## 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 |||||
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**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, <br>• Views: CardView, RecyclerView, ListView, GridView, ScrollView, WebView, SearchView, TabLayout, DynamicListView, ExpandedListView <br>• Adapters: ArrayAdapter, Simple Cursor Adapter, Base Adapter, <br>• Layout: ConstraintLayout, LinearLayout, TableLayout, FrameLayout, Relative Layout, Custom Layout | | |
| 2 | **Data Storage, SQLite, Firebase, Content Provider & Notification** | • Shared Preferences <br>• Android File System <br>• Internal storage, External storage <br>• SQLite : Storing data using SQLite, Querying SQLite database, insert-update-delete operations, Persistent database using SQLiteOpenHelper and creating a database <br>• Integration with Realtime Firebase Database <br>• CRUD Operation with Firebase Database <br>• Accessing built in content providers like | 20 | 12 |

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|---|---|---|---|---|
| | | 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, | **20** | **12** |
| | | • Audio – Recording audio, Playing audio | | |
| | | • Video– Recording video, Playing video | | |
| | | • Alarm Manager | | |
| | | • Camera - Capturing pictures, configuring camera mode settings, camera parameters, zooming camera. | | |
| | **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, | **20** | **12** |
| | | • 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 | | |
| | **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 | | |

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|---|---|---|---|---|
| | | • Controlling local Bluetooth device<br>• Discovering and bonding with Bluetooth devices<br>• Managing Bluetooth connections<br>• 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<br>• Showing google map in an Activity<br>• Map Overlays<br>• Itemized overlays<br>• Geocoder<br>• Displaying route on map | **20** | **12** |
| | **Drawing, Animation and Graphics programing** | • Drawing on screen – using canvas and paint<br>• Working with bitmap, shapes<br>• 2D Animation  - Drawable, View, Property animation | | |
| | **Packaging, Deploying and distributing/ selling app** | • Signing certificate and generating apk and Bundle<br>• Distributing android app via Google Play<br>• 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.<br>2.  Android cookbook  - Ian F. Darwin Oreilly<br>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**<br>Java Script Overview & Basics<br>Variable, Conditional Statements, Loops in JS,<br>Functions, Arrays & Events in JS<br>ES6 Overview & Basics<br>ES6 Classes, functions & Promises<br>**Express JS**<br>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<br>**Components:** Creating components, Basic components, Nesting components, functional component, class component<br>**Introduction to JSX:** JSX Programs<br>**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<br>**Rendering:** Conditional Rendering and List Rendering, List and keys, Index as Key Anti-pattern<br>**Introduction:** Basic form handling<br>**Components:** Components Life Cycle Methods, Components Mounting Lifecycle methods, Components Updating Lifecycle methods, Pure Components | 20 | 12 |

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| | | ▪ **Fragments** | | |
| 4 | Memo, Refs, Props and Context | ▪ **Memo**<br>▪ **Introduction to Refs:** Refs, Refs with Class Components, Forwarding Refs and Portals<br>▪ **Components:** Higher Order Components<br>▪ **Props Again!**: Rendering Props and Context<br>▪ **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.<br><br>▪ **useEffect:** useEffect Hook, useEffect after render, Condionally run effects, run effects only once, useEffect with cleanup, useEffect with incorrect dependency.<br><br>▪ **Fetching data:** Fetching data with useEffect, useContext Hook<br><br>▪ **useReducer Hook:** useReducer – simple state and action, complex state and action, multiple useReducers<br><br>▪ **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), | | |

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|---|---|---|---|---|
| 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<br><br>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<br>Other AWS monitoring | 20 | 12 |
| | **Case Study on Open Source & Commercial Clouds** | • Eucalyptus<br>• Microsoft Azure<br>• 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) | |
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| **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<br>• 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.