SAURASHTRA UNIVERSITY

RAJKOT – INDIA

Accredited Grade A by NAAC (CGPA 3.05)

CURRICULAM

FOR

M. Sc. (IT & CA)

(2 Years Full Time: 4 Semester Programme)

MASTER OF SCIENCE
(Information Technology & Computer Application)

(Semester 1 & 2)

Effective From June – 2022

M.Sc. (IT & CA)
Saurashtra University
Effective from June - 2022
Master of Science (Information Technology & Computer Application)
M.Sc. (IT & CA)
(2 years Full Time: 4 Semester Programme)

Ordinance:

O. M.Sc.(IT & CA) – 1: Candidate seeking admission to the Master of Science (Information Technology & Computer Application) must have a Bachelor's degree of minimum three years duration with 48% or more in the discipline

1. **B. C. A. with 48% or more**
   OR
2. **B. Sc. with 48% or more**
   OR
3. **B. E. with 48% or more**
   OR
4. **B. Com. (With optional Computer Science) with 48% or more**
   OR
5. **B. Pharm. with 48% or more**
   OR
6. **B. Arch. with 48% or more**
   OR
7. **Any graduate with 48% or more and P.G.D.A.C.A. with 48% or more**
   OR
8. **Any graduate with 48% or more and P.G.D.C.A. with 48% or more**

O. M.Sc.(IT & CA) – 2: The duration of the course is full time two academic years. The examination for the Master of Science (Information Technology & Computer Application) course will be conducted under the semester system. For this purpose the academic year is divided into two semesters. No candidate will be allowed to join any other course simultaneously.

O. M.Sc.(IT & CA) – 3: Candidate who have passed an equivalent examination from any other university or examining body and is seeking admission to the M.Sc. (IT & CA) programme shall not be admitted without producing the eligibility certificate from the Saurashtra University.

O. M.Sc.(IT & CA) – 4: No candidate will be admitted to any semester examination for the Master of Science (Information Technology & Computer Application) unless it is certified by the Head of the Department/ Director of institute.
"That candidate has attended the course of study to the satisfaction of the Head of Department/Director of institute)

O. M.Sc.(IT & CA) – 5: Candidate desirous of appearing at any semester examination of the M.Sc.(IT & CA) programme must forward their application in the prescribed form to the Controller of Examination through Head of Department/Director of Institute on or before the date prescribed.

O. M.Sc.(IT & CA) – 6: No candidate will be permitted to reappear at any semester examination, which he/she has already passed.

O. M.Sc.(IT & CA) – 7: To pass the whole M.Sc.(IT & CA) examination, candidate must clear all the four semester examinations within a period of five years from the date of his/her registration, otherwise candidate has to register him/her self again as a fresh candidate and keep attendance and appear and pass all the four semester examinations .

O. M.Sc.(IT & CA) – 8: There shall be an examination at the end of each four semesters to be known as First semester examination, Second semester examination respectively, at which a student shall appear in the portion of papers practical and Project viva-voce if any, for which he has kept the semester in accordance with the regulations in this behalf.
A candidate whose term is not granted for whatsoever reason shall be required to keep attendance for that semester of terms when the relevant papers are actually taught at the institute.

O. M.Sc.(IT & CA) – 9: A candidate will be permitted to go to the next semester, irrespective he/she is failing in any number of subjects.

O. M.Sc.(IT & CA) – 10: No candidate will be allowed to reappear in examination of any subject which he/she has already passed.

Regulations:

R. M.Sc.(IT & CA) – 1: The standard of passing the M.Sc.(IT & CA) degree examination will be as follows: (i) To pass any semester examination for the M.Sc.(IT & CA) degree, a candidate must obtain at least 40% marks in each subject of theory, practical and project viva-voce in university examination. (ii) Those of the successful candidates who obtain less than 50% marks in the aggregate of all the semester together will be awarded as Pass Class, who obtain 50% or more marks in the aggregate of all the semesters taken together will be declared as Second Class and who obtained 60% or more marks in the aggregate of all semesters taken together will be declared as First Class. The successful candidates who obtain 70% or more marks in the aggregate of all the semesters taken together will be declared to have passed the examination in First Class with Distinction. (iii) A candidate failing in any number of subjects, and pass all these subjects in subsequent examination, marks of all the subjects will be carry forwarded for the award of class in the final semester.

R. M.Sc.(IT & CA) – 2: Following is the syllabus

M.Sc. (IT & CA) (Semester – 1)

SR. NO.	SUBJECT	No. of LECT./Lab. PER WEEK	CREDIT
1.	**CS – 01** APPLICATION DEVELOPMENT USING ADVANCE JAVA	5	5
2.	**CS – 02** ADVANCE WEB DEVELOPMENT IN LARAVEL	5	5
3.	**CS – 03** NoSQL DATABASE: MONGODB	5	5
4.	**CS – 04** PRACTICAL - 1 (BASED ON CS-01)	5	5
5.	**CS – 05** PRACTICAL - 2 (BASED ON CS-02 and CS-03)	5	5
6.	**CS – 06** PROJECT DEVELOPMENT (In House)	5	5
Total Credits of Semester – 1			**30**

Note:
1. Total marks of each **theory paper** are 100 (university examination of 70 marks + internal examination of 30 marks).
2. Total marks of each **practical and project-viva** paper are 100. No internal examination of marks in practical and project-viva papers.

CS – 01: APPLICATION DEVELOPMENT USING ADVANCE JAVA

Objectives:
- Learn how to download, setup and configure the Spring Framework
- Explore the Spring Container and Modules
- Understand dependency injection
- Learn aspect oriented programming and how it is used to provide cross cutting concerns
- Understand how Spring deals with transaction management and ORM
- Hibernate: Inheritance mapping collection mapping.
- Understand the HQL.

Pre-Requisites: Students must have strong Java programming skills and exposure to J2EE technology.

Sr. No	Topics	Details	Weightage in %	Approx Lectures
1	**Basics of Spring, Spring with IDE And IOC container**	• What is Spring • Spring Modules • Spring Application • Spring in Myeclipse • Spring in Eclipse	20	12
	Dependency Injection	• Constructor Injection • CI Dependent Object • CI with collection • CI with Map • CI Inheriting Bean • Setter Injection • SI Dependent Object • SI with Collection • SI with Map • CI vs SI • Autowiring • Factory Method		
2	**Spring AOP**	• AOP Terminology • AOP Implementations • Pointcut • Advices		
	Spring JDBC	• JdbcTemplate Example • PreparedStatement • ResultSetExtractor • RowMapper • NamedParameter		

		• SimpleJdbcTemplate		
	Spring with ORM And SpEL	• Spring with Hibernate • Spring with JPA • SpEL Examples • Operators in SpEL • variable in SpEL	20	12
	Spring 3 MVC and Remoting with Spring	• Spring with RMI • Http Invoker • Hessian • Burlap • Spring with JMS		
3	**OXM Frameworks, Spring Java Mail And Web Integration**	• Spring with JAXB • Spring with Xstream • Spring with Castor • Spring with Struts2 • Login and Logout Application	20	12
	Basics of Hibernate And Hibernate with IDE	• Hibernate Introduction • Hibernate Architecture • Understanding First Hibernate application • Hibernate in Eclipse • Hibernate in MyEclipse		
	Hibernate Application And Hibernate Logging	• Hibernate with annotation • Hibernate Web application • Hibernate Generator classes • Hibernate Dialects • Hibernate with Log4j 1 • Hibernate with Log4j 2		
4	**Inheritance Mapping**	• Table Per Hierarchy • Table Per Hierarchy using Annotation • Table Per Concrete • Table Per Concreteusing Annotation • Table Per Subclass • Table Per Subclass using Annotation	20	12
	Collection Mapping	• Mapping List • One-to-many by List using XML • Many to Many by List using XML • One To Many by List using Annotation		

		• Mapping Bag • One-to-many by Bag • Mapping Set • One-to-many by Set • Mapping Map • Many-to-many by Map • Bidirectional • Lazy Collection		
5	**Component Mapping, Association Mapping, Transaction Management, HQL and HCQL**	• One-to-one using Primary Key • One-to-one using Foreign Key	20	12
	Named Query, Hibernate Caching and Integration	• First Level Cache • Second Level Cache • Hibernate and Struts • Hibernate and Spring		
		Total	100	60

References Books
1. Spring and Hibernate - Santosh Kumar K. - Tata McGraw-Hill Publishing 2. Spring persistence with Hibernate - Paul Tepper Fisher and Brian D. Murphy - Apress 3. Spring 4 and Hibernate 4: Agile Java Design and Development McGraw-Hill Education, 2015 4. Pro Spring - Chris Schaefer, Clarence Ho, and Rob Harrop Apress

Course Outcome:
After completion of the course students will be able:
▪ Able to learn how to download, setup and configure the Spring Framework
▪ Able to explore the Spring Container and Modules
▪ Able to understand dependency injection
▪ Able to learn aspect-oriented programming and how it is used to provide cross cutting concerns
▪ Able to Understand how Spring deals with transaction management and ORM
▪ Able to Hibernate: Inheritance mapping collection mapping.
▪ Able to Understand the HQL.

CS-02: Advance Web Development in Laravel

Objectives:
- Understand the Actual Implementation of Object-Oriented Programming with Application.
- Executing the functions in desired manner which is often supported by in-built functions of the framework.
- Creating database structure is smartly built and do not need to re-create or modify DB settings.
- Building ability to produce high-quality and customized applications in quick time.
- Implementing authentication by Bcrypt hashing algorithm for generating an encrypted representation of a password.

Pre-Requisites: Strong background and Knowledge of HTML, CSS, JavaScript and PHP is mandatory.

Sr. No	Topic	Details	Weightage in %	Approx. Lectures

1	Object Oriented Programming in PHP and Bootstrap Basics	■ **The Basics of PHP and Introduction**
		■ **Object Oriented Programming in PHP**
		   ○ Class, Object, Features, Properties, Methods, Constructors, Destructors, Class Constants, Inheritance, Method Overriding, Abstract Class, Interface
		   ○ Access Specifies (public/private/protected), Scope Resolution Operator(::), Static Keyword, Final Keyword
		   ○ Predefined Variables, Exceptions, Autoloading Classes, Anonymous Classes
		   ○ Object Iteration, Magic Methods, Magic Constants, Object Cloning, Comparing Objects, Type Hinting, Late Static Bindings, Objects and References
		● **Bootstrap Basics**
		   ○ **Introduction**: File Structure, Basic HTML Template, Global Styles, Default Grid System, Basic Grid HTML, Offsetting
			20	12

		Columns, Nesting Columns, Container Layouts, Responsive Design, What Is Responsive Design? ○ **Implementation**: Tables, Forms, Buttons, Images, Glyphicons, Pagination, Label, Badges, Typographic Elements, Thumbnails, Alerts.		

2	**Introduction to Laravel, Artisan, Route and Controller**	• What is Laravel, Features, MVC Architecture
		 • **Installation**
		   ○ Basic Requirements for Laravel, Use of Composer, Laravel Install Using Composer, Finding and installing new Packages.
		 • **Configuration**
		   ○ Introduction, Environment Configuration, Protecting Sensitive Configuration, Maintenance Mode, Database Configuration.
		 • **Project Structure**
		   ○ Root Directory structure, App Directory Structure.
		 • **Artisan Console:** Artisan Command Line Tool, Generating Commands, Artisan Migration, Command Structure
		
		 • **Routing in Laravel** : Types of Route files, Route Basics, Route Parameters, Named Routes, Route Groups, Route Model Binding, Rate Limiting, Accessing The Current Route, Routing Controllers, Passing Parameters, Advance Routing
		
		 • **Controllers :** Introduction, Basic Controllers, Using View, Request Parameters, Controller Middleware.
			20	12

3	**Blade Template, Form and Validation**	• **Blade Template** : Introduction, Components & Slots, Displaying Data, Control Structures, Including Sub-Views, Stacks, Service Injection, Extending Blade, Blade Operators • **Forms**: Creating Forms, Adding Labels,	20	12

		Generating Inputs, Generating Buttons, Secret Inputs, CSRF Token, Form Macros • **Validation :** Defining The Routes, Creating The Controller, Writing The Validation Logic, Displaying The Validation Errors, Array Validations, Creating New Validators, Error Messages &Custom Errors • **Available Validators :** Accepted, After(Date), Alpha, AlphaDash, Alpha Numeric, Array, Before(Date), Between, Boolean, Date, DateFormat, Different, Digits, Digits Between, E-Mail, Exists (Database), Image(File), In, Integer, Max, Min, Not In, Numeric, Regular Expression, Required, String Custom Validation Rules.		
4	**Migrations, SQL Interaction and Query Builder**	• **Migrations:** Database Connections, Generating Migrations, Migration Structure, Creating Tables & Columns, Rolling Back Migrations, Column Modifiers, Writing Seeders • **SQL Interaction:** Introduction, Running Raw SQL Queries, Database Transactions • **Query Builder:** Retrieving Results, Chunking Results, Aggregates, Selects, Raw Expressions, Joins, Sub-Query Joins, Where Clauses	20	12
5	**Eloquent ORM and API**	• **Eloquent ORM Models:** Defining Models, Table Name &Primary Keys, Timestamps, Retrieving Models, Inserting, Updating Models & Deleting Models, Relationships, Collections, Mutators • **API Resources:** Introduction, Generating Resources, Writing Resources • **API Authentication:** Passport Tokens	20	12
		Total	100	60

References Books

1. Online Laravel 5.2 Documentation (https://laravel.com/docs/5.2)
2. Laravel 5 Essentials, Martin Bean, Packet Publishing, ISBN 978-1-78528-301-7
3. Bootstrap, Jake Spurlock, O'reilly, ISBN: 978-1-449-34391-0
4. Matula,T,(2013),*Laravel Application Development Cookbook.*Packt Publishing
5. Pecoraro, C. J. *(2015),Mastering Laravel***.**Packt Publishing
6. McCool**,S(**2012), *Laravel Starter.* Packt Publishing.
7. White,L(2015), *Practical Laravel 5: Build a Laravel 5 Application Step by Step.* Apress
8. Bean,M,(2015), *Laravel 5 Essentials*.Packt Publishing.
9. Rees,D(2012), *Laravel: Code Happy*.Packt Publishing
10. HasinH,(2007), *Object-Oriented Programming with PHP5.*Packt Publishing.
11. Malatesta, F,(2015),*Learning Laravel's Eloquent***.** Packt Publishing
12. Pecoraro,C. J. (2015),*Mastering Laravel Book*.Packt Publishing

Course Outcome:

After completion of the course students will be able:

- Able to Learn Laravel Framework at an ease and build their application.
- Able to Implement Customize User Interface.
- Able to perform OOP within PHP and Understand the basic components of an object-oriented program.
- Able to Implement security system in web application
- Able to Design ORM Model using Relational Database Management System, Responsive Design
- Able to meet current modern market requirement and create fruitful products
- Able to Simulate the real-world application with all desired aspects for web application

CS – 03: NoSQL DATABASE: MongoDB

Objectives:
- To develop proficiency in the specification, representation and various other types in MongoDB using PHP.
- To be able to perform various Analytical as well as to increase the programming skills in PHP using MongoDB.
- To get a good understanding regarding various styles in Programming.
- To develop a good base for No-SQL queries.

Pre-Requisites: Knowledge of PHP

Sr. No	Topics	Details	Weightage in %	Approx Lectures
1	**Introduction to NoSQL Database**	• Define NoSQL, its characteristics and history, and the primary benefits for using NoSQL databases. • Define the major types of NoSQL databases including a primary use case and advantages/disadvantages of each type. • Describe the factors affecting return on investment for using locally hosted database vs. database-as-a-service.	20	12
	Introduction to MongoDB	• MongoDB concepts – Databases, collections, and documents • Downloading Installing and running MongoDB, Installing PHP Driver for MongoDB on various OS Platforms • The Data Model and Working with Data		
2	**Learning MongoDB by implementing web Application**	• Inserting documents in MongoDB, Querying documents in collection. • Doing advance queries in MongoDB, Updating documents MongoDB, • Deleting documents in MongoDB, Managing relationships between documents	20	12
	Session Management	• Understanding HTTP sessions. • Understanding PHP native session handling, • Implementing session handling with MongoDB. • Putting Session Manager. • Building user authentication module, creating login, logout and user profile.		
3	**Queries &**	• Querying using find(), sort(), skip(), limit()		

	Aggregation Queries	• Update, Delete, Aggregation • Generating Sample Data. • Understanding MapReduce, • Performing MapReduce in MongoDB and PHP, Aggregation using group() • Listing distinct values for field • counting documents with count()	**20**	**12**
4	**Web Analytics using MongoDB**	• Logging with MongoDB, • Extracting analytics data with MapReduce • Real-time analytics using MongoDB	**20**	**12**
	Using MongoDB with relational Databases	• MongoDB and RDBMS together • Defining the relational model		
5	**Handling Files with GridFS**	• What is Grid? • Storing files in GridFS • Serving files from GridFS • Reading files in chunks	**20**	**12**
	Database Management	• Database Administration • Optimization • Replication • Sharding		
		Total	**100**	**60**

References Books
1. MongoDB the definitive guide - O'Reilly Kristina Chodorow & Michal Dirolf
2. MongoDB in Action - Kyle Banker Manning Sheltar Island.
3. The definitive guide to MongoDB - NoSQL Database for cloud and desktop computing. - Apress - Eelco Plugge, Peter membrey and Tim Hawkins
4. PHP and MongoDB Web Development Beginers guide - Rubayeet Islam - Open Source

Course Outcome:
After completion of the course students will be able:
 ▪ Able to explore and define specification, representation and various other types in MongoDB using PHP.
 ▪ Able to implement concept of Replication and Sharding in MongoDB practically.
 ▪ Able to perform various Analytical as well as to increase the programming skills in PHP using MongoDB.
 ▪ Able to get a good understanding regarding various styles in Programming.
 ▪ Able to execute No-SQL queries.

CS – 04: PRACTICAL - 1 (BASED ON CS-01)	
Topics	**Marks**
APPLICATION DEVELOPMENT USING ADVANCE JAVA	**100**

CS – 05: PRACTICAL - 2 (BASED ON CS-02 and CS-03)	
Topics	**Marks**
• ADVANCE WEB DEVELOPMENT IN Laravel • NoSQL DATABASE: MongoDB	**100**

Note:
• Practical examination may be arranged before or after theory exam.

CS – 06: PROJECT DEVELOPMENT (In House)	Marks: 100
Project must be developed in the computer laboratory of concern institute under the supervision of faculties of concern institute on any subject of current semester. **(At the time of Project-Viva examination student must show Project Report along with all the Workouts in workbook, implementation of project in SDLC, Documentation, Program codes and project in running mode)**	

Note :
• Project must be submitted before two week of commencement of theory exam.
• Project viva examination may be arranged before or after theory exam.
• During the project viva examination project must be run.

M.Sc. (IT & CA) (Semester – 2)

SR. NO.	SUBJECT	No. of LECT./Lab. PER WEEK	CREDIT
1.	**CS – 07** APPLICATOIN DEVELOPMENT USING ADVANCED ANDROID	5	5
2.	**CS – 08** REACT JS & EXPRESS JS	5	5
3.	**CS – 09** CLOUD COMPUTING WITH AWS	5	5
4.	**CS – 10** PRACTICAL - 1 (BASED ON CS-07)	5	5
5.	**CS – 11** PRACTICAL - 2 (BASED ON CS-08 and CS-09)	5	5
6.	**CS – 12** PROJECT DEVELOPMENT (In House)	5	5
Total Credits of Semester – 2			**30**

Note:
1. Total marks of each **theory paper** are 100 (university examination of 70 marks + internal examination of 30 marks).
2. Total marks of each **practical and project-viva** paper are 100. No internal examination of marks in practical and project-viva papers.

		CS – 07: APPLICATOIN DEVELOPMENT USING ADVANCED ANDROID		

Objectives:

- To be able to develop mobile applications using advanced android api based on
- Data storage in external and internal memory and database
- To develop app that supports animation, multimedia, camera, sensor
- To develop app that supports Network, Bluetooth-Wi-Fi
- Developing web service and retrieving data using JSON & xml
- Packaging and distributing android app

Pre-Requisites: OOPS concepts, Programming in core java, Basic Android Programming.

Sr. No	Topics	Details	Weightage in %	Approx Lectures
1	**Basics of Android & UI Design**	• Core building blocks, Android manifest.xml file, Basic UI widgets, Activity, Layout, Intent, Fragments	20	12
	Working with view and adapter	• TextView, EditText, Spinner, DatePicker, TimePicker Dialogs, Material Design, TextInputLayout, Password Toggle, Button, ToggleButton, ImageButton, RadioButton, RadioGroup, Checkbox, AutoCompleteTextView, MultiAutoCompleteTextView, • Views: CardView, RecyclerView, ListView, GridView, ScrollView, WebView, SearchView, TabLayout, DynamicListView, ExpandedListView • Adapters: ArrayAdapter, Simple Cursor Adapter, Base Adapter, • Layout: ConstraintLayout, LinearLayout, TableLayout, FrameLayout, Relative Layout, Custom Layout		
2	**Data Storage, SQLite, Firebase, Content Provider & Notification**	• Shared Preferences • Android File System • Internal storage, External storage • SQLite : Storing data using SQLite, Querying SQLite database, insert-update-delete operations, Persistent database using SQLiteOpenHelper and creating a database • Integration with Realtime Firebase Database • CRUD Operation with Firebase Database	20	12
		• Accessing built in content providers like		

		Read Call Log, Read Contact, Read Images from Memory Card		
		• Searching for content		
		• Adding, changing, and removing content		
		• Creating custom content provider		
		• Sending & Receiving Broadcast		
		• Notifying user, Notifying with status bar		
3	**Multimedia API**	• Wallpapaer, Live Wallpaper, • Audio – Recording audio, Playing audio • Video– Recording video, Playing video • Alarm Manager • Camera - Capturing pictures, configuring camera mode settings, camera parameters, zooming camera.	**20**	**12**
	Device Connectivity	• Bluetooth Tutorial –existence of Bluetooth, enable Bluetooth, discover devices, List Paired Devices, establishing connection between devices. • Working with WiFi		
	Working with Sensor	• Sensor API, • Working with different sensors :Motion Sensor, Position Sensor, Environmental Sensor, • Sensor Values, SensorManager class, Sensor Class, SensorEvent class, SensorEventListener interface, Compass Acceslerometer and Orientation Sensors • Reading sensor data, calibrating sensors, determining device orientation		
4	**Android Web Service**	• Introduction to web service, • Soap Vs Restful web service • Android Restful web service example with java servlet • Storing data into external database • Verifying data in android with external database	**20**	**12**
	JSON & XML Parsing	• XML Parsing SAX • XML Parsing DOM • XML Pull Parser • JSON Parsing • Integrating Social Networking using HTTP		
	WiFi & Bluetooth	• Monitoring and managing Internet connectivity • Managing active connections • Managing WiFi networks		

		• Controlling local Bluetooth device • Discovering and bonding with Bluetooth devices • Managing Bluetooth connections • Communicating with Bluetooth		
5	**Location Based Services and Google Maps**	• Location Based Services - Finding current location and listening for changes in location, Proximity alerts, Working with Google Maps • Showing google map in an Activity • Map Overlays • Itemized overlays • Geocoder • Displaying route on map	**20**	**12**
	Drawing, Animation and Graphics programing	• Drawing on screen – using canvas and paint • Working with bitmap, shapes • 2D Animation - Drawable, View, Property animation		
	Packaging, Deploying and distributing/ selling app	• Signing certificate and generating apk and Bundle • Distributing android app via Google Play • Obfuscating and optimizing with ProGuard		
		Total	**100**	**60**

References Books:
1. Advanced Android Application Development – Joseph Annuzzi, Lauren darcey, Shane Conder – 4th Edition, Addision – Wesley. 2. Android cookbook - Ian F. Darwin Oreilly 3. The Android Developer's CookBook – Building Application with Android SDK – 2nd Edition, Addision – Wesley.

Course Outcome:
After completion of the course students will be able:
- Able to develop mobile applications using advanced android api based on
- Able to use and explore Data storage in external and internal memory and database
- Able to develop android app that supports animation, multimedia, camera, sensor
- Able to develop android app that supports Network, Bluetooth-Wi-Fi
- Able to develop web service and retrieving data using JSON & xml
- Able to deploy and distribute android app on google play.

CS – 08: REACT JS & EXPRESS JS

Objectives:

- Articulate what React is and why it is useful.
- Explore various attributes of web development.
- Explore the basic architecture of a React application.
- Explore various web development techniques of this JavaScript and would learn new techniques based on industry requirement.
- Gain a deep understanding of JSX and Hooks.

Pre-Requisites: Java Script, HTML, CSS and OOPs,

Sr. No	Topics	Details	Weightage in %	Approx Lectures
1.	**Express JS & Java Script**	▪ **Java Script** ▪ Java Script Overview & Basics ▪ Variable, Conditional Statements, Loops in JS, ▪ Functions, Arrays & Events in JS ▪ ES6 Overview & Basics ▪ ES6 Classes, functions & Promises ▪ **Express JS** ▪ Setting up an app with ExpressJS, Routing in ExpressJS, Connecting views with templates, configurations and error handling.	20	12
2	**Introduction to JSX & REACT JS**	▪ **Introduction:** What is ReactJS? Installation or Setup, Hello World Program, Create a first app, folder structure ▪ **Components:** Creating components, Basic components, Nesting components, functional component, class component ▪ **Introduction to JSX:** JSX Programs ▪ **Props:** ReactJS Props, React State, Destructing Props and State, setState, methods as Props.	20	12
3	**Form Handling, components and fragments**	▪ **Event Handling:** Event Handling and Binding event handlers ▪ **Rendering:** Conditional Rendering and List Rendering, List and keys, Index as Key Anti-pattern ▪ **Introduction:** Basic form handling ▪ **Components:** Components Life Cycle Methods, Components Mounting Lifecycle methods, Components Updating Lifecycle methods, Pure Components	20	12

		▪ **Fragments**		
4	Memo, Refs, Props and Context	▪ **Memo** ▪ **Introduction to Refs:** Refs, Refs with Class Components, Forwarding Refs and Portals ▪ **Components:** Higher Order Components ▪ **Props Again!**: Rendering Props and Context ▪ **HTTP:** HTTP and React, GET and React, POST and React.	20	12
5	Introduction to Hooks and its implementation	▪ **Introduction:** React Hooks introduction, useState Hook, useState Previous state, useState with object, useState with array. ▪ **useEffect:** useEffect Hook, useEffect after render, Condionally run effects, run effects only once, useEffect with cleanup, useEffect with incorrect dependency. ▪ **Fetching data:** Fetching data with useEffect, useContext Hook ▪ **useReducer Hook:** useReducer – simple state and action, complex state and action, multiple useReducers ▪ **useContext:** useContext, useReducer, Fetching data with useReduer, useState vs useReducer	20	12
		Total	100	60

References Books
1. Learning React, Martin Bean, Kirupa Chinnathambi Pearson Addison Wesley
2. ReactJS Notes for Professional, GoalKicker, Website ebook,
3. The Road to React_ Your journey to master plain yet pragmatic React, LeanPub Book, Robin Wieruch -Independently Published (2020)
4. Codevolution. "ReactJS Tutorial for Beginners." YouTube, YouTube, www.youtube.com/playlist?list=PLC3y8-rFHvwgg3vaYJgHGnModB54rxOk3.

Course Outcomes:

After completion of the course students will be able:

- ✓ Able to Understand the Actual Implementation of Object-Oriented Programming with Application.
- ✓ Able to Understand the use of JavaScript and various React Applications
- ✓ Able to Compute the various attributes of ReactJs Web applications
- ✓ Able to Remembering the components and syntax of ReactJS.
- ✓ Able to Construct a model to prepare a Single Page Applications
- ✓ Able to Implementing various logics and packages to ReactJS for generating the web applications.
- ✓ Able to Implementing the ReactJS with Hooks for web applications.

CS – 09: CLOUD COMPUTING WITH AWS

Objectives:

- Understand the architecture and infrastructure of cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud, hybrid cloud, various management and other distinguish services of AWS.

- Explore the fundamental concepts in datacenters to understand the trade-offs in power, efficiency and cost by the Load balancing approach and instances.

- Understand fundamental concepts of cloud storage and demonstrate their use in storage systems such as Amazon S3 and Database.

- Analyze various clouds Service models and apply them to solve problems on the cloud.

- Deploy applications over commercial cloud computing infrastructures such as AWS.

Pre-Requisites: Computer Networks, Operating Systems

Sr. No	Topics	Details	Weightage in %	Approx Lectures
1	**Introduction of Cloud & Amazon Web Service**	Introduction of cloud computing, how it works Types of cloud, what is Virtualization, Advantages of Cloud, AWS history, Dashboard, AWS Overview, Architecture	20	12
	Cloud Service Models	Software as a Service (SaaS): Introduction, Challenges in SaaS models: Model, SaaS Integration Services, Advantages and Disadvantages, Infrastructure As a Services (IaaS): Introduction, Virtual Machines, VM Migration Services, Advantages and Disadvantages. Platform As a service (PaaS): Introduction, Integration of Private, and Public Cloud, Advantages and Disadvantages.		
2	**Identity & Access Management**	IAM Overview and Policies, IAM Users, Groups, Access Key & Secret Access Key, MFA, Report	20	12
	Elastic Cloud Computing (EC2)	Amazon EC2 Overview, Elastic Block Storage (EBS),		

3	**Virtual Private Cloud (VPC)**	Amazon Machine Image (AMI), Instance Purchasing Options, Introduction to EC2 Instance Types Security Group Elastic, Public & private IP Overview, Amazon EBS & Snapshot, AWS CLI, Bootstrap Script, Elastic Load Balancing (ELB), Auto Scaling Amazon Virtual Private Cloud (VPC), Amazon VPC and Subnets, Route Table, Internet Gateway	20	12
	Amazon Simple Storage Service (S3)	Simple Storage Service (S3), S3 Object Storage and Buckets, Security on bucket, Web Hosting, Logging & event, Glacier, Versioning & Lifecycle Policy, Cross region replication		
4	**Route 53**	DNS Records, Website Hosting, Routing Policy, Health Check	20	12
	Databases	Relation Database System, DB engine & Instance details, Security, Parameter group, Monitoring Resourcing, DynamoDB, Elasticache		
5	**CloudWatch & Monitoring**	Cloud Watch, Matrices, Alarm & notification, Log & billing Monitoring Other AWS monitoring	20	12
	Case Study on Open Source & Commercial Clouds	• Eucalyptus • Microsoft Azure • Amazon EC2		
		Total	100	60

Reference Books
1. Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010
2. Cloud Computing: Principles and Paradigms, Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wile, 2011
3. Judith Hurwitz, R Bloor, M.Kanfman, F.Halper "Cloud Computing for Dummies", Wiley India Edition, First Edition
4. Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, "Cloud Computing: Principles and Paradigms", Wiley Publication,2011

5.   Tim Mather, SubraKumara swamy, Shahed Latif, "Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance", O'ReillyMedia Inc, 2009
6.   Mickey Iqbal 2010, " IT Virtualization Best Practices: A Lean, Green Virtualized Data Center Approach", MC Press
7.   Frank H. P. Fitzek, Marcos D. Katz, "Mobile Clouds: Exploiting Distributed Resources in Wireless, Mobile and Social Networks", Wiley Publications, ISBN: 978-0-470-97389-9, Jan 2014.

8.   Cloud Computing: Principles, Systems and Applications, Editors: Nikos Antonopoulos, Lee Gillam, Springer, 2012
9.   Cloud Security: A Comprehensive Guide to Secure Cloud Computing, Ronald L. Krutz, Russell Dean Vines, Wiley-India, 2010
10. George Reese – Cloud Application Architectures: Building Applications and Infrastructures in the cloud – O'Reilly Media Inc., 2009
11. Anthony T. Velte, Toby J. Velte, Robert Elsenpeter – Cloud Computing A practical Approach – McGraw Hill, 2010

Course Outcome:
After completion of the course students will be able:
  ▪ Able to Understand the architecture and infrastructure of cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud, hybrid cloud, various management and other distinguish services of AWS.
  ▪ Able to Apply the fundamental concepts in datacenters to understand the trade-offs in power, efficiency and cost by the Load balancing approach and instances.
  ▪ Able to Illustrate the fundamental concepts of cloud storage and demonstrate their use in storage systems such as Amazon S3 and Database.
  ▪ Able to Analyze various clouds Service models and apply them to solve problems on the cloud
  ▪ Able to deploy applications over commercial cloud computing infrastructures such as AWS.

CS – 10: PRACTICAL - 1 (BASED ON CS-07)	
Topics	**Marks**
APPLICATOIN DEVELOPMENT USING ADVANCED ANDROID	**100**

CS – 11: PRACTICAL - 2 (BASED ON CS-08 and CS-09)	
Topics	**Marks**
• REACT JS & EXPRESS JS • CLOUD COMPUTING WITH AWS	**100**

Note:
● Practical examination may be arranged before or after theory exam.

CS – 12: PROJECT DEVELOPMENT (In House)	Marks: 100
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 Project Report along with all the Workouts in workbook, implementation of project in SDLC, Documentation, Program codes and project in running mode)**	

Note :
• Project must be submitted before two week of commencement of theory exam.
• Project viva examination may be arranged before or after theory exam.
• During the project viva examination project must be run.