Uka Tarsadia University

B. Tech.

Semester VI

FULL STACK DEVELOPMENT (XXXXXX)

EFFECTIVE FROM July-2021

Syllabus version: 1.00

Subject Code	Subject Title	Teaching Scheme			
		Hours		Credits	
		Theory	Practical	Theory	Practical
XXXXXX	Full Stack Development	3	2	3	1

Subject Code	Subject Title	Theory Examination Marks		Practical Examination Marks	Total Marks
		Internal	External	CIE	
XXXXXX	Full Stack Development	40	60	50	150

Objectives of the course:

- To provide basic knowledge of React and build powerful, fast, user-friendly and reactive web application.
- To demonstrate an understanding of server-side concepts using Node.js.
- To give insights of data storage mechanisms with Node.js and MongoDB.

Course Outcomes:

Upon completion of the course, the student will be able to:

CO1: Describe the basics of React, installation process and ES6.
CO2: Understand the different styling React components and elements.
CO3: Describe the use of Node for server-side development.
CO4: Implement a simple HTTP server using the Node HTTP core module.
CO5: Implement a web server using the Express framework.
CO6: Perform various database operations on the MongoDB server from Node application.

Sr. No.	Topics	Hours
	Unit – I	
1	**Introduction to React and ES6:** Introduction to ES6, ES6 *const* and *let*, ES6 arrow functions, ES6 classes, Promises, ES6 modules, Introduction to React, History of React, Introduction to JSX, Lists and functional component in React, React DOM, Handler function in JSX, Working with lists and conditionals, Understanding single page applications and multi-page applications.	5
	Unit – II	
2	**React Component and Elements:** Property validation, Validating props with create class, Default props, Custom property validation, React state management - Introducing component state, Initializing state from properties, State within the component tree, Passing properties down the component tree, Passing data back up the component tree; Style component, Setting styles and class name component dynamically, Radium for media queries, Style component and dynamic style, CSS module and media queries.	9

Unit – III		
3	**Introduction to Node.js:** Introduction to Node.js, Installing Node.js, Executing Node.js scripts, Types of variables, Functions in Node.js, Default values, Closures, Exact equality, Modules, *this* keyword, Prototype, Error handling, Node package manager; Popular node package manager modules - Handling command line arguments, Handling date/time using moment.	8
Unit – IV		
4	**Node.js HTTP:** Basics of Node.js HTTP, Creating simple webs server, Inspecting headers, Request and response, Serving base HTML, Serving a directory, Middleware, Create and use middleware, HTTPs module.	9
Unit – V		
5	**Express Framework:** Basics of Express, ExpressJS middleware, Serving static pages, Listing directory contents, Accepting JSON requests and HTML form inputs, Handling cookies, Cookie-based sessions, Compression, Time-out requests, Express response object, Understanding REST, Express application routes, Creating a route object, Parameter-based routing, Express router object.	9
Unit – VI		
6	**Persisting Data:** Introduction to NoSQL and MongoDB, MongoDB _id field, MongoDB document format, Callback hell and promises, Mongoose ODM, CRUD operation using MongoDB.	5

Sr. No.	**Full Stack Development (Practical)**	**Hours**
1	Create a “Hello World” program using ES6 arrow function in react.	2
2	Create a TODO List in React.	6
3	Implement “Hello world” program in Node.js.	2
4	Create a simple web server using the HTTP module in Node.js.	2
5	Create a Node.js program that takes username as input from the user using $_GET method and print welcome greeting using username.	4
6	Write a Node.js program to demonstrate use of various conditional statements.	2
7	Write a Node.js program to demonstrate use of path, fs, os and util module.	4
8	Write a Node.js program to demonstrate use of session management using express.	2
9	Demonstrate CRUD operations using MongoDB/mongoose module in Node.js.	2

10	Create a full-fledged REST API server with Express, Mongo and Mongoose.	4

Text books:

1. Basarat Syed - "Beginning Node.js", 1st Edition, Apress.
2. Robin Wieruch - "The Road to Learn React Your Journey to Master Plain Yet Pragmatic React.js", Zaccheus Entertainment.

Reference books:

1. AzatMardan - "Practical Node.js: Building Real-World Scalable Web Apps", Apress.
2. Kevin Faaborg, Sandro Pasquali - "Mastering Node.js - Second Edition", Packt Publishing.
3. Marc Wandschneider – "Learning Node.js, Second Edition", Addison-Wesley Professional.
4. Alex Banks, Eve Porcello – "Learning React: Functional Web Development with React and Redux", O'Reilly Media, Inc.
5. Mehul Mohan - "Advanced Web Development with React: SSR and PWA with Next.js using React with advanced concepts (English Edition)", BPB Publication.

Course objectives and Course outcomes mapping:

- To provide basic knowledge of React and build powerful, fast, user-friendly and reactive web application: CO1, CO2.
- To demonstrate an understanding of server-side concepts using Node.js: CO3, CO4, C05.
- To give insights of data storage mechanisms with Node.js and MongoDB: CO6.

Course units and Course outcome mapping:

Unit No.	Unit Name	Course outcomes					
		CO1	CO2	CO3	CO4	CO5	CO6
1	Introduction to React and ES6	✓					
2	React Component and Elements		✓				
3	Introduction to Node.js			✓			
4	Node.js HTTP				✓		
5	Express Framework					✓	
6	Persisting Data						✓

Programme outcomes:

PO 1: Engineering knowledge: An ability to apply knowledge of mathematics, science, and engineering.

PO 2: Problem analysis: An ability to identify, formulates, and solves engineering problems.

PO 3: Design/development of solutions: An ability to design a system, component, or process to meet desired needs within realistic constraints.

PO 4: Conduct investigations of complex problems: An ability to use the techniques, skills, and modern engineering tools necessary for solving engineering problems.

PO 5: Modern tool usage: The broad education and understanding of new engineering techniques necessary to solve engineering problems.

PO 6: The engineer and society: Achieve professional success with an understanding and appreciation of ethical behavior, social responsibility, and diversity, both as individuals and in team environments.

PO 7: Environment and sustainability: Articulate a comprehensive world view that integrates diverse approaches to sustainability.

PO 8: Ethics: Identify and demonstrate knowledge of ethical values in non-classroom activities, such as service learning, internships, and field work.

PO 9: Individual and team work: An ability to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO 10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give/receive clear instructions.

PO 11: Project management and finance: An ability to demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO 12: Life-long learning: A recognition of the need for, and an ability to engage in life-long learning.

Programme outcomes and Course outcomes mapping:

Programme Outcomes	Course Outcomes					
	CO1	CO2	CO3	CO4	CO5	CO6
PO1	✓					
PO2						
PO3		✓	✓	✓		
PO4		✓	✓	✓		
PO5		✓	✓	✓	✓	
PO6						
PO7						
PO8						
PO9						
PO10						
PO11		✓	✓	✓	✓	
PO12						✓