

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

1. Distributed Systems: Principles and Paradigms By Andrew S. Tanenbaum & Maarten Van Steen
2. Client/Server Computing (2nd Edition) By Patrick Smith and Seth Guengerich



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3. Beginning MERN Stack: Build and Deploy a Full Stack MongoDB, Express, React, Node.js by Greg Lim

(b) Open source software and website:

1. <https://www.w3schools.com/>

Suggested Project List:

1. Develop an event management App. The App should suggest venues as per event and size of crowd. Develop backend as required. Also consider location. Prepare project for company meeting, birthday celebration, music concert.
2. Develop a travel log App. In which user can view/share travel experiences.
3. Develop an app that recommends the food as per nutrition requirements.

Suggested Activities for Students:

1. Real world case studies-based learning – How Amazon, Netflix recommendation engine for movie work.
2. Problem solving/Coding – 1. Implement weather Application 2. Implement food recipe sharing

CO- PO Mapping:

Semester _5	Course Name : Full Stack Development POs										
Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	2						1		1		
CO2	2	2	2	2	3		1	2	1	1	2
CO3	2	2	2	2	3		1	2	1	1	2
CO4	2	2	2	2	3		1	2	1	1	2
CO5	2	1			1	2	1	2		1	2

Legend: '3' for high, '2' for medium, '1' for low and '-' for no correlation of each CO with PO.
